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CONTENTS

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Note to Reader

The ANCIENT CEYLON being a journal to which papers are contributed by various writers within and outside the Department of Archaeology it is not possible to adhere to a uniform method of editing, presentation of notes, variation of types, method of reference, &c. Consequently each paper in this issue appears as prepared by the author. The conclusions by the authors do not necessarily reflect the views of the Department of Archaeology.

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FOREWORD

Since the founding of the Department of Archaeological Survey in 1890 Administration Reports have been published to record the administration of the Department as well as progress of archaeological activity undertaken by the Department. It has long been recognised that this annual report of the Archaeological Commissioner is not the appropriate publication for studies by individual officers in the various branches of archaeology within the Department.

Academic publications of the Archaeological Department are Memoirs, Epigraphia Zeylanica and the Corpus of Inscriptions of Ceylon, the first volume of which will be out of the press shortly. None of these are annual publications and the need for such a bulletin of the Archaeological Department has been keenly felt for a long time.

This need is satisfied by the institution of a new periodical Ancient Ceylon and in this first issue are included articles of a specialist nature as well as those calculated to be of interest to a wider group than those directly involved in archaeology or related disciplines.

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6th December, 1970.

PREHISTORIC CEYLON—a SUMMARY in 1968

S. DERANIYAGALA

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INTRODUCTION

Ceylon's prehistory has been described in numerous papers to which ready access is often not available. The purpose of the present paper is to bring together published data which is likely to be of use to the researcher. The writer has omitted such information as is apparently superfluous or out-dated and, apart from organizing the data in an assimilable form, makes no claims to originality.

PART I

Ceylon—Physical features

Ceylon is an ovate island with a 270 mile north-south and a 140 mile east-west axis. It is situated at 80° E. Long. and 8° N. Lat. The shallow Palk Strait separates India from Ceylon by 20 miles at Talaimannar. The 10 fa. isobath connects India with Ceylon.

Ceylon comprises 3 peneplains [5: 55-69*]

1st peneplain	..	elevations, 0-100 ft. although it reaches 400 ft. in places.
1st escarpment	..	400-1400 ft.
2nd peneplain	..	1400-2500 ft.
2nd escarpment	..	2500-5500 ft.
3rd peneplain	..	5500-8000 ft.

The 3rd peneplain is least like a single unit as it consists of a complex of plateaux, mountain chains, massifs and basins, each of which displays a general erosion level. The origin of these peneplains and scarps is still a matter of debate. One theory is that the Island has been elevated relative to the sea level in three stages causing the receding knick points to form escarpments, [1: 438] and the other postulates block uplift in stages. [54: 25-32] The latter theory appears to be more applicable in view of the evidence of block faulting in north-west Ceylon. [48: 17-18,55:202-205]

Ceylon's radial river system has its source in the central mountains. Its streams cascade over the escarpments and deposit much of the load in the extensive coastal plain which forms the first peneplain.

Climate—Soils—Vegetation

The pattern of Ceylon's rainfall, which is convectional is modified to a great extent by the two monsoons. The south-west monsoon reaches its peak in July, the drier north-east in December. The annual rainfall received in the Island varies from 25″ to 200″ depending on the region. Similarly, the temperatures range from 55° to 100° F. The following is an elementary system of climatic zoning which has been correlated with soils and vegetation : [47 42-71]

1. **Warm lowland wet tropical**

   Distribution—south-west Ceylon.

   Rainfall—75-250″ per year. Over 200 days of rain. Considerable excess of precipitation over evaporation.

Ref. no. 5 (vide end of paper), pp. 55-69.

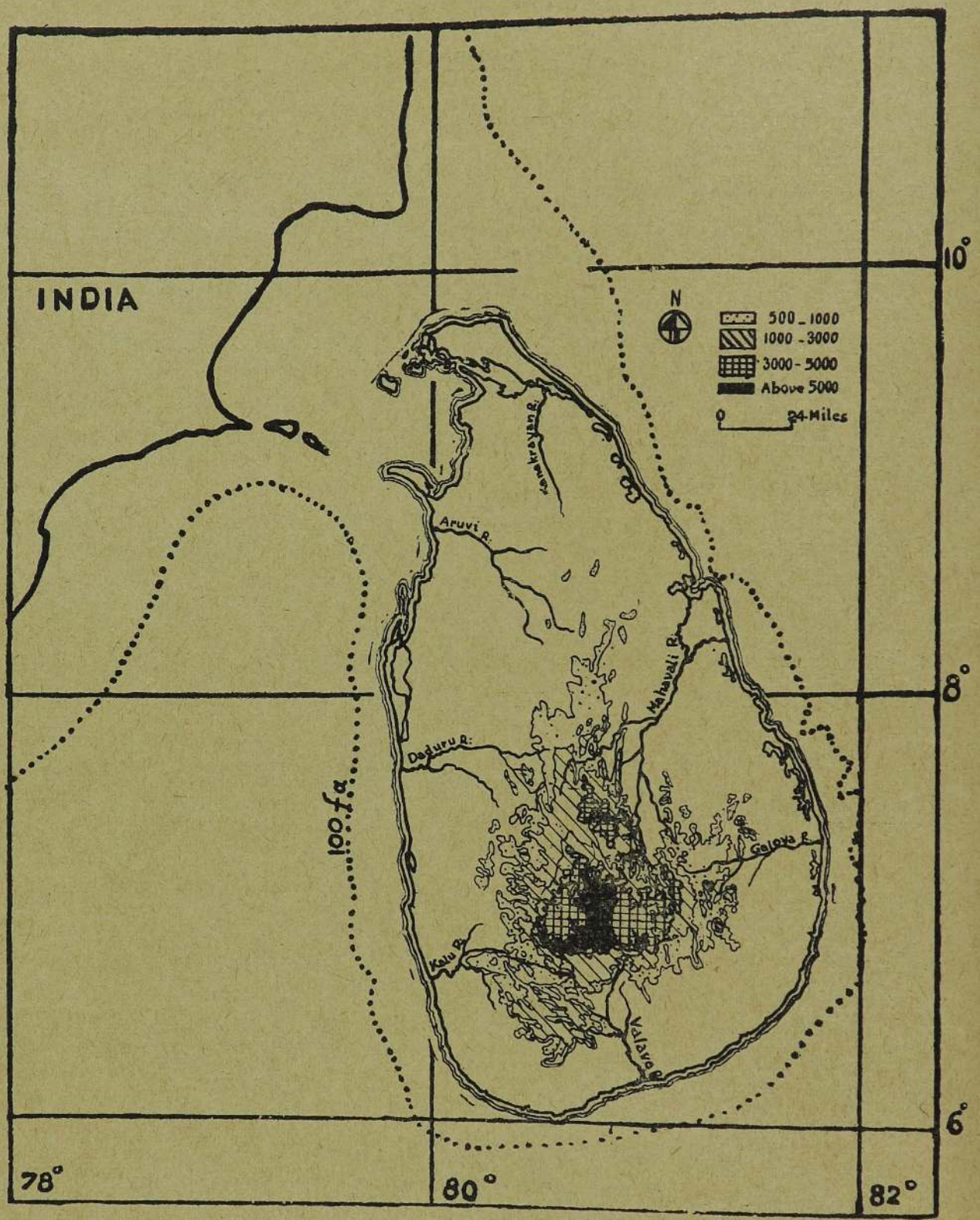


Fig. 1. Relief map of Ceylon.
(*Adapted from Cooray*, 1967).

Temperature—80° F. with very little seasonal variation.
Soil—red-yellow podzols, some being strongly lateritic. [51:68-81]
Vegetation—tropical rain forest. The trees often exceed 100 ft. in height.

2. **Cool montane wet tropical**

Distribution—the central mountains.
Rainfall—75-250″ per year. Over 200 days of rain. The eastern aspect of the hills tends to be drier than the remainder.
Temperature—drops by 1° F. for every 300 ft. of elevation. At the highest elevations the temperature is about 57° F. There is little seasonal fluctuation although the diurnal variation could be as much as 15° F. Frosts are rare.
Soil—red-yellow podzols. [51: 68-81] Peat deposits occur on the highest plateaux.
Vegetation—montane rain forest with trees rarely exceeding 30 ft. in height. Grasslands are common. Savannah occurs in the zone which is intermediate between highland and lowland.

3. **Warm lowland dry tropical**

Distribution—much of the north, east and south of Ceylon. This is the island's largest climatic zone.
Rainfall—50-75″ per year. About 100 days of rain, most of which falls during the north-east monsoon. Severe inter-monsoonal droughts.
Temperature—80° F.
Soil—reddish brown earths. [51: 68-81]
Vegetation—evergreen forests with a fair proportion of deciduous species. The trees are usually about 60 ft. tall. Swampy grasslands occur along certain flood plains and parts of coast.

4. **Warm lowland arid tropical**

Distribution—north-west and south-east Ceylon.
Rainfall—25-50″ per year. The rate of evaporation is higher than in the dry tropical zone and the droughts are longer. The rains are restricted to the period between December and February.
Temperature—80° F.
Soil—latosols on Quaternary loams, recent sands and reddish brown earths. [51: 68-81]
Vegetation—thorny scrub.

Alluviums are to be found along the river valleys traversing the four zones. The floods caused by the onset of the monsoons are sudden and violent. Their erosional capacity is considerable. Most of the older alluviums have been eroded away. The physical environment of Ceylon is unfavourable for the preservation of organic remains.

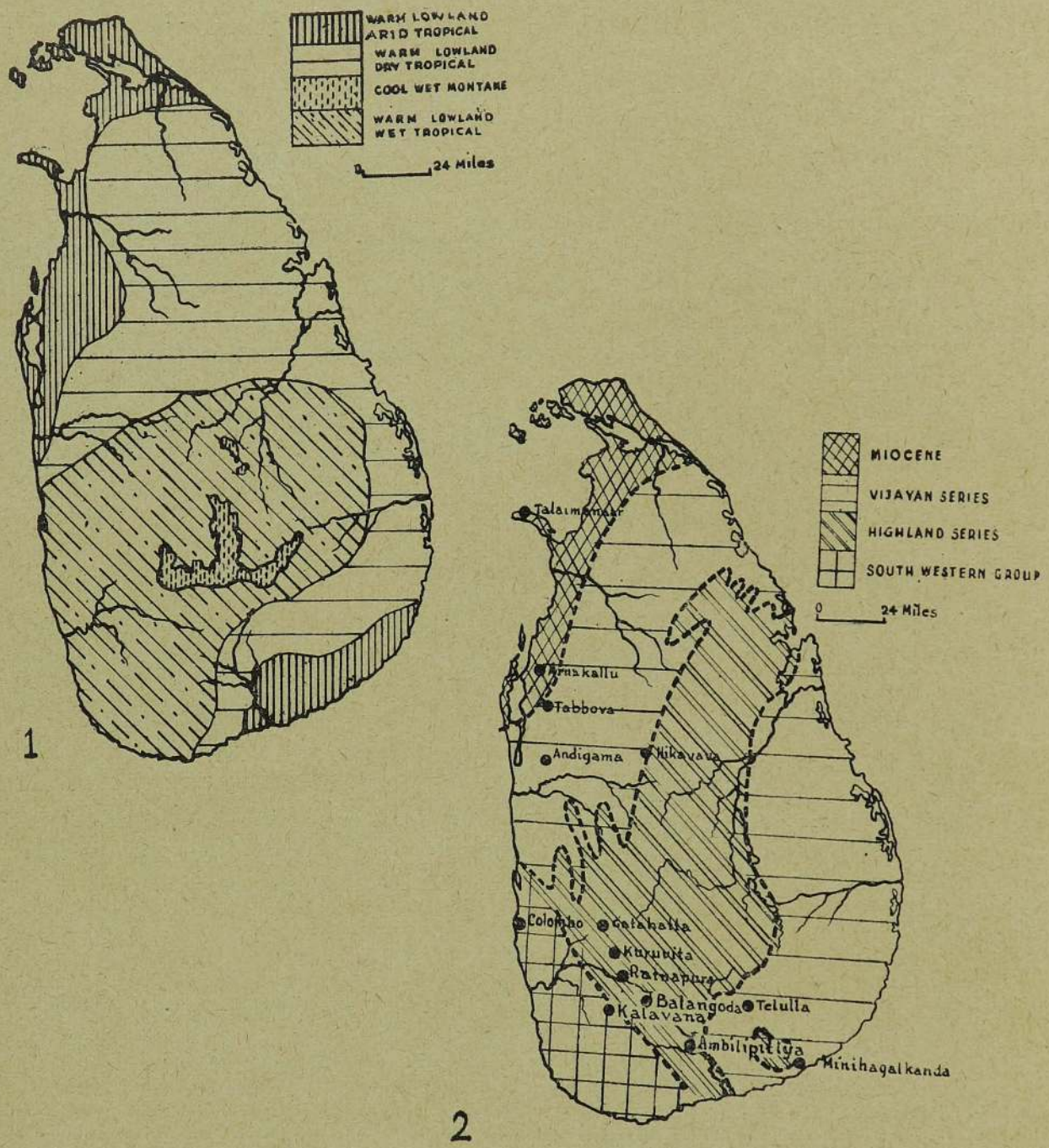


Fig. 2.

1. Soil climates of Ceylon. (*After Fernando, S. N. U.*, 1967).
2. Geological map of Ceylon. (*After Cooray*, 1967).

Geology

Ceylon forms a part of the south Indian shield. It is probable that a rift valley separates India from Ceylon. 9/10ths of Ceylon's rocks comprise a complex of schists, gneisses, granites, granulites and migmatites of considerable variety. [5: 83–124] The history of these rocks appears to be as follows: [5: 245]

Period	Age in millions of years	Geological event	Formation	
Pre—Cambrian	1700	Sediments accumