(015) History and Characteristics of Korean Fermented Foods

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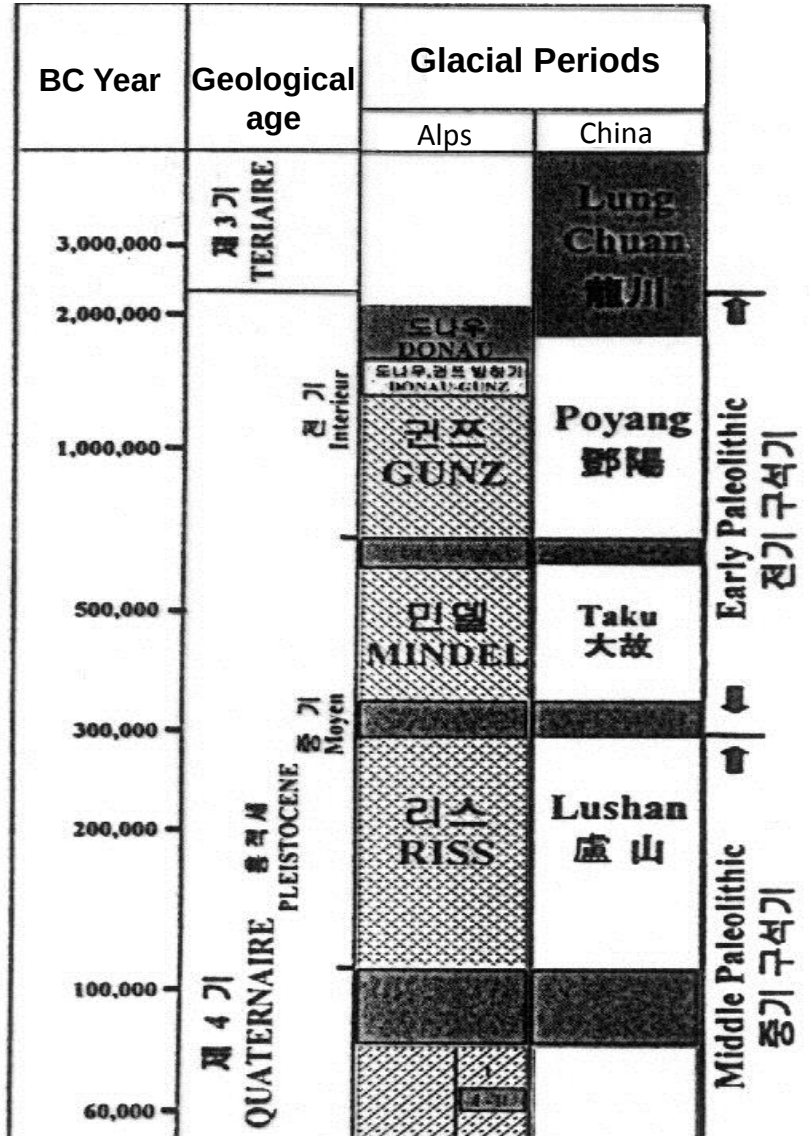
Map of Northeast Asia

Prehistoric culture in Northeast Asia



Prehistoric Culture in Northeast Asia

Korea	China, Mancharia(M), Siberia(S)
Australopithecus in Africa	
	Yuan-mou man (Yunnan, China)
Homoerectus in	
	Xihoudu
Sokchangni	Lanthian
Chungbuk Keumkol	Zhoukoudian
	Jinnuisan(M)
Homo Sapiens in	
Yokpo cave, Sangwon cave	
Homo Sapiens neanderthalensis in	
Seungrisan cave, Durubong,	Dingum(M)
Jommal Yongkul, Chonkokni	Hapjadong cave (M)
Chongchongam cave	Xujiayao, Sjara-osso-gol
Gulpori	仙人洞 (M)
Sangmu Yougni	Irkutsk (S)
Dongkwangjin	
Sangshi	

Bones excavated from the paleolithic remains in Korean peninsular

- Mammoth - Hamkyungbukdo Unggi (▼)
- Elephant, Buffalo, Monkey, Bear, Deer
  - Pyongannamdo Sangwonkun (▼)
- Deer, Hippopolamus - Chungbuk Durubong (▼)
- Bear, Deer, Roe deer, Raindeer- Cheju Bukcheju (▼)
- Tiger, Bear, Deer - Kyungbuk Keumreung (▼)
- Teeth of hippopolamus and wild horse
  : Hwanghaedo Jesuksan lime-cave (▼)
- Teeth of mammoth, bone of whale – Hambuk Kilju (▼)
- Bone & teeth of aurochs, deer & wild horse
  - Pyongyang Mirimri (▼)

Foodstuffs of the paleoliyhic men in Korean peninsular and Northeast Asia (Lee, 1998)

