

PREHISTORIC SERIES



SANGIRAN

World Prehistoric Site



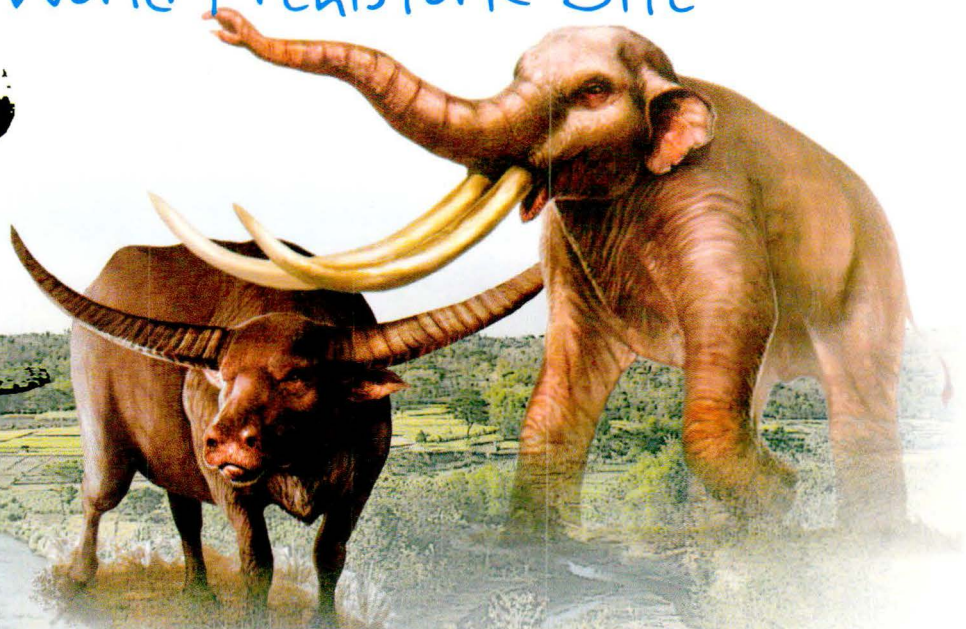
Harry Widiyanto
Iwan SB

PREHISTORIC SERIES



SANGIRAN

World Prehistoric Site



MINISTRY OF EDUCATION AND CULTURE
DIRECTORATE GENERAL OF CULTURE
CONSERVATION OFFICE OF SANGIRAN EARLY MAN SITE

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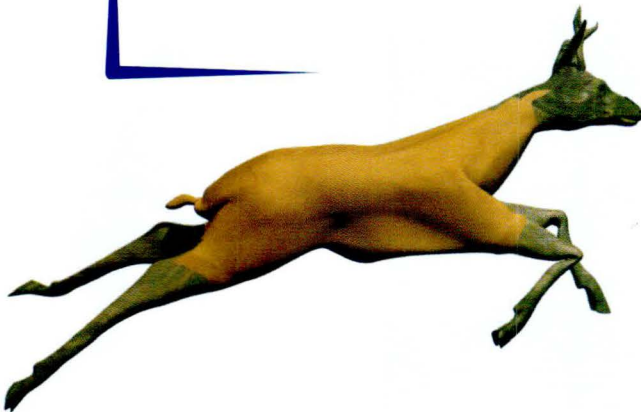
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Writers : Harry Widiyanto dan Iwan Setiawan Bimas
Lay outer : Iwan Setiawan Bimas
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What is Sangiran?

Sangiran is prehistoric Site in Central Java, at approximately 15 km northward from Solo. The area covers two Regencies, Sragen and Karanganyar in Central Java. The area covers 56 km², bears past evidence in the form of early human, fauna, and flora evidence. Human fossils, fauna, flora fossils, and artifact, and stratigraphy data which is deposited naturally from 2 mya, are the source of knowledge to understand the past life. Due to these outstanding values, UNESCO in 1996 established Sangiran Site as World Cultural Heritage number C. 593 with the official name The Sangiran Early Man Site.

Sangiran's Researchers

The Sangiran's famous performance can not be separated from the role of scientists, among others :



G.H.R. Von Koenigswald, the first scientist who found Sangiran Site in 1934 by based on the finding of flake tools in Ngebung Village. Two years later, the Early Man fossil was found, named as Homo erectus.



Prof. Dr. R.P. Soejono



Prof. Dr. T. Jacob



Prof. Dr. R. Sartono

Post National Independence, there was the awakening of national scientists, who paid attention to the Sangiran research. Among others are Prof. Dr. R.P Soejono, Prof. Dr. T. Jacob, and Prof. Dr. R. Sartono, who had different specialties, which is pre history, paleoanthropology, and geology. The three studies are related and complementing each other to reveal the aspects of Sangiran's Early Man and environment.



