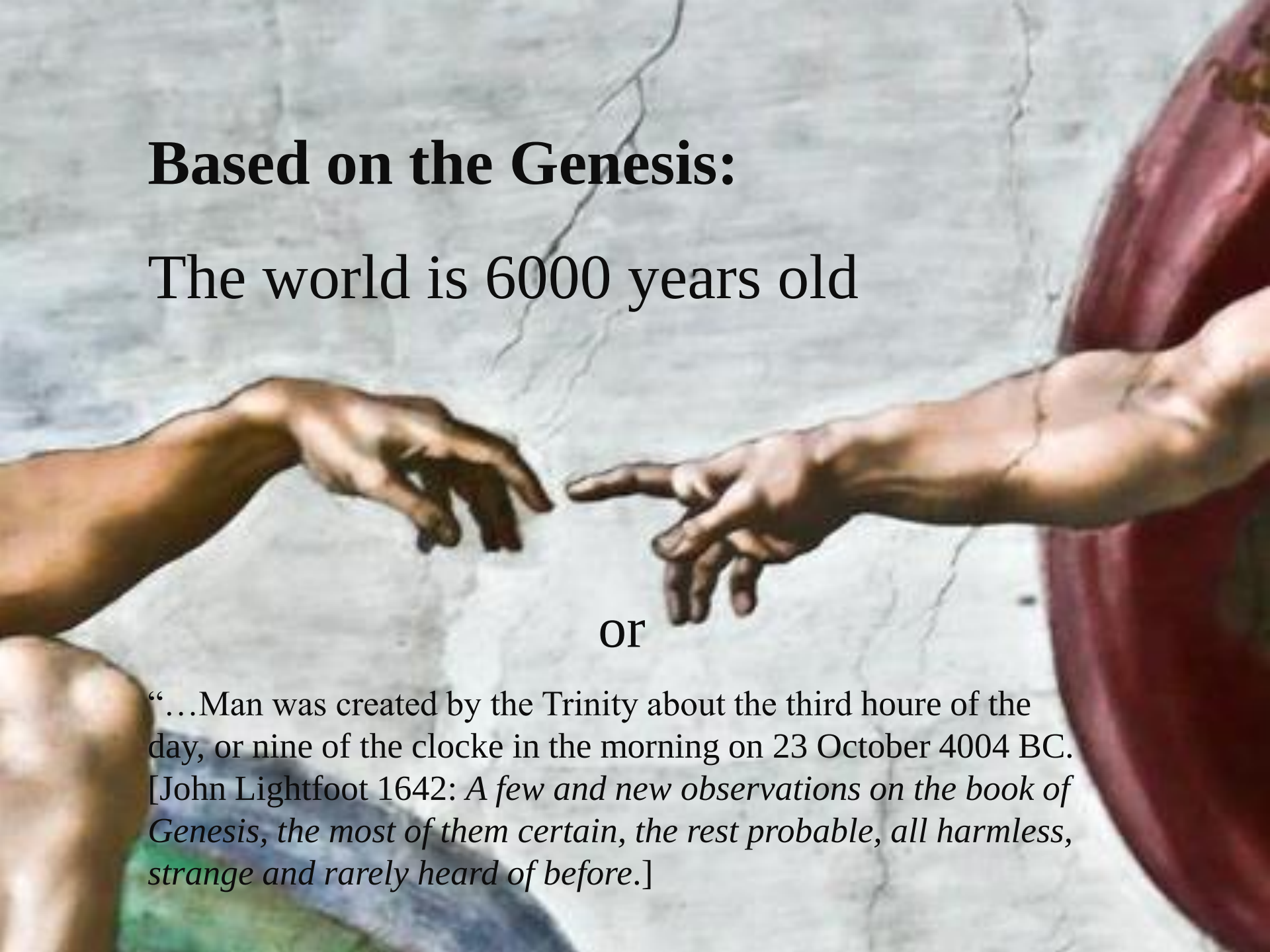
PHILIPPINE CHRONOLOGY

Attempting a Chronostratigraphy for Philippine Archaeology

Alfred Pawlik – UP ASP



Based on the Genesis:

The world is 6000 years old

or

"…Man was created by the Trinity about the third houre of the day, or nine of the clocke in the morning on 23 October 4004 BC. [John Lightfoot 1642: *A few and new observations on the book of Genesis, the most of them certain, the rest probable, all harmless, strange and rarely heard of before*.]