	Early Paleolithic	Middle Paleolithic	Late paleolithic

Major Food-stuffs

Cow, horse, elephant, beasts, rabbit, monkey. mouse,

Acorn, chestnut, pine nut, roots, wild fruits, vegetables

Cooking methods

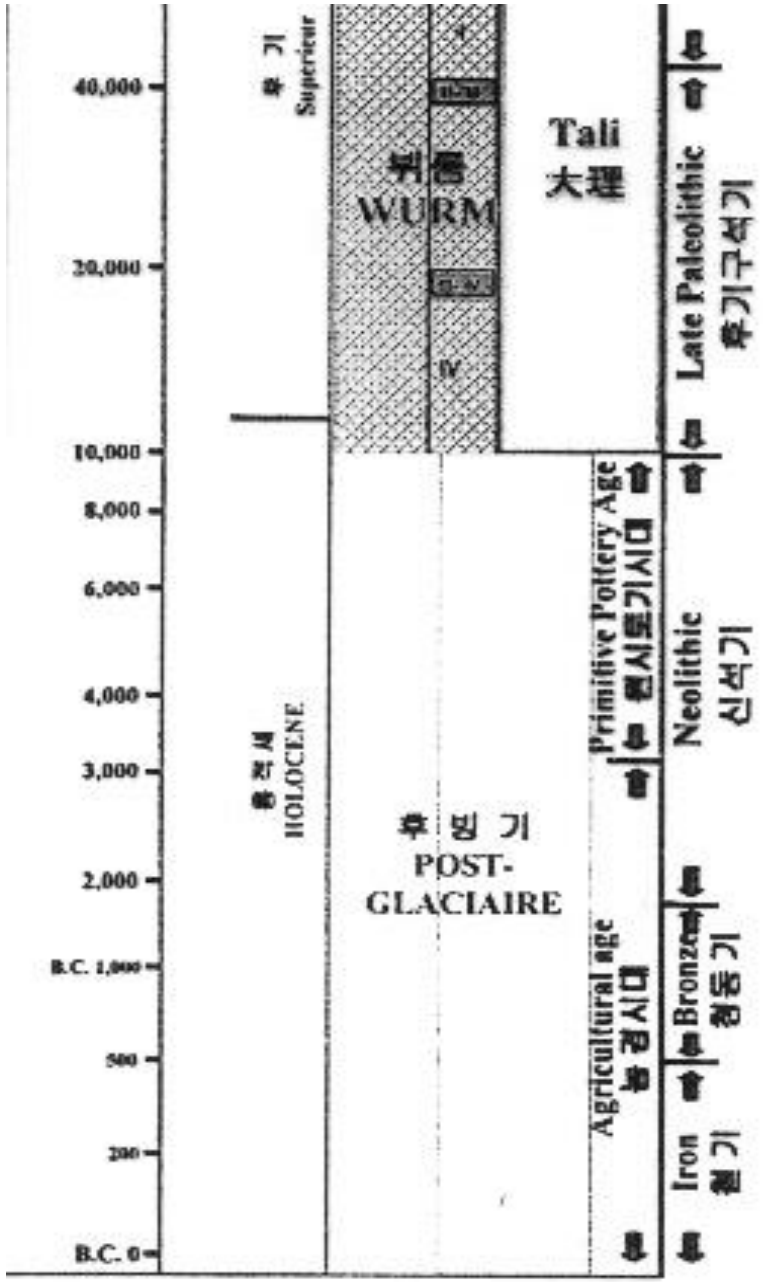
Raw, roasting

Foodstuffs of the paleoliyhic men in Korean peninsular and Northeast Asia (Lee, 1998)

	Early Paleolithic	Middle Paleolithic	Late paleolithic
Major Food-stuffs		Cow, horse, deer, Beasts, rabbit, frog, Insects, Acorn, chestnut, pine nut, roots, arrowroot, wild-fruits, vegetables , wild-berries, mulberry, wildvine, persimmon	
Cooking methods		Raw, roasting Sun drying	

Foodstuffs of the paleoliyhic men in Korean peninsular and Northeast Asia (Lee, 1998)

	Early Paleolithic	Middle Paleolithic	Late paleolithic
Major Food-stuffs		  	Mouse, cow, horse, Beasts, rabbit, frog, Insects, mollusk , river fish, Acorn, chest nut, pinenut, vegetables, Wild-berries, mulberry, wildvine, persimmon , arrowroot, bellflower root, dropwort, mugwort grass seeds, millet, wild beans
Cooking methods			Roasting, smoking, Sun drying



Homo Sapiens Sapiens in
Changdukni, Duksan, Samgol,
Mandali, Changnae

山西峙　, 河南小南海
周家油坊(M)
石門山村(M)
西八間房(M)
Malta(S)
Ustinovka (S)

Primitive Pottery
Fukui cave(Japan)
Kamikuroiwa cave (Japan)
Sangnodaedo — Dengdoushan
Osanri, Sanghakri — Banpo
越高 (Japan) — Hemudu
Dongsamdong, Seopohang — Pailigang, Dadiwan
田村,早水台 (Japan),

Appearance of tribal states
Hannim (Hankuk) — Yellow Emperor
Hanung (Shinshi Gaechon) — Tang-Yao
Tankun (Chosun) — Yu-Shun
Kiza Chosun — Hsia
Yemaek — Shang
Three Hans — Chou
Three Nations (Kokuryo, Silla, Baekje) — Chin, Han