Prof. Dr. Truman Simanjuntak



Dr. Harry Widiyanto



Prof. Dr. Yahdi Zaim



Dr. Tony Djubiantono

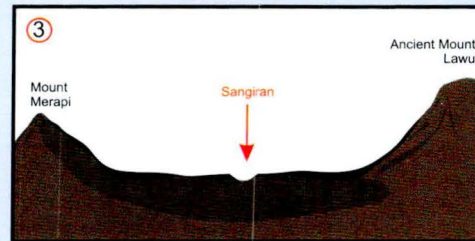
Until today, the above scientists have been regenerated by new scientist. Prof. Dr. Truman Simanjuntak is focusing in artefact, Dr. Harry Widiyanto is focusing in Early Man, and two Geologists, Prof. Dr. Yahdi Zaim and Dr. Tony Djubiantono are focusing in Sangiran's Geologi.

Sangiran's Environmental Evolution

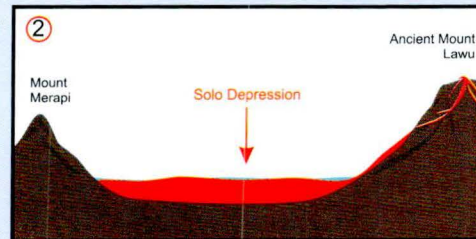
Through Geological process in the form of tectonic plates' shifting, volcanic activities, and the changes of sea level in 2 millions years, Sangiran at least had experienced three environmental changes, from marine to swamp, and to be mainland as we see nowadays. The information of these changes are gained by observing the Sangiran's stratigraphy, since every layer keeps the different information on each environment.



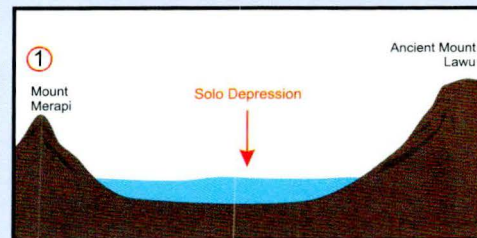
Sangiran's Environmental Changes



At around 0.9 million years ago, there was an eruption in Northern Kendeng Mountain in the form sand and gravel, limestone, from Southern Mountains, sedimented in Sangiran, and formed hard concretion is named as Grenzbank. By those sedimentation, Sangiran was changed from marine sedimentation to land environment. Since then, the marine is forever vanished.



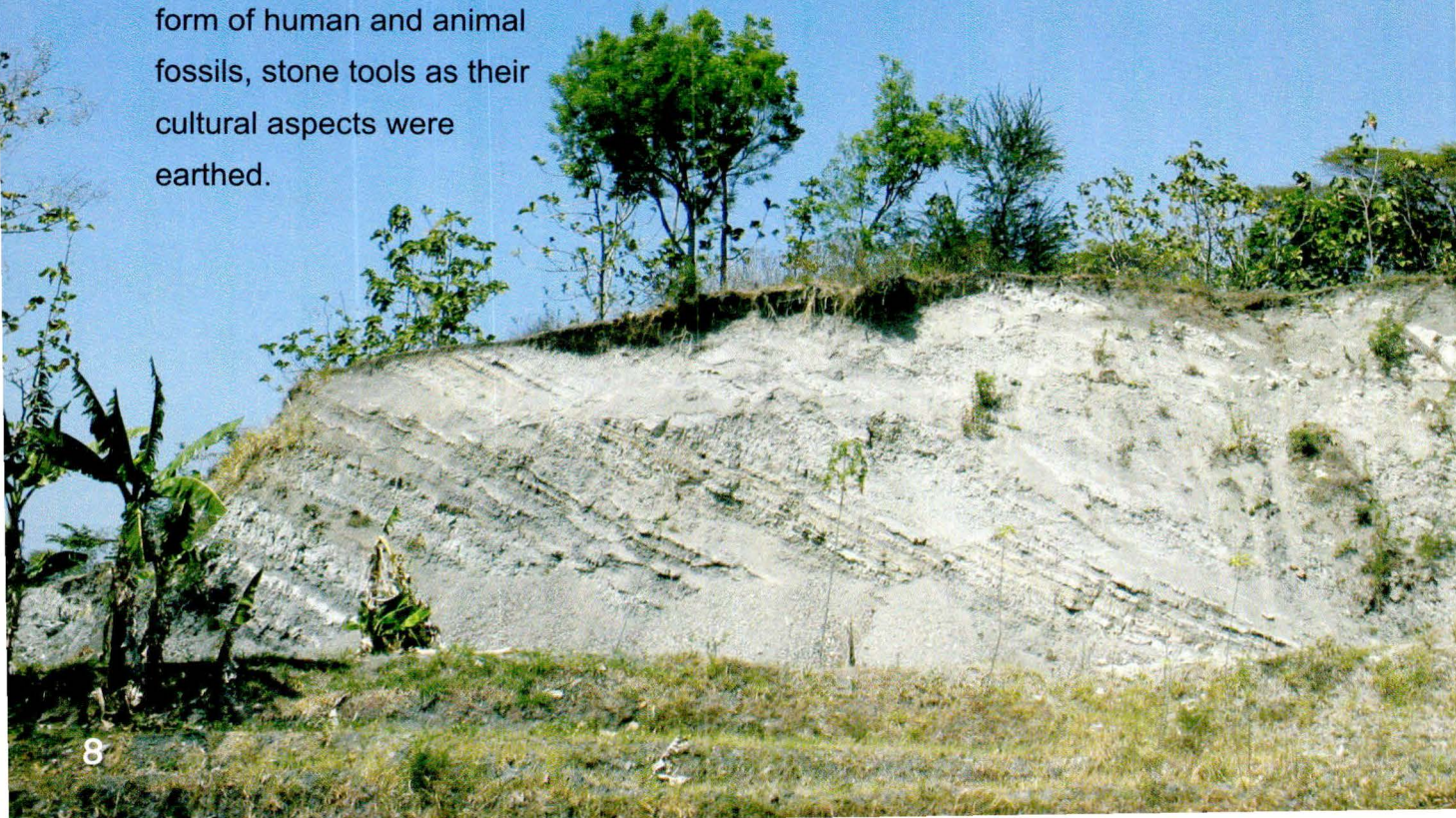
At around 1,8 mya, the lava of Ancient Mount Lawu was sedimented in the place of nowadays Museum. Then, in 1,8 – 0.9 mya, was sedimented the swamp sedimentation and those two sediments were named as Pucangan Formation. This Formation reflects swamp environment in Sangiran which lasted for more than 1 million years.



Kalibeng Formation is 2,4 milion years old, represents Sangiran environment which was marine environment in Solo Depression between ancient Mount Lawu and Mount Merapi.

How was Sangiran Dome Formed?

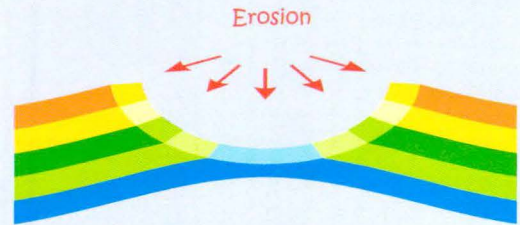
For more than 2,4 million years, there were five formations in Sangiran. Those are, Kalibeng Formation (2,4 mya), Pucangan Formation (1,8 mya), grenzbank (900.000 mya), Kabuh Formation (700.000 mya), and Notopuro Formation (250.000 mya). Geological process is still continued in Sangiran. About 100.000 years ago, there were stratigraphy's deformation, due to endogen and exogenous movement, until become Huge Dome. The stratigraphy was previously formed following the dome. Eruptions in the peak were slowly exposing the layer, so each ancient layer is displayed in nowadays layer. The ancient remains in the form of human and animal fossils, stone tools as their cultural aspects were earthed.



The Process of Sangiran Dome Formation

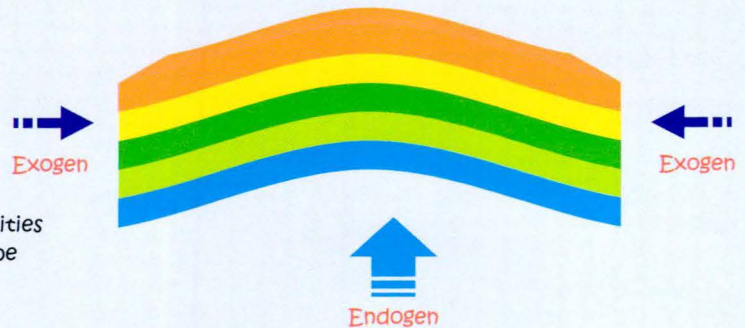
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Finally, the Peak of the Dome was eroded and became nowadays formation. The past remains then discover in earth surface.



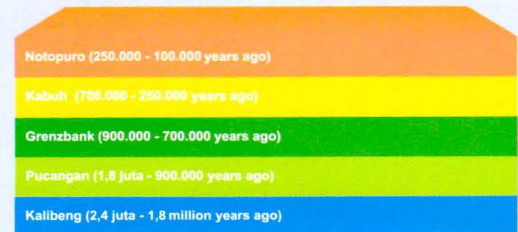
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Then geological activities was happened, to be Sangiran Dome