DATING OUR HISTORY

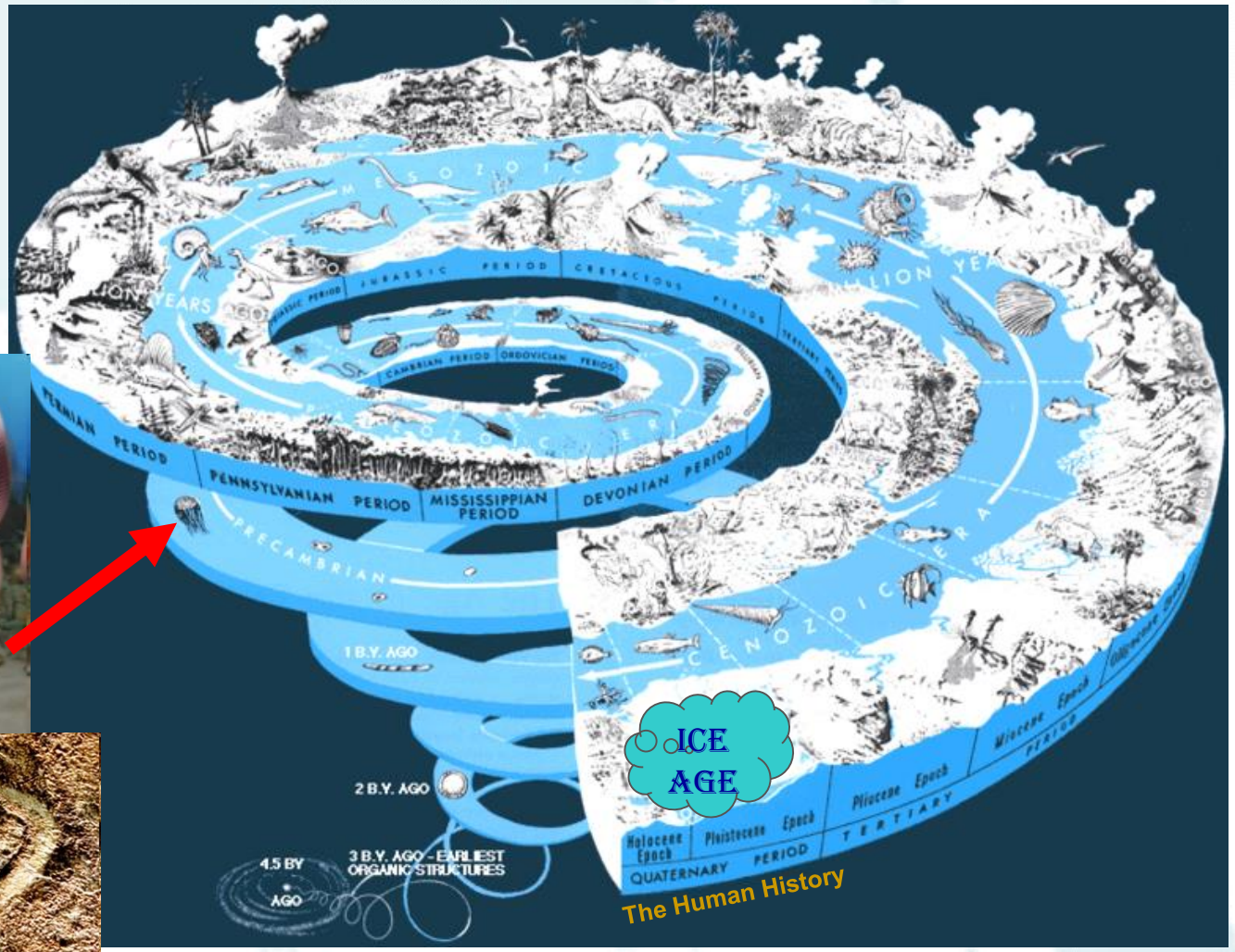
- James Ussher, 'Archbishop of Ireland and Primate of All Ireland'

- Chronological study based on the Julian Calendar to establish the time and date of:

- "The entrance of the night preceding the 23rd day of October... the year before Christ 4004"; that is, around 6 pm on 22 October 4004 BC

James Ussher,
(1581-1656)

MEANWHILE...

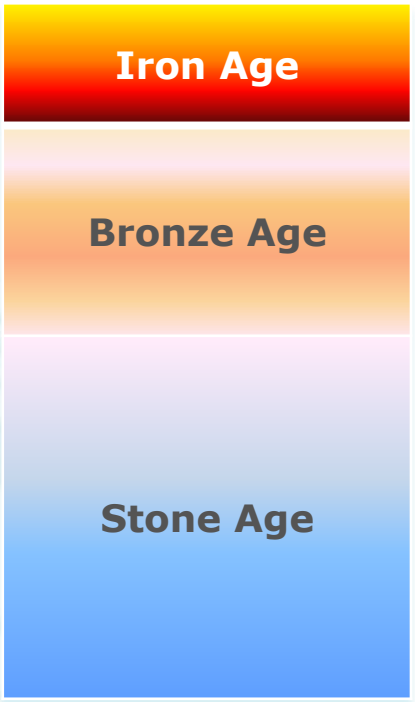


Ediacara fauna: The „Dawn of Animal Life“ (600 ma-542 mya)

CLASSIC CHRONOLOGICAL FRAMEWORKS

- Christian Thomsen: Three Age System
- Arranged the collections of the Danish National Museum
- Established a chronology of the "Dark Age"

Christian Thomsen (1836)

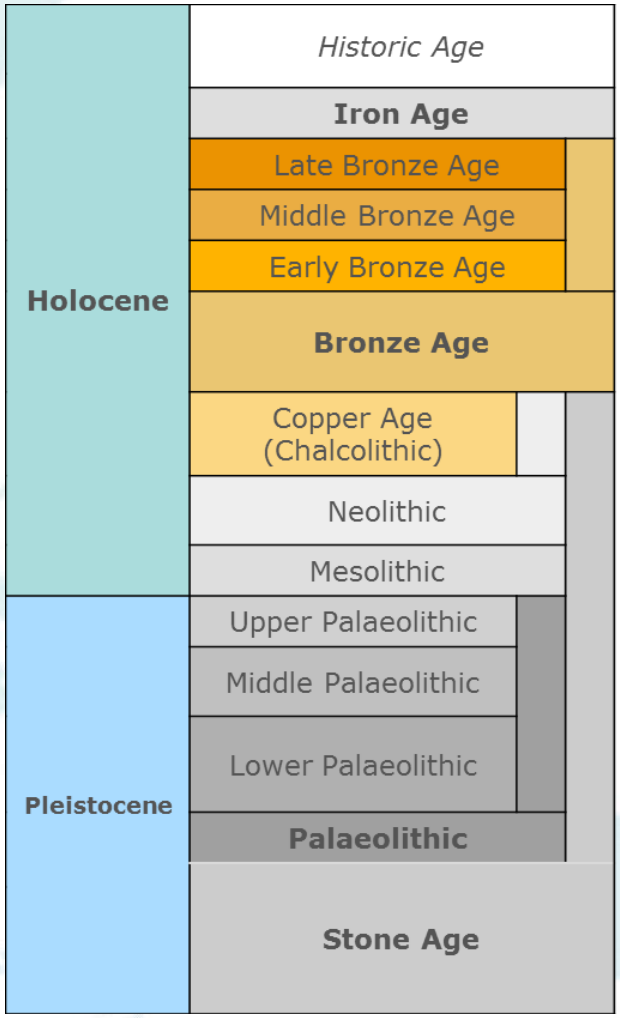


CLASSIC CHRONOLOGICAL FRAMEWORKS

Refinement of the Three Age System in the second half of the 19th Century

- Stone Age divided into Palaeolithic and Neolithic by John Lubbock 1865
- Period of chipped stone (Palaeolithic)
- Period of ground stone (Neolithic)

John Lubbock



CLASSIC CHRONOLOGICAL FRAMEWORKS

Refinement of the Three Age System in the second half of the 19th Century

- Gabriel de Mortillet (1821-1898)
- Typology: Chronology of the Palaeolithic based on characteristic type forms within lithic assemblages.
- Each period ('culture') is named after its type locality (1872):
- Period of Saint-Acheul or Acheuleén
- Period of Moustier or Mousterién
- Period of Solutré or Solutreén

Gabriel de Mortillet

CLASSIC CHRONOLOGICAL FRAMEWORKS

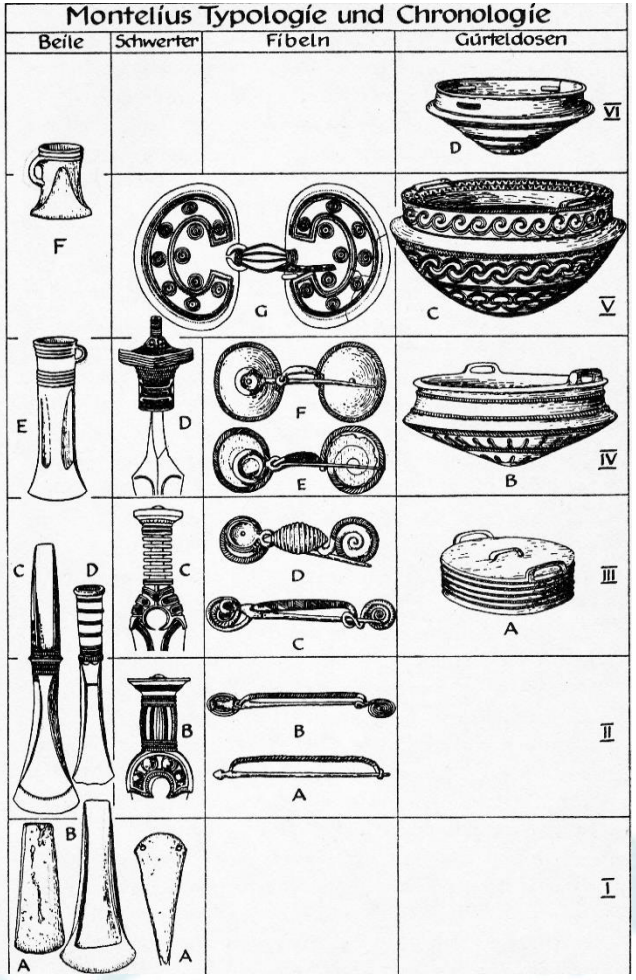
Refinement of the Three Age System
in the second half of the 19th Century

- Oskar Montelius
- 'Die Methode' (1901):

  "*Relative Chronology tells us if an object is younger or older than another object*".

Oskar Montelius

- Typology as a tool for Relative Dating



TYPOLOGY DILEMMA OF LITHIC MATERIALS

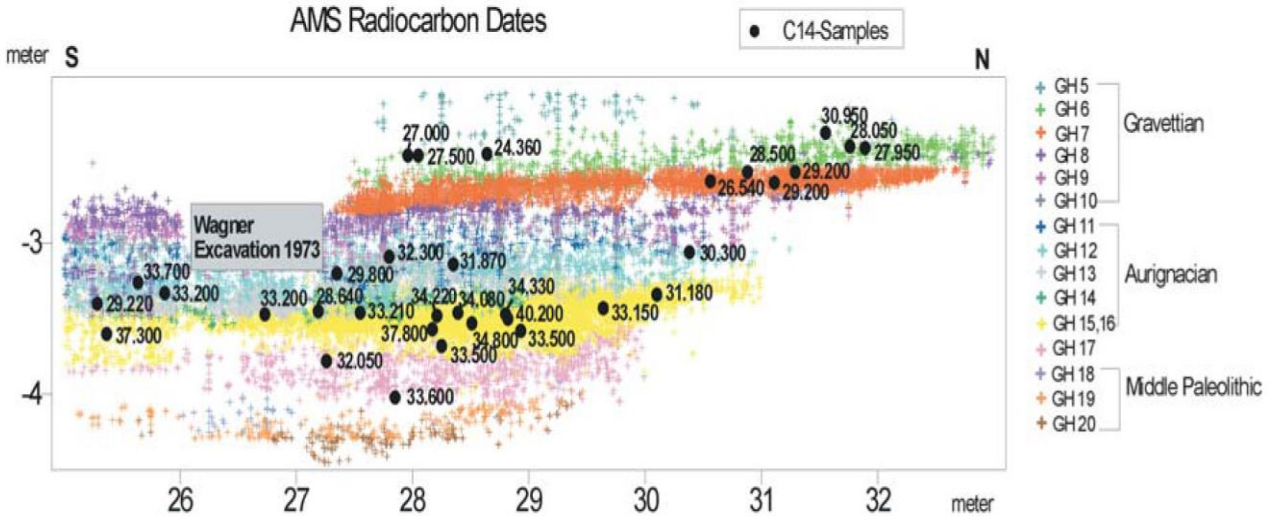
Chronological sequences in prehistoric archaeology are generally based on cultural materials, chiefly stone tools. In the Philippines, however:

- Lack of characteristic, recurring type tool forms until the Neolithic
- No advanced core technology (e.g. Levallois, blade cores, etc.)
- Mode 1 and rarely Mode 2 artefacts in open sites.
- No secure stratigraphic context so far. Although a new biostratigraphic record in continuous Pleistocene sediments from northern Luzon might provide an initial timeline.
- 'Simple and unsophisticated' tool technology found in cave sites since the upper Pleistocene, mostly small-sized flakes used without further modification
- Traditional Typology-based models seem not applicable.

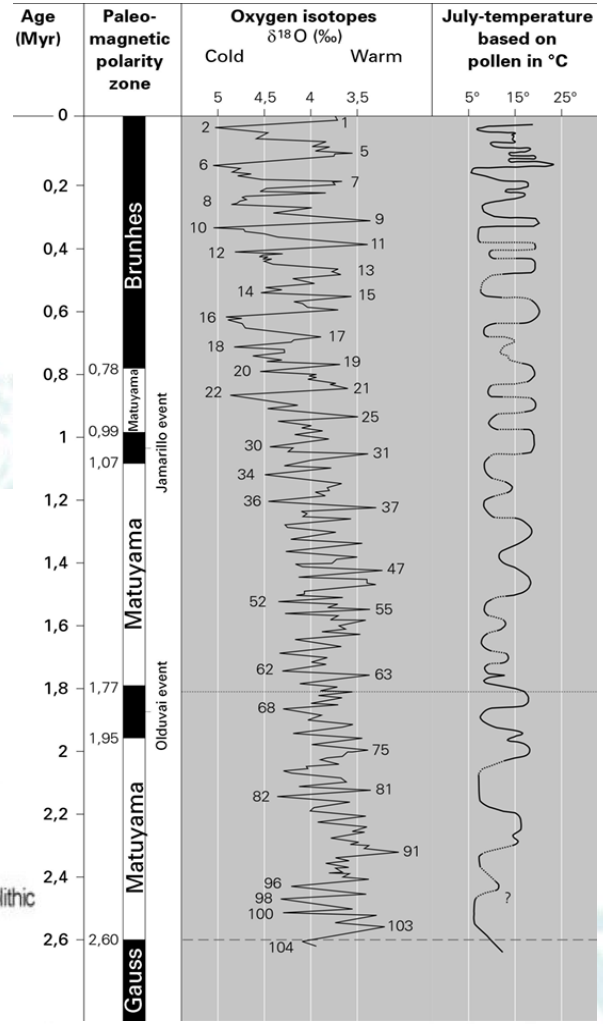
CURRENT CHRONOLOGICAL FRAMEWORKS

Interdisciplinary Approach:

- Geochronology
- Climate and environmental proxies
- Stratigraphic and contextual field methods
- Absolute dates through radiometric methods



Chronostratigraphy of Geißenklösterle Cave (Conard et al. 2004)



GEOCHRONOLOGICAL CONTEXT

International Commission on Stratigraphy (ICS-IUGS)

Quaternary epochs defined by *Global Boundary Stratotype Sections and Points* (GSSP)*

- Pleistocene 2.58ma – 11.7ka BP
- Lower/Middle Pleistocene boundary at 0.77ma BP
- Middle/Upper Pleistocene boundary at 126ka BP
- Pleistocene/Holocene Boundary defined by NGRIP2 core at 1492.45m depth (IUGS 2008)
  This boundary is connected to the sharp rise of $\delta^{18}O$ within 1-3 years from glacial to interglacial values. Indicates a rapid temperature increase at the end of the Younger Dryas at 11.7ka BP

*Gibbard et al. and the Subcommission on Quaternary Stratigraphy. **2010**. Formal ratification of the Quaternary System/Period and the Pleistocene Series/Epoch with a base at 2.58 Ma. Journal of Quaternary Science 25: 96–102.

GEOCHRONOLOGICAL CONTEXT

Holocene usually subdivided by regional climate stages

Time (cal BP)	Europe/N-America
11700	Younger Dryas ends
11700 – 10600	Preboreal
10600 – 9200	Boreal
9200 – 5650	Atlantic
5650 - 2400	Subboreal
2400 -present	Subatlantic

Two *Global Boundary Stratotype Section and Points**:

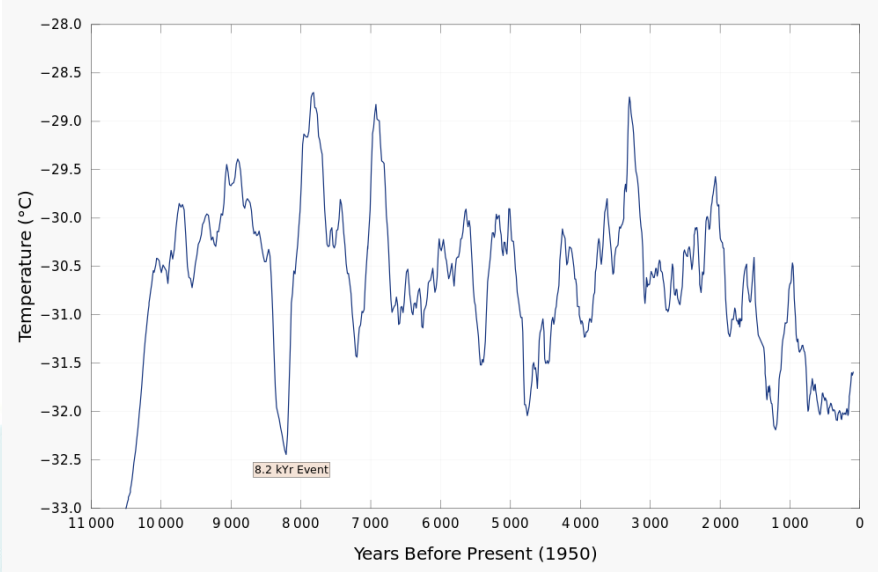
1. Early/Mid Holocene boundary at 8200 BP (8.2 Event)
2. Mid/Late Holocene boundary at 4200 BP (4.2 Event)

*Walker et al. 2012. Formal subdivision of the Holocene Series/Epoch. Journal of Quaternary Science 27: 649–659

THE 8.2ka EVENT*

Selected published proxy records

Sudden decrease in global temperatures. Grey bar marks the approximate duration of the climatic anomaly associated with the 8.2ka event



Zoller, H. (1960): "Misox oscillation", pollen record of Valle Mesolcina, CH
https://commons.wikimedia.org/w/index.php?curid=13309952

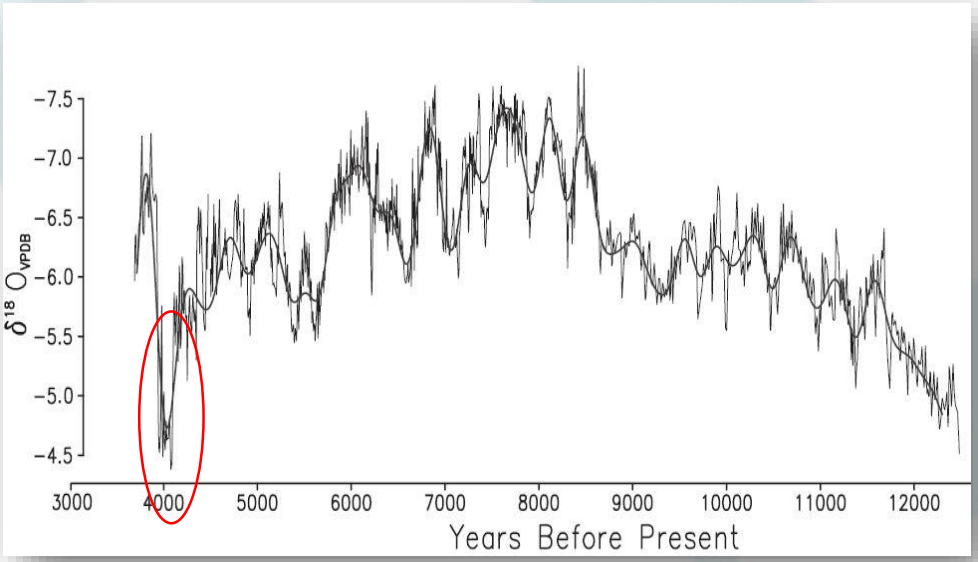
*Walker et al. (2012). Formal subdivision of the Holocene Series/Epoch. Journal of Quaternary Science 27: 649–659

THE 4.2ka EVENT

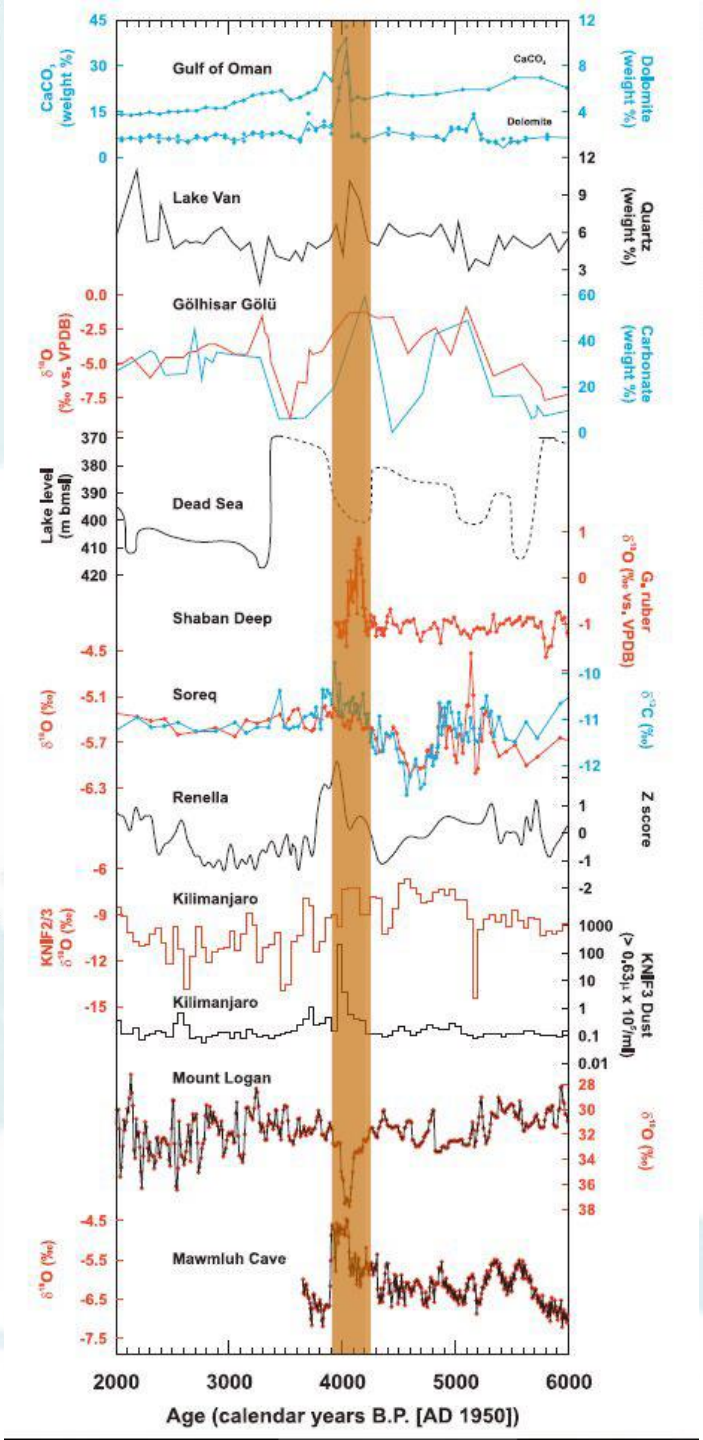
Selected published proxy records:

Orange bar marks the likely onset and termination of the 4.2 anomaly

Indicates a sharp drop in temperature (and a sharp rise after its end)



The Mawmluh Cave d^{18}O record, showing the GSSP of the 4.2 event as clear isotopic signal (NE-India; Berkelhammer et al., 2012)



THE 4.2ka EVENT and its climatic effects

- Marine and terrestrial proxy indicators in Australasia and S-America suggest a major climatic transition after 5.0 ka BP (McGlone et al., 1992)
- Marked cooling of southern ocean waters at c. 4.3 ka BP (Moros et al., 2009)
- Widespread and severe drought conditions are evident around 4.2 ka BP in pollen, diatom and testate amoebae assemblages, cave speleothem stable isotopes and dune systems (Weiss 2012)
- Pollen evidence from the tropical northeast Australia suggests the onset of an ENSO-dominated climatic régime at c. 4.0 ka BP (Schulmeister & Lees, 1995)
- Onset of much colder conditions at c. 4.0 ka BP (Mischke & Zhang, 2010)
- In China, the 4.2 event is also marked by drought and, paradoxically, by extreme flooding (Huang et al., 2011)
- In Taiwan, an increase in palaeoprecipitation, reflecting a strengthening of the East Asia summer monsoon, happened about 4.2 ka BP (Yang et al., 2011).

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

1. PALAEOLITHIC

- TIME: Pleistocene to mid/late Holocene boundary (*c.* 4200 cal. BP),
- MATERIAL CULTURE: Flaked lithic artefacts, shell artefacts in coastal sites, no pottery
- SUBSISTENCE: Hunting and gathering (foraging) of terrestrial and marine resources

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

1. PALAEOLITHIC

a) LOWER PALAEOLITHIC: Currently appearing only in open sites (e.g. Arubo, Espinosa, Huluga).

Assemblages contain larger flake cores and core tools ("Mode 1"), rarely with "Mode 2", i.e. unifacial and bifacial tools.

A direct association of potentially early Palaeolithic sites in the Philippines with its extinct Pleistocene megafauna (Kalinga, Cagayan) still needs to be verified as well as absolute dates obtained.

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

1. PALAEOLITHIC

a) LOWER PALAEOLITHIC: A formal similarity can be established with lithic artefacts from lower Palaeolithic sites in the Region:

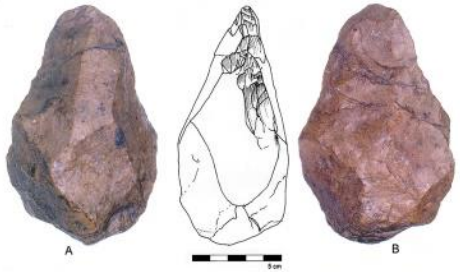
South China, e.g. Bose Basin (0.8ma BP)

Thailand, e.g. Lampang (E/MPL)

Central Vietnam, e.g. Roc Tung (0.7-0.9ma BP)

Indonesia, e.g. Sangiran (>1ma BP) and

Soa Basin sites on Flores (0.8-1ma BP)



Arubo, Central Luzon (Pawlik 2002)


Fengshudao, Bose Basin (Wang et al. 2014)


Roc Tung, Central Vietnam (Derevianko 2016)

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

1. PALAEOLITHIC

b) UPPER PALAEOLITHIC:

Dominantly small flake production. Core tools are generally absent.

Most flakes remained unmodified. Limited secondary modification observed.

Seemingly unchanged production technology. No formality, no typological method applicable.

Osseous artefacts appear.

Various burial practices in the later period, e.g. flexed, cremation; no or few grave goods

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

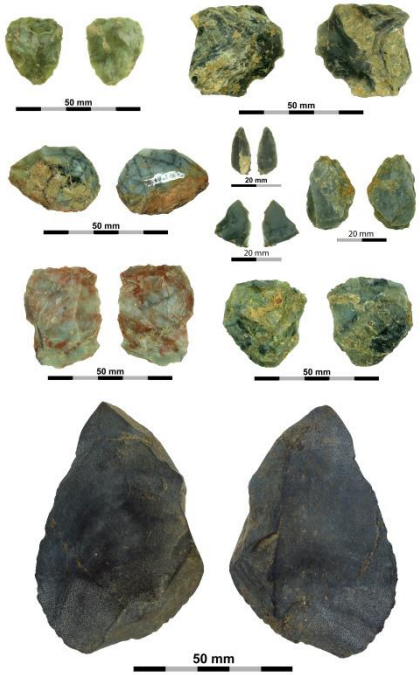
1. PALAEOLITHIC

b) UPPER PALAEOLITHIC:

Lack of Typology as tool for relative chronological classification currently prevents the establishing of a detailed chronological sequence. No clear association with Hoabinhian traditions in the mainland (e.g. no Sumatraliths, edge ground tools, short axes). Lithic assemblages associated with stratified contexts in caves and rockshelters.

14C dates start at c. 35-30ka cal. BP (Tabon, Callao, Bubog 1).

Less secure U-series dates might suggest as early as c. 50ka BP.



Ille Cave, c. 14-12ka BP

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

1. PALAEOLITHIC

c) EPI-PALAEOLITHIC:

Time: Late Holocene (after c. 4200 cal BP)

Material culture: Flaked lithic artefacts, shell artefacts in coastal sites, pottery

Subsistence: Hunting and gathering (foraging) of terrestrial and marine resources

Continuation of foraging as main subsistence strategy during a time when immigrant farming societies were already established the Philippines. Largely unchanged behavior although contacts and material exchange with the new migrants and/or adoption of their cultural traits is visible through the material culture.

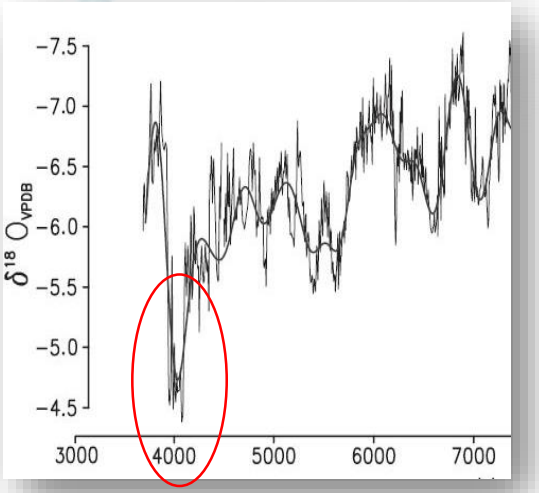
A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

2. NEOLITHIC

- TIME: Late Holocene (after c. 4200 cal. BP)
- MATERIAL CULTURE: Ground adzes, pottery, wide range of ornamental items, imported objects and raw materials
- SUBSISTENCE: Dominantly farming, evidence for plant cultivation and animal domestication. Introduction of new species.
- Arrival of the first Austronesian speaking groups coincides with the climate anomaly and drastic cooling associated with the 4.2 Event
- Direct date on *Sus scrofa* P_4 from Nagsabaran: 4447-4280 cal. BP. Earliest known introduction of domestic pig (Piper et al. 2009)

THE 4.2ka EVENT

POTENTIAL EFFECTS ON HUMAN COMMUNITIES



- Cultural upheaval in north Africa, the Middle East and Asia
- The collapse of the Akkadian Empire around 4.2 ka BP has been linked to sudden aridification (Weiss et al., 1993)
- In Egypt, the Old Kingdom seems to have collapsed following a series of exceptionally low Nile floods at about 4.1 ka BP (Stanley et al., 2003)
- In China, drought conditions during the late fifth millennium BP may have caused the demise of a number of Neolithic cultures (Stanley et al., 1999; Wu & Liu, 2004; Gao et al., 2007; Liu et al., 2010)
- In the Yangtze and Yellow River basins, there is a marked decline in the number of recorded archaeological sites from c. 4.2 ka BP onwards (Liu & Feng, 2012)
- Potential trigger of the Austronesian Diaspora

METAL AGE OF THE PHILIPPINES

2840 ± 80

UCLA-992A. Manunggul cave, Palawan **890 B.C.**

Charcoal from Manunggul cave, Quezon, Palawan, Philippines (9° 20′ N Lat, 117° 45′ E Long), from Chamber A, subsurface. Nat. Mus. catalogue 1964-M-86. Associated with Early Iron-age with Sa-Huy'nh funerary pottery.

2660 ± 80

UCLA-922B. Manunggul cave, Palawan **710 B.C.**

Charcoal from same location as UCLA-992A. Nat. Mus. catalog 1964-M-48, 49, 57. Should be similar age as above.

2140 ± 100

UCLA-992C. Manunggul cave, Palawan **190 B.C.**

Charcoal from same cave, but Chamber B, surface and sub-surface. Nat. Mus. catalog 1964-M-136, 137. Associated with jar burial assemblage with iron.

5680 ± 80

UCLA-994. Duyong cave, Palawan **3730 B.C.**

Charcoal from Duyong cave, Iwaig, Palawan, Philippines (9° 20′ N Lat, 118° 5′ E Long). Square II, depth 30 cm. Associated with jar burial assemblage with pottery of Sa-Huy'nh tradition.

Quality Problem !

Attempt to merge absolute dates with relative periodization was affected by problems of context interpretation and association as well as sample quality

Spriggs 1989: Chronometric hygiene necessary! Several dates for the Neolithic that are too early raise questions on quality and the context

METAL AGE OF THE PHILIPPINES

How to securely distinguish Bronze Age from Iron Age?

- Beyer (1947): Beginning of the Iron Age about 250-200 BC, similar to mainland SE-Asian chronology
- Fox in Berger & Libby (1966): Charcoal samples from Manunggul Chamber A associated with Early Iron Age and Sa-Huy'nh pottery. 14C dated to 2840± 80 and 2660 ± 80 BP (3168-2777 cal. BP and 2961-2493 cal. BP).
- Fox (1970): Manunggul Chamber B: Iron artefacts associated with earliest 14C date: 2140±100 BP or 2344-1921 cal. BP
- Fox's initial periodization based on context association and the returned 14C dates from UCLA did not match
- Fox (1970): Manunggul Chamber A and Spirit Boat Jar revised to Late Neolithic. Positioned the beginning of the Early Metal Age immediately after
- Fox (1970) rejected the recognition of a "Bronze Age" as too brief period

METAL AGE OF THE PHILIPPINES

However:

- Fox (1970): *Ling-ling-o* diagnostic ornament of the Early Metal Age in Palawan (Tabon, Duyong and Uyaw).
- Fox (1970): Early Metal Age burial sites contain bronze and/or copper implements and stone tools. General absence of iron objects
- Fox's classification of Early Metal Age and Late Metal Age uses the same criteria as for Bronze Age and Iron Age. Merely a replacement of terms
- Although several studies on the related material culture for the Philippines appeared since, majority of researchers still uses the term "Metal Age"
- Remaining problem: Reference sites are mostly associated with antiquated 14C dates, 'bad' dates or have no dates at all. No direct dates available
- Ch. Higham et al. (2011): The Origins of the Bronze Age of Southeast Asia. Large set of AMS ^{14}C dates and Bayesian modelling for several sites in Thailand indicate that bronze metallurgy reached Southeast Asia in the late 2nd millennium BC. *Ban Non Wat*: Transition into the Bronze Age at c. 1200 cal. BC

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

3. BRONZE AGE

- TIME: After c. 3000 cal. BP
- MATERIAL CULTURE: Addition of items made of copper and copper alloys to the Neolithic material culture. Appearance of *Lingling-o* and other ornamental objects, shell and stone beads
- Subsistence: Continuation of the Neolithic and further development of agricultural production
- Continuation of jar burial practices

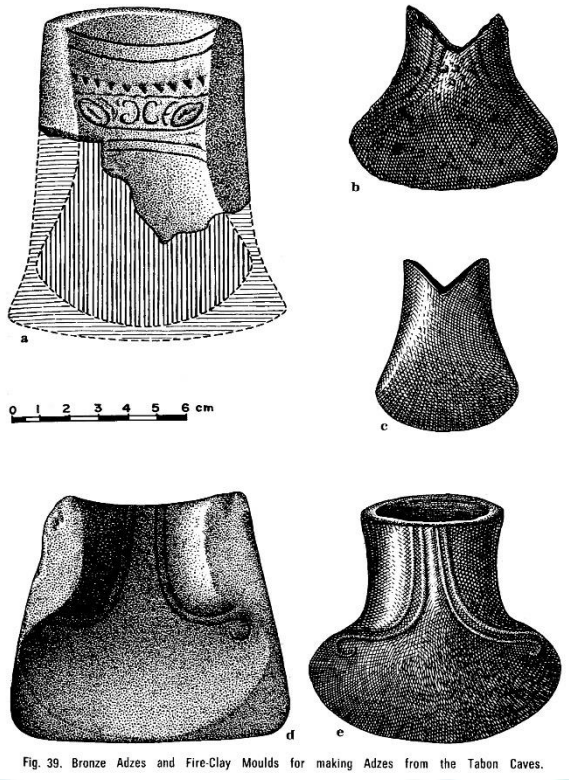


Fig. 39. Bronze Adzes and Fire-Clay Moulds for making Adzes from the Tabon Caves.

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

4. IRON AGE

- Time: After c. 2200 cal BP (Manunggul Cave B)
- Material culture: Addition of ferrous items made of iron alloys (e.g. wrought iron, steel) produced by smelting and forging to the Bronze Age material culture. Beads from glass and semi-precious stones
- Subsistence: Continuation of the Bronze Age and agriculture production. Growth of trade and exchange networks and complex social systems (chiefdoms) Contacts with imperial states on the Asian mainland

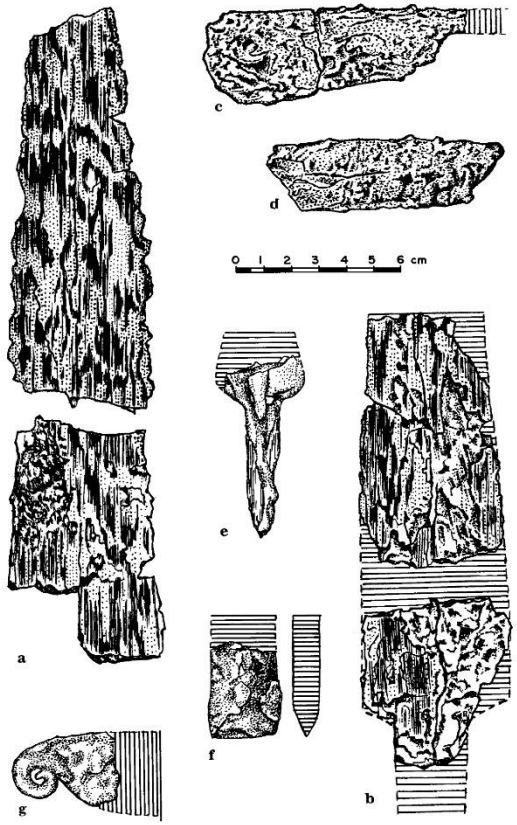


Fig. 47. Forms of Iron Spears and Knives from Tadyaw Cave.

SYNTHESIS

A BASIC ARCHAEOLOGICAL CHRONOLOGY OF THE PHILIPPINES

Back to Thomsen, Lubbock and Montelius – and Beyer and Fox?

Establishing a basic chronology system that is supported by:

- Stratigraphic record
- Environmental data
- Morphological analogies of artefacts
- Referenced by absolute dating
- Absolute dating remains an issue for the periodization of metal bearing assemblages. More dates from good contexts required
- Bronze Age and Iron Age are as good terms as are Early and Late Metal Age

CHRONOLOGICAL STRUCTURE OF THE PHILIPPINES

Time BP	GSSP (IUGS)	Geol. Stage	Archaeological Stage
500		Late Holocene	Historic Period
1000			Iron Age
2000			
3000			Bronze Age
4000	4.2ka Event		Neolithic / Epi-Palaeolithic
5000		Mid Holocene	Upper Palaeolithic
6000			
7000			
8000	8.2ka Event		
9000		Early Holocene	
10000			
11000			
12000	11.7ka Event		
13000		Pleistocene	
.....			
30000			
40000			
50000			Lower Palaeolithic
.....			

Proposal for a revised Philippine Chronology

CHRONOLOGICAL STRUCTURE OF THE PHILIPPINES

Time BP	GSSP (IUGS)	Geol. Stage	Archaeological Stage
500		Late Holocene	Historic Period
1000			Iron Age
2000			Manunggul B
3000			Manunggul A Bronze Age
4000	4.2k Event		Nagsabaran Neolithic Epi-Palaeolithic Vito UA
5000		Mid Holocene	Vito LA Balobok Minori Duyong Burial
6000			
7000			
8000	8.2k Event		
9000		Early Holocene	Duyong Gouge Bubog 2
10000			Upper Palaeolithic
11000			Tabon Ib
12000	11.7k Event		
13000		Pleistocene	Ille TPL
.....			
30000			Callao Bubog 1 L9b
40000			Tabon VI
50000			Lower Palaeolithic
.....			

Proposal for a revised Philippine Chronology