Chronology of Prehistoric Era of Korean Peninsula and Northeast Asia

- **700,000-300,000BP Early Paleolithic Age**
  - **300,000-40,000 BP Middle Paleolithic Age**
  - **40,000-10,000 BP Late Paleolithic Age**
  - **BC 8,000 - 3,000 Primitive Pottery Age, Shell mounds**
  - **BC3,000 - 1,500 Neolithic Age, Agricultural stone tools**
  - **BC 1,500 - 500 Bronze Age, Megalithic Dolmens**
  - **BC 500 Iron Age**

(Shell mounds)

Shell mounds

Techno-historical consideration of Primitive earthenware

- Environmental factors of pottery making
- Technological developments related to usage of pottery
- Shape and usage of pottery

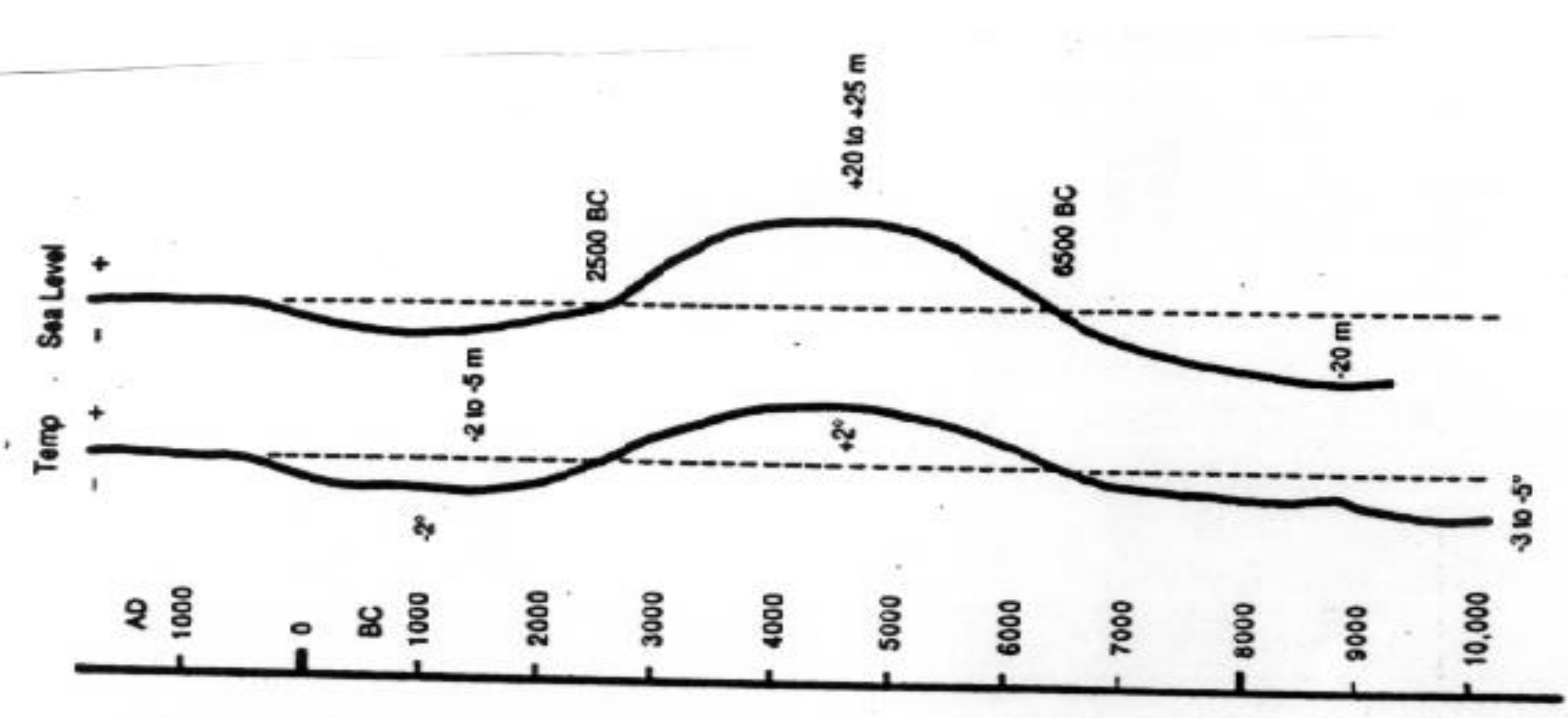
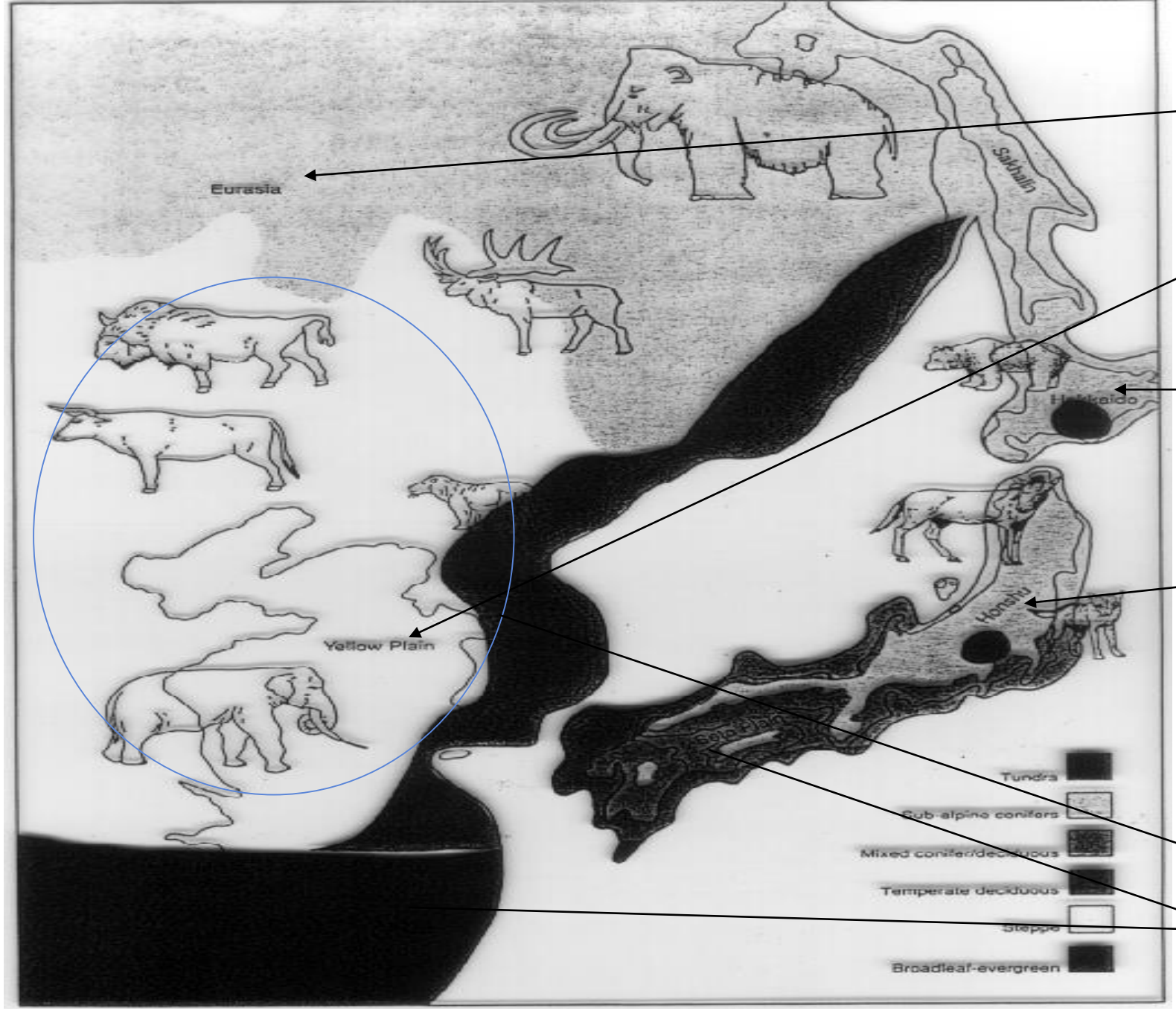


Fig 2. Average temperature and sea level of the glove during the alluvial epoch (Barnes, 1993)



Eurasia

Yellow Plain

Honshu

Steppe

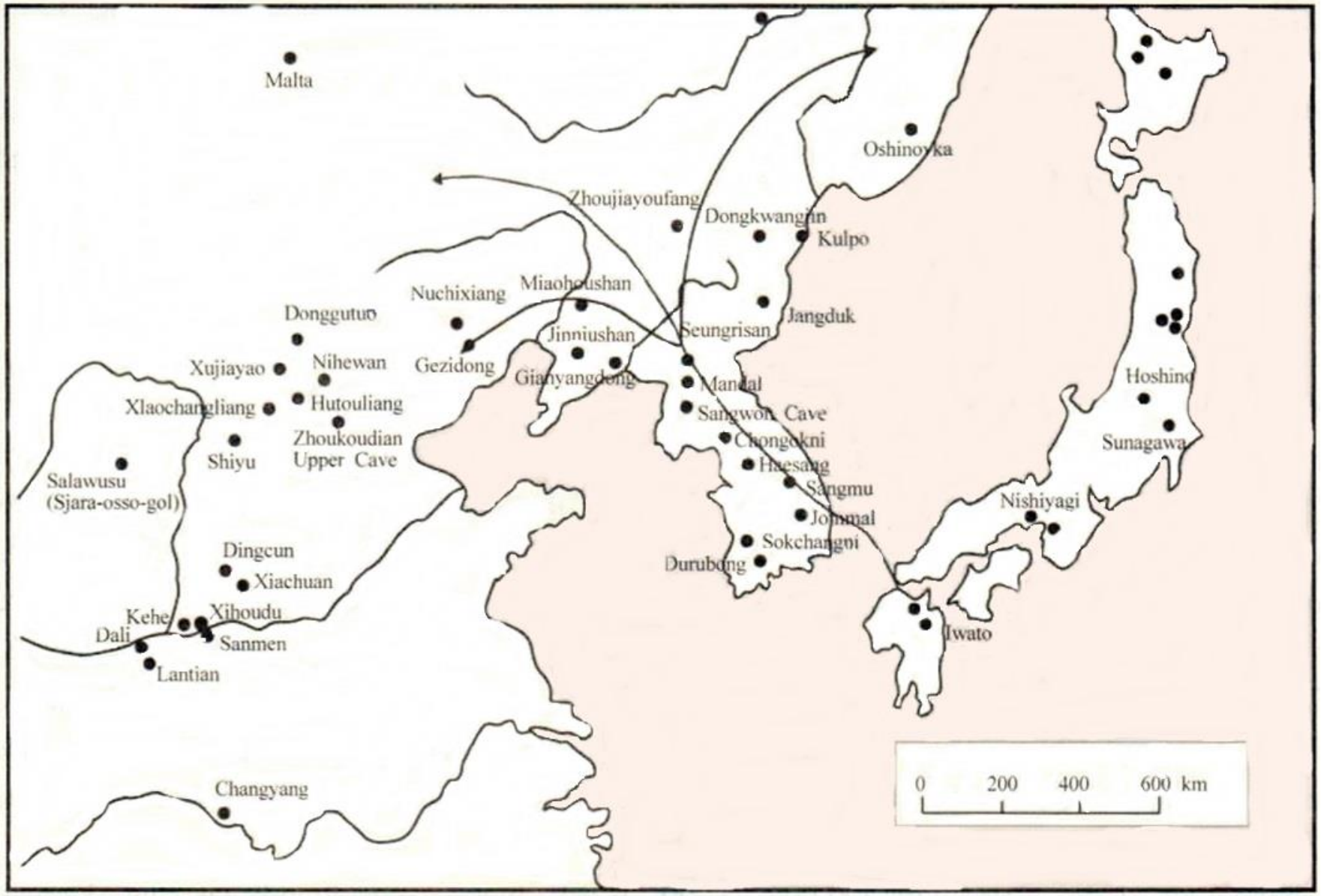
Broadleaf-evergreen

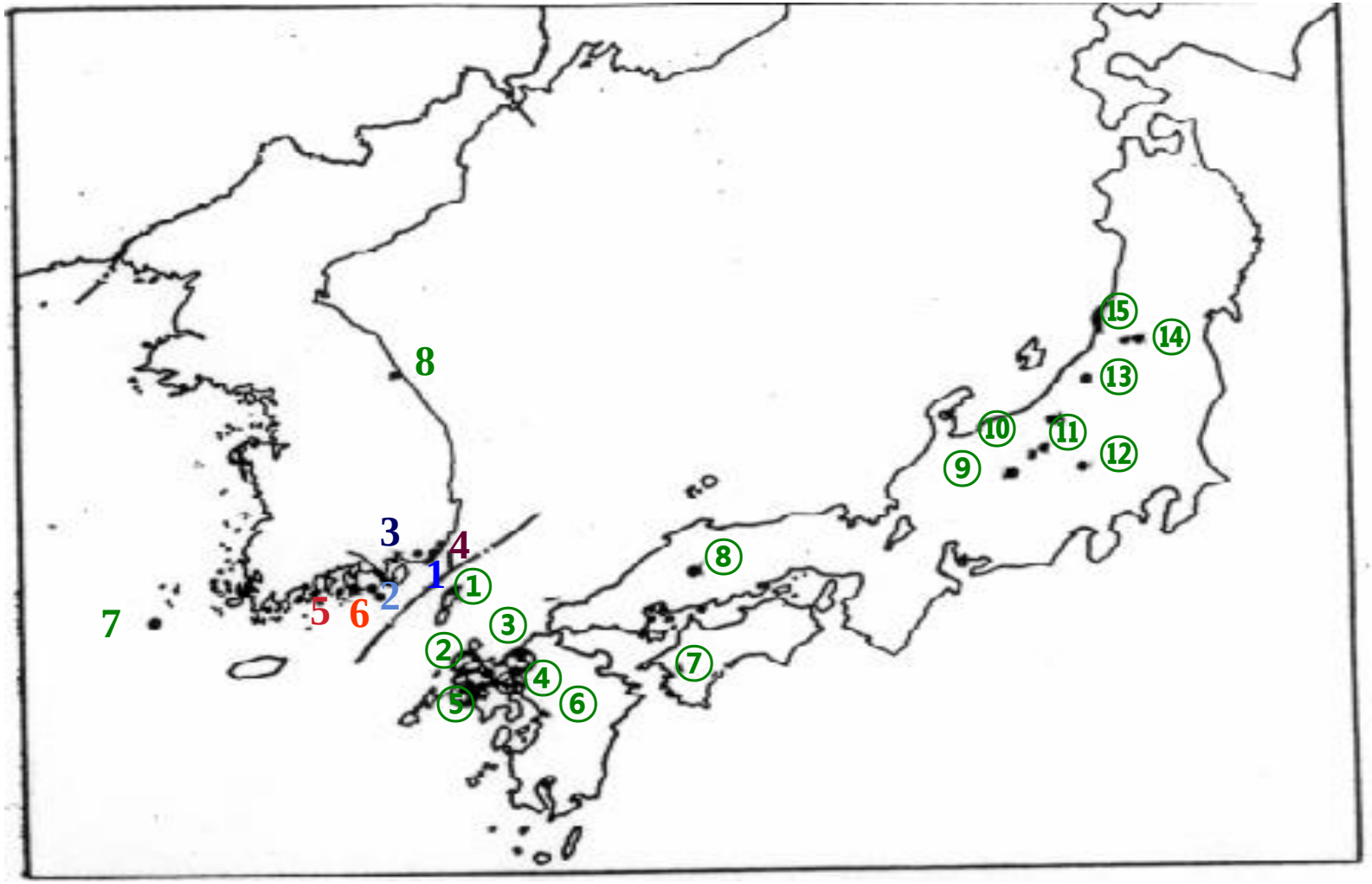
Geography of Northeast Asia in 16,000 B.P. (Barnes, 1993)

Table 2-2. The depth of sea around Korean Peninsula

Sea	Average	Deepest
East sea	1,864 m	4,049 m
South (Korea Strait)	101	227
Yellow sea	44	103
Bohai bay	21	72

Paleolithic remains found in Northeast Asia (Lee, 2001)





<Korea Strait> 1. Dongsamdong 2. Dadaepo 3. Chukgok 4. Sinamri 5. Sangnodaedo 6. Yokjido 7. Sohuksando 8.Osanri

<Japanese Archipelago> ① Kosijima ② Fukui ③ Nisikaratsu ④ Iwasita ⑤ Senpukuji ⑥ Todoroki ⑦ Kamikuroiwa ⑧ Mawatari ⑨ Yangimata ⑩ Isigoya ⑪ Hasitate ⑫ Tazawa ⑬ Ozawa

Fig 1. Primitive Pottery Age remains excavated in Korea Strait Region

8,000 - 3,000 B.C. PRIMITIVE POTTERY AGE

- Invention of earthenware, use of bow and arrows
- Carved bone tools and fishery equipments, shell mounds
- Littoral foragers and hunters, semi-subterranean pit dwellings
- Invention of boiling process by using earthenware

-Chigae culture

- Discovery of salt making process
- Storage of grains, fish and vegetables in a jar

- Fermentation technology

Table 1-1. The estimated ages of primitive pottery remains of Paleolithic era in Korean Peninsula and Northeast Asia (Lee, 1999)

Century	Korean Peninsula southeastern coast Korea Strait coast	Korean Peninsula northwestern region Liaotung, Manchuria	Korean Peninsula northeastern region Maritime Province of Siberia	Korean Peninsula Midwest region	China Mainland
B.C.10000	Kyushu Hukui Cave Shigoku Kamikuroiwa Cave				
B.C. 8000	Japanese Island(早水?) Sangnodaedo Xth layer				Pendoushan in Yangzi
B.C. 6000	Dongsamdong Jodogi Sangnodaedo 1st culture, Osanri B, Japanese Island)	Manchuria Shinuishan lower layer, Northwest Korea lower layer, Chonghori	Sopohang 1st		Peiligang Dadiwan
B.C. 5000	Dongsamdong Mokdogi, Sangnodaedo 2nd culture, Osanri lower layer, Japanese Island	Ssanghakri Tosongri	Sopohang 1st	Amsadong, Jitapri 1, dwelling site	Bampo Xinglongwa Bexin Hemudu Majiabang

Continued…

Century	Korean Peninsula southeastern coast Korea Strait coast	Korean Peninsula northwestern region Liaotung, Manchuria	Korean Peninsula northeastern region Maritome Province of Siberia	Korean Peninsula Midwest region	Chinese Neolithic culture Remains
B.C. 4000	Dongsamdong Pusangi Sangnodaedo 3rd culture, Osanri middle-upper layers. Sugari 1st layer Japanese Island Mori	Manchuria Shinuishan Mid layer, Dongsan lower layer, Ogachon	Sopohang 3rd	Misari, Keumtanri, Namkyung 1st era	Miadigou Hongshan Dawenkou Daxi
B.C. 3000	Dongsamdong Dudo Sugari 2nd layer, Japanese Island	Manchuria Shinnuishan lower layer, Dangsan upper layer, Ssangtaja 1st era, Shinamri 1st era	Sopohang 4th	Sunyudo, Namkyung 2nd era	Majiayao Banshan Qujialing Liangzhu
B.C. 2000	Dongsamdong Youngdogi, Sangnodaedo 4th culture, Sugari 3rd layer, Japanese Island	Sinamri 2nd layer Sangmasok A	Sopohang 5th	Sobudo, Joido, Shido	Quijia Longshan L.Xiajiadian Qinglongquan Yueshi

빗살무늬토기 남부지방 높이(왼쪽 위) 28.4cm

Table 2-3. Chronology and manufacturing characteristics of potteries excavated from *Sangnodaedo* remains (Lee, 1999)

Layer name (estimated year)	Main ingredient/ Bizim(additive)	Molding technique	Finishing technique	Baking temperature	Water absorbency	Color/wall thickness	Shape/rim-diameter
Ⅹ layer, before 6000 B.C.	Traces of pottery small debris						
Ⅸ layer, before 6000 B.C.	clay, ferrous salt clay/quartz, granite, pottery powder(70/30)	Sunal Kwonsang Dough width 1-3cm	Wall rubbing, Painting thick layer, white/ red dye	below 700℃	9.5-25.3%	brown/ 7-8mm	no pattern, attached strips, round-bottom, flat-bottom, big vessel, half-egg bowls/12-38cm
Ⅷ layer, 6000 B.C	ferrous salt clay, rock powder/. pottery powder, quartz(55/45)	Kwonsang Dough width 3-3.5cm	Painting thick layer, inner wall rubbing	below 700oC	9.7-17%	light brown/ 4-12mm	round-bottom,, small bowl/18-34cm

Layer name (estimated year)	Main ingredient/ Bizim(additive)	Molding technique	Finishing technique	Baking temperature	Water absorbency	Color/wall thickness	Shape/rim-diameter
Ⅶ layer, before 6-5000 B.C.	ferrous salt clay, rock powder/ quartz, feldspar, pottery powder (55/45)	Kwonsang	Painting thick layer	below 700℃	10-16.8%	brown, grey/ 7-8mm	attached strip, no pattern, round-bottom, large vessel/14-38cm
Ⅴ layer, 4000 B.C.	ferrous salt clay, rock powder / quartz, pottery powder, clamshell powder, biotite	Kwonsang Yonjok	Painting thin layer, no painting	near 700°C	5.2-17.2%	brown, grey/ 5-6mm	fish bone pattern, comb, dot, scale pattern, round bottom, flat bottom, large vessel, crocks, trays/6-42cm
Ⅰ Ⅳ ayer, 3000 B.C	sandy soil/ clamshell powder, pottery powder, mica	Kwonsang Yonjok	inner wall rubbing, painting thick layer	700-750°C	6.2-15.1%	black- brown, grey- brown/ 6mm	slash, wave pattern, comb pattern, inclined lips, double lips, round-bottom, big vessel/12-42cm
Ⅲ layer, 2000 B.C	sandy soil/ clamshell powder, quartz	Kwonsang Yonjok	wall rubbing Double lips	700-750°C	7.2-16.9%	brown, grey, black/ 6mm	clomb, dot, wave pattern, round-bottom, flat-bottom, sharp-bottom vessel single lip/14-40cm double lip/26-48cm

Direction of technological progress of primitive pottery in Korea Strait Region

- Harder
- Lower water absorbency
- Durable on fire
- Bigger

Classification according to the usage

- **Cooking vessel :**
  - **Bowl (mouth diameter 6-12 cm, 12 - 24cm**
  - **low absorbency, conic or round bottom**

- **Fermentation crock :**
  - **middle size jar(4-17 liter)**
  - **low absorbency, conic or round bottom**

- **Storage jar :**
  - **large size jar (17-56 liter)**
  - **high absorbency, round/flat bottom**

Dietary culture of littoral foragers

Food culture related with pottery use

- Cooking vessel
  - Boiling with sea water
  - Finding of salt, salty taste
  - Cooking with sea food, vegetable, meat, and seeds
  - *Chigae* culture

- Storage jar
  - Storage of wet foods
  - Putrefaction / fermentation
  - Fermentation technology

Origin of fermentation technology

- ***Nuruk***

  (alcoholic fermentation starter)

- ***Kimchi*** **fermentation**

- ***Jeotkal*** **fermentation**

Beginning of *Nuruk* making and alcoholic fermentation of cereals

- Storage of seeds, grains, roots and nuts in earthen jar

- Mold growth by warm & humid climate
- Raw starch hydrolysis by amylase from *Rhyzopus* sp.
- With water, alcoholic fermentation by yeasts
- Uncooked alcoholic fermentation

- Spontaneous natural process

Kimchi fermentation

Vegetables in sea water in a jar

- **Lactic acid production by *Leuconostoc mesenteroides* (pH 4.5)**

- **Suppression of pathogens and spoilage microorganisms**

- ***Lactobacillus* growth (pH 3.0)**

Joetkal fermentation

- Fish mixed with lactic acid fermented vegetables

  - Addition of sour fruits
  - Enzymic digestion of fish
  - Stink/strong smell with low salt
  - Increase of salt content to improve the flavor

Origin of Fermented Soybean Foods

- **Primitive Pottery and Fermentation Technology in Korea Strait Region (6000 BC)**
- **Arrival of Northern Nomads and the Need for Protein Source**
- **Invention of Soybean Use for Food by Boiling Technology (ca. 2000 BC)**
- **Invention of Soybean Fermentation by Adopting Cereal Alcoholic Fermentation Technology**
- **Fermented Soybean Paste and Soybean Sauce Making (Before 200 BC.)**
- **Marinating Meat with Soysauce – Bulgogi(Roasted Beef of Korea)**

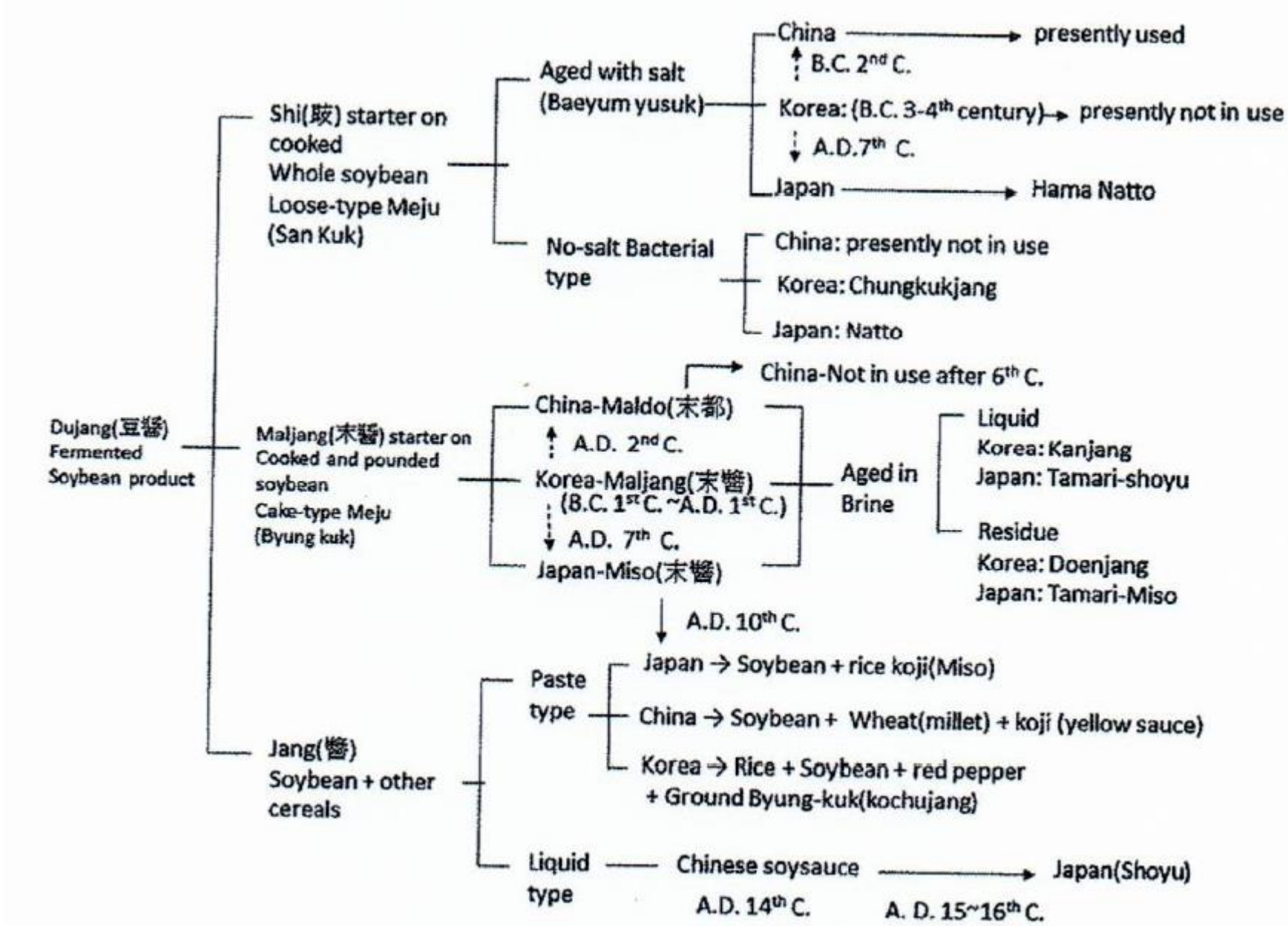


Fig. 1.1 The origin and interchange of Dujang (fermented soybean products) in East Asia (Lee 1990, 2009)

Early records on fermented foods

- **Shijing (B.C. 1000) – rice wine**
  - **Thousand wines in Yao**
  - **King Woo's daughter : Godess of rice wine**

- **Juolii (B.C. 200)**
  - **Jang, Chi**
  - **fermented meat/fish**

Social developments during Primitive Pottery Age

- **Improvement of food storage technology**
  - **Fermentation**
- **Improvement of nutrition and food hygiene**
  - ***Chigae* culture**
- **Population increase**
- **Formation of tribal states (BC. 3-4000)**
- **Megalithic culture, Eastern tribe (*Dong Yi*)**

Sundubu-Chigae
Soybean curd,
Hot-bean paste(Gochujang),
Clam, Shrimp, Vegetables

Deulggae-Chigae
Soybean curd, Perilla seeds,
Soybean paste(Doenjang)
Vegetables

Chueotang(fish chigae)
Ground mud-fish,
Soybean paste(Doenjang)
Hot-bean paste(Gochujang)
Garlic, Onion, and
Vegetables

References

- Lee, C. H. 2001. *Fermentation Technology in Korea.* Seoul: Korea University Press.

- Lee, C. H. and M. L. Kim. 2016. History of fermented foods in Northeast Asia. In *Ethnic Fermented Foods and Alcoholic Beverages of Asia* (Ed.: J.P. Tamang). New Delhi: Springer, 1-16

Key Takeaways

- **8,000 - 3,000 B.C. PRIMITIVE POTTERY AGE in Northeast Asia**
- **Techno-historical consideration of Primitive earthenware**
- **Food culture related with pottery use**
- **Origin of fermentation technology**
- Origin of Fermented Soybean Foods
- **Social developments during Primitive Pottery Age**