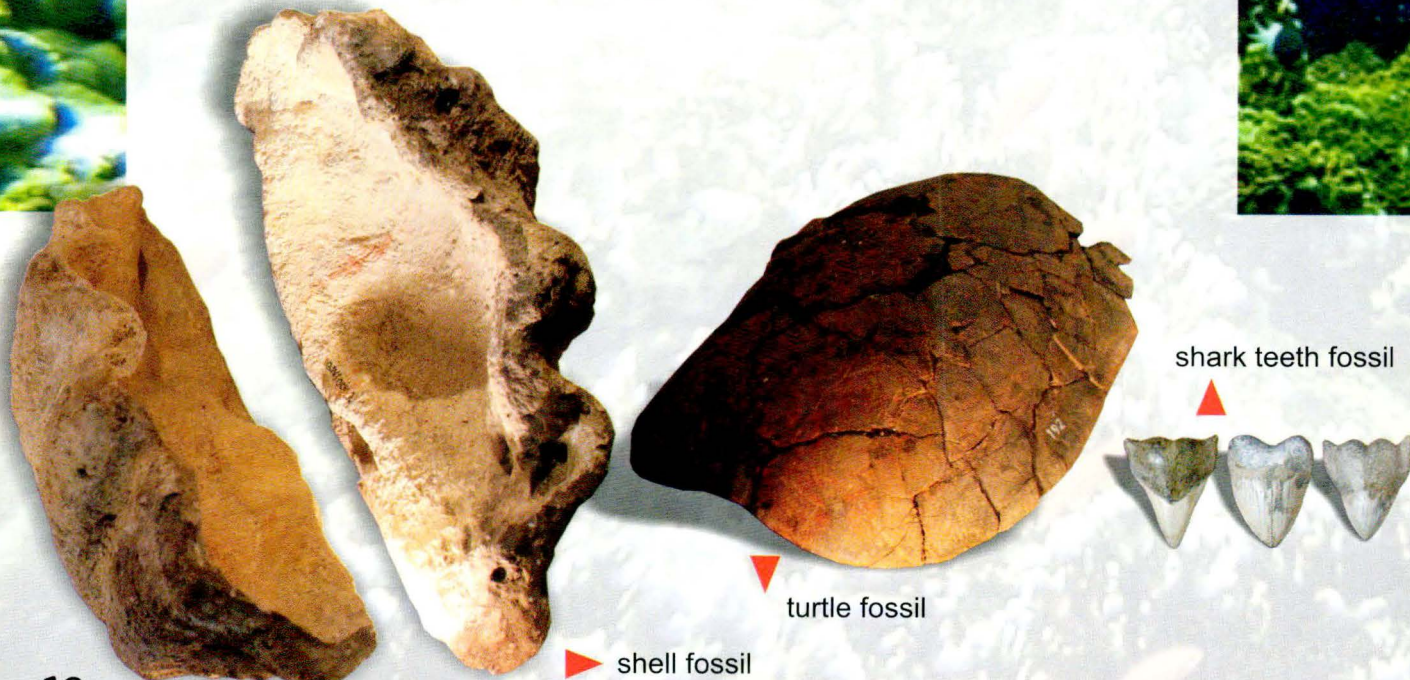
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In the beginning, Sangiran was a plain area. Each sedimentations from every material formed million of years of stratigraphy. In each layer, there was a life, human and animal, or fauna.



The Oldest Stratigraphy of Sangiran

The form of Earth's surface is always changing from time to time, but the changing is going so slowly so that we did not recognize until a long process and period. Sangiran we see today has ever been an ocean. Fossils such as shells, sharks' teeth, shell of Sea Turtle, coral, etcetera found in blue clay layer. Kalibeng Formation proved Sangiran had ever been a marine environment at about 2,4 mya.





The Source of Saline Water

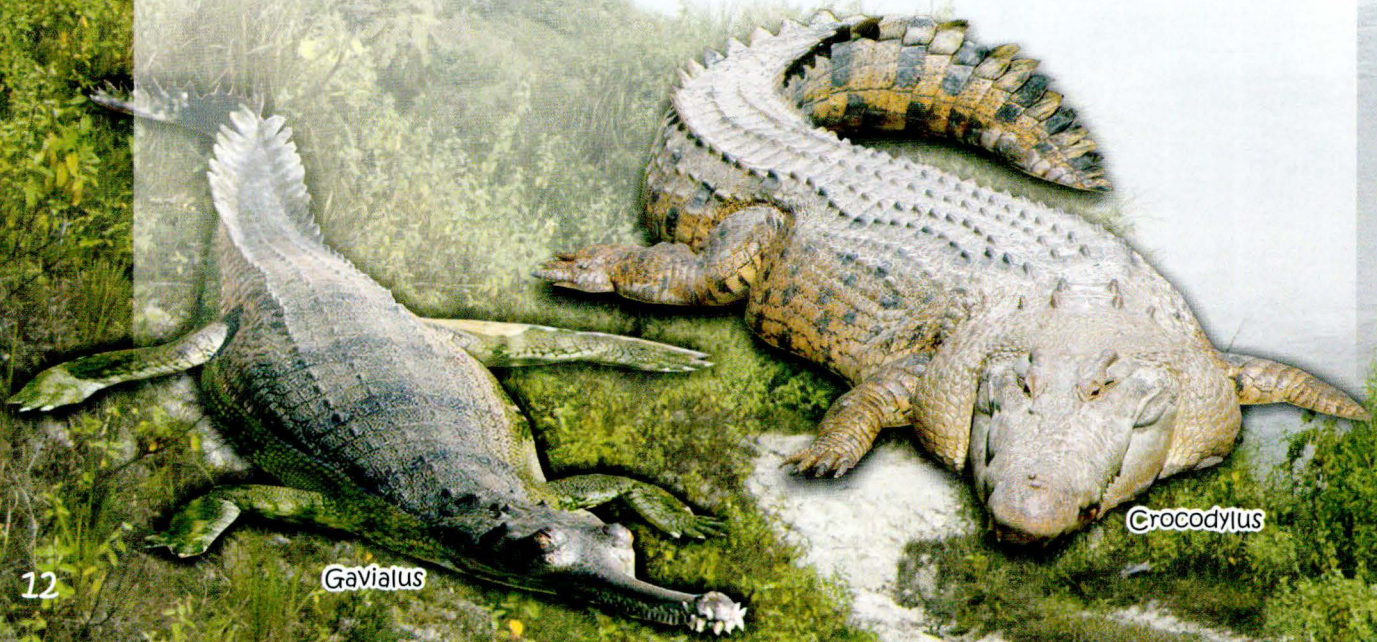
Aside from the marine fauna fossils evidence, there are sources of saline water, with volcanic mud. Those can be found in Pablengan SubVillage, near Sangiran Museum.



When the sedimentation process was happened, the volcanic muds in marine environment were 'trapped' in the basins of sedimentation. Whenever the soil was cracked, then the saline water mixed with volcanic mud was gushing.

Swamp Environment

At about 1,8 – 900,000 mya, Sangiran's marine environment was changed to swamp environment due to the volcanic material sedimentation. There were some types of Crocodile living at the era, along with other mammals such as hippopotamus, elephant, few bovidae (cow, buffalo and wild buffalo). At the time, Sangiran was still lack of species of animals. Early Man (archaic *Homo erectus*) started to arrive in Sangiran at about 1,5 mya, inhabiting the river banks in the middle of swamp environment. They have created cultural material in the form of flakes and chalcedony.



The Masters of Swamp and River

1. Swamp Crocodile

Crocodile is a reptile and an ancient animal experiencing minimal evolution process. Commonly they inhabit the freshwater environment such as river, lake, swamp, and watery land.

But there are some crocodile live in brackish water such as saltwater crocodile.

Their main food is vertebrate animal.



2. Fresh Water Crocodile

This crocodile possess the slight and long snout. The morphology of the snout is the special adaptation to

catch smallest active animal. Gavialis more likes deeper and heavy current

where adults stay together in deep burrows and the curves of river, while the younger choose the creek or riverbank.



Mainland, at last!

The open forest environment, enriched by rivers was common scene in Sangiran at 900,000 – 300,000 years ago. In this time, Sangiran had its most wonderful environment, with the life of *Homo erectus* (typical) along with various species of animal. Ancient Elephants genus *Mastodon* sp. had been replaced by the modern genus, those are *Stegodon* sp. and *Elephas* sp., cervidae, and Bovidae were increasing in number, followed by the new comer Rhino (*Rhinoceros* sp.) and pig (*Sus* sp.), also tiger (*Phantera tigris* sp.). Early man (typical *Homo erectus*) was sophisticatedly creating the stone tools in the form of flakes and hand-axes. This is the golden era of Sangiran, occurring for more than 500,000 years.



The Unbroken Three Generations

There are three genus of elephants lived in Sangiran, *Mastodon*, *Stegodon*, and *Elephas*. Physical characteristic distinguished the three of them are the teeth type and the form of the tusk.

1. *Mastodon* is a forest traveler and the most primitive in Sangiran. *Mastodon*'s molar is bunodont type, the simplest teeth type of herbivores.
2. *Stegodon* has the rounded and curved tusk, and the teeth is brachydont, a type of teeth with lower crown. This type is suitable to chew the smooth leaves.
3. *Elephas sp.* is the most modern elephant among the three. The form of the tusk is relatively straight and used for uprooting the trees to get the roots and branches for food. *Elephas sp.* has Hypsodont teeth, a type of teeth with high crown. The type is most suitable for chewing hard foods like dried grass and grains.



Mastodon

Stegodon

Elephas

Fossils

Fossils are all organic materials such as human bones, animal bones, or the plant due to fossilization process. Fossilization is the process of replacement of organic material (bone, teeth, and wood) to be inorganic in the form of mineral (such as silica and iron oxide) from the sedimented-soil. In this process, the organic elements from bones or woods will be decomposed in time, and replaced by those minerals, becoming harder, heavier, and experiencing color changes suitable with mineral. Whenever all the organic material have completely been changed into minerals, so a bone or wood is regarded as fossil. In fossilization process, the original form (structure) is persisting, but the composition of bone (texture) turns to be mineral and fossilized.

Becoming Fossil

3



In time, mineral inducted to the bone or wood and replacing the decomposed organic material. When all the organic material had been replaced by mineral, a bone or a wood can be named as a fossil.

2



The skeleton have been cover by sediments bearing rich minerals, such as volcanic sediments (bearing silica and iron minerals)

1



An animal died and left to be skeleton.

Every bone and wood has the same opportunity to be a fossil, but the success depends on the sediment-factors material. If the sediment-factor materials are rich with stone minerals, such as silica and iron, then the organic material has a chance to be a fossil.

Homo erectus, the Early Man

The abundant Sangiran's potentials and contributory to science is acknowledged by international community when the human fossils were found. At least, 50% of *Homo erectus* fossils in the world are from Sangiran and surrounding Sites. This is a valuable contribution since *Homo erectus* has significant role in human evolution.



The development of Human Evolution

The journey of human to be prominent creature can not be separated from his long journey, for millions of years.



Australopithecus is a point of the ancestor of human evolution. They live at 7-4 mya, in Africa and has the ability as bipedal. The smarter is Australopithecus africanus, as the first tool maker in the world.

Then, Homo habilis emerged at 2 million years ago, lived in Africa. This species is known as the creator of Oldowan stone-tool culture, a very simple technology, a chopper.



Homo erectus is known as first traveler in the world. They were out of Africa 1.8 mya and dispersed then occupied Europe, East Asia, and Southeast Asia until 100,000 mya. Their culture is diverse, such as chopper, chopping, hand-chisel, hand-axe, flakes, blade, and scraper. Bone tools are also included.

Homo sapiens is a true human like nowadays' human. They have occupied the earth and created modern technology.



S17, Sangiran's Masterpiece



Sangiran 17, also called as S17, is a famous skull of Homo erectus, due to its completeness, so that can be reconstructed. S17's duplicate are found in some famous Museum in the world.



The physical characteristic of Sangiran 17



And this is the face of Homo erectus, the flat forehead, the protruding frontal bone, protruding mouth, the skull is short and indented forward. Due to its morphological characteristic, S 17 is an adult male individual. He lived in Sangiran when Sangiran was dominated by river environment at about 700,000 million years ago.

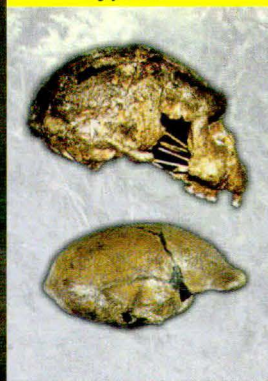
The Three Types of *Homo erectus*

During the life span of more than 1 million years in Sangiran, from 1,5 – 0,3 million years ago, *Homo erectus* in Sangiran had experienced two evolutionary levels, those are archaic *Homo erectus* (1,5 – 1 mya) and typical *Homo erectus* (0,9 – 0,3 mya). From the broader area, there was also progressive *Homo erectus*, living at 0,2 – 0,1 mya in Ngandong (Blora) and Sambungmacan (Sragen), and Selopuro (Ngawi).

Archaic



Typical

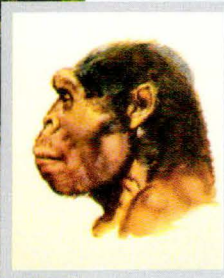


Progressive



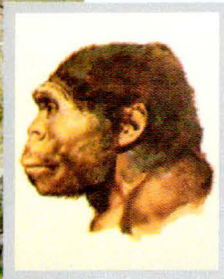
Evolutionary development of *Homo erectus* Skull

The evolutionary development of *Homo erectus* can be determined from the skull's morphology and the development of cranial capacity.



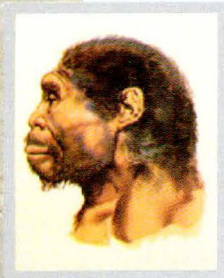
Archaic *Homo erectus*

This *Homo erectus* has the robust physical characteristics, with strong teeth and masticating tools. The skull is thin, and reaches 1.2 cm on its parietal. The cranial capacity reaches approximately 850 cc.



Typical *Homo erectus*

This type of *Homo erectus* is more advanced compared to Archaic *Homo erectus*, with more than 1,000 cc of cranial capacity, a higher and slightly different skull, and a rounder skull cap. The teeth are also smaller.

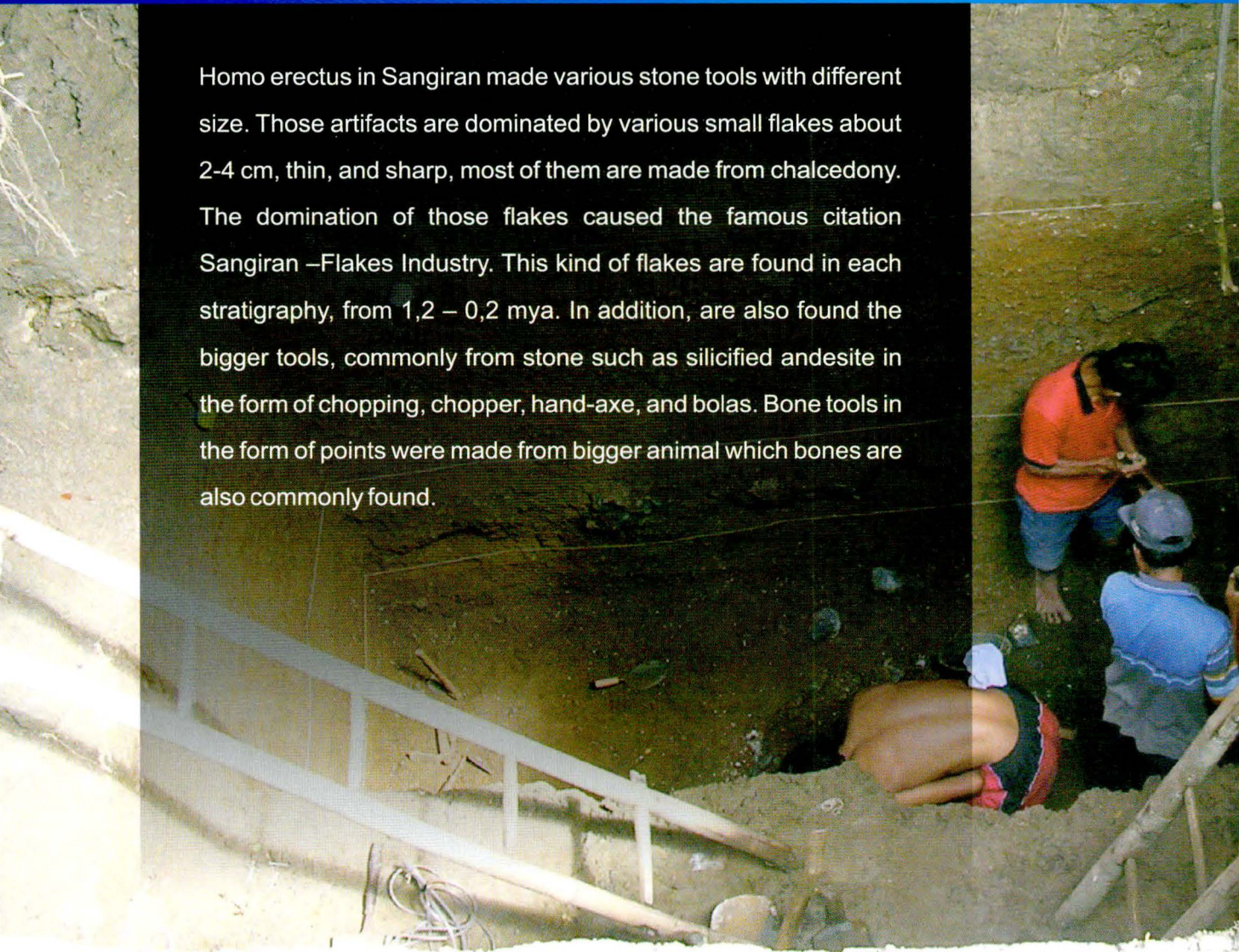


Progressive *Homo erectus*

This is the most progressive *Homo erectus*, the latest lived in Java before they were extinct at 100,000 mya. The skull is higher and rounder compared to the two ancestors, with 1,100 cranial capacities.

Homo erectus' Culture

Homo erectus in Sangiran made various stone tools with different size. Those artifacts are dominated by various small flakes about 2-4 cm, thin, and sharp, most of them are made from chalcedony. The domination of those flakes caused the famous citation Sangiran –Flakes Industry. This kind of flakes are found in each stratigraphy, from 1,2 – 0,2 mya. In addition, are also found the bigger tools, commonly from stone such as silicified andesite in the form of chopping, chopper, hand-axe, and bolas. Bone tools in the form of points were made from bigger animal which bones are also commonly found.



Various Stone Tools



Flakes



T. Simanjuntak, 2011

Chopper



Chopping



T. Simanjuntak, 2011

Hand-axe



Bolas



Bone Tools

What is World Heritage?

World Heritage is the past heritage around the world, we have today to be inherited to our future descendants, as an irreplaceable wealth. World heritage is classified into three category, those are Cultural World Heritage, Natural World Heritage, and the mixture of Cultural-Natural (the Cultural landscape). The three categories should possess Outstanding Universal Values, designated by UNESCO.



World Heritage List No. C593

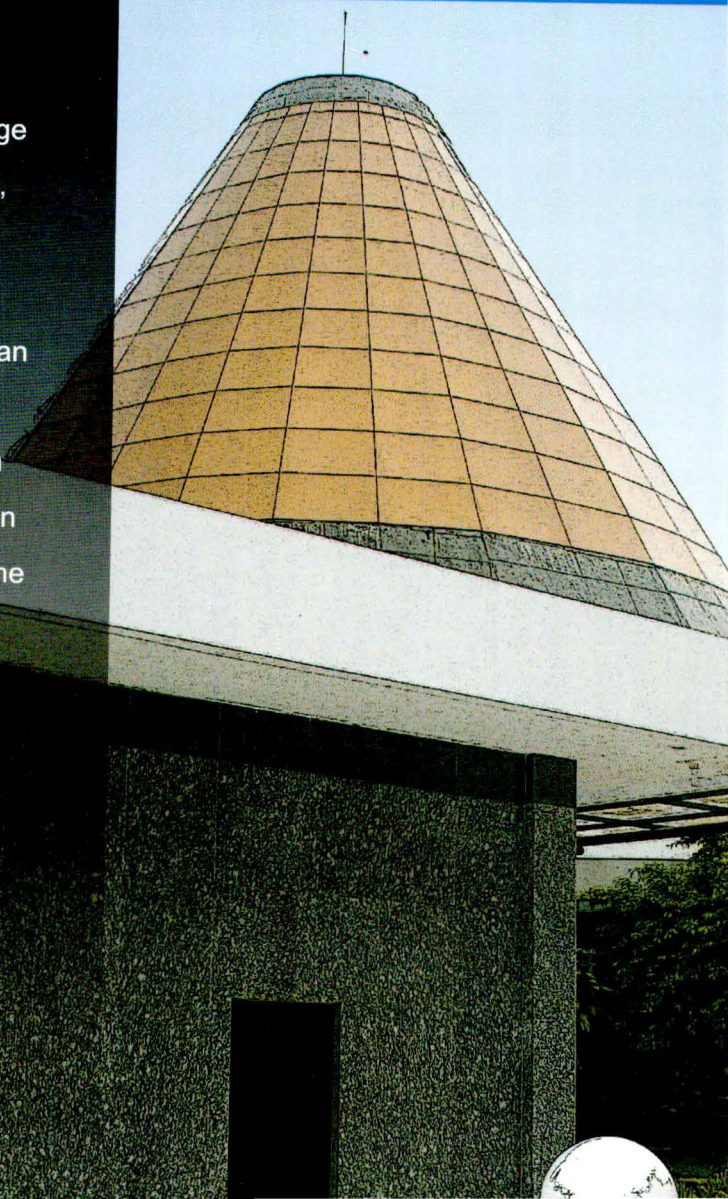


Indonesian struggle to receive World Heritage establishment from UNESCO for Sangiran Site, had been started since 1995. Through proposal, verification, and World Heritage Conference by UNESCO,

Sangiran Site was acclaimed as World Heritage in December 6, 1996 in Mexico, with number C 593 and named as The Sangiran Early Man Site. Since then, Sangiran Site belongs to international community, not only Indonesian.

The Responsibility in Conserving Sangiran

Conservation is a dynamic effort to conserve the existence of Cultural Heritage and the values, by protecting, developing, and utilizing the Site. /Balai Pelestarian Situs Manusia Purba/BPSMP Sangiran (Conservation Office of Sangiran Early Man Site) has the responsibility to conducting the research, conservation, and utilization of Sangiran Site and other hominid Sites in Indonesia. Therefore, the existence and the conservation of Sangiran Site are our responsibility.



To Support Sangiran's Conservation

1. Reporting to the Officer whenever a fossil or assumed as a fossil is found. The officer will take certain procedures to taking care and identify the fossils.
2. Not conducting the excavation or fossil hunting activities, since every fossil being taken from the exact location will lost the important information.
3. Not doing the sand mining since the activities may destruct the stratigraphy and data of past environment.
4. Not exchanging the fossil findings to anyone, since the fossils in the Site is such a treasure to be delivered to our descendants.
5. The remains of the past time, including human, animal, and plant fossils, are Cultural Properties, protected by Indonesia Law No. 11/2010 on Cultural Properties.



How to Utilize Sangiran?





As a World Heritage, Sangiran Site is one of tourist destination, and rely on the magnetism and information of human civilization. Beside as laboratory and information center to support the deveopment of science, history, and culture, Sangiran has to contribute to local people as one of tourist destination.

The Development of Sangiran Site as Tourist Destination.

There are four Clusters as Sangiran development to be World Tourist Destination :

1. Krikilan Cluster

This is the center of Information about the live of Early Man, not only in Sangiran, but also in Indonesia.

2. Ngebung Cluster

Particularly provide information on the history of Sangiran, since the first finding of flakes tool by G.H.R von Koenigswald in 1934, and the first finding of human fossil in 1936

3. Bukuran Cluster

This Cluster provide complete information on human evolution.

4. Dayu Cluster

This is developed as one of Information Center on recent researches.

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Sangiran Site has known worldwide as one of human Evolution Center, and to be shared with world community since 17 was establish as one of World Heritage by UNESCO at 1996. The understanding on the Sangiran's potentials as human evolution center needs to be inverted since early age, to around the pride and love on national identity. By time, they will safeguard and conserve the heritage potentials in Sangiran.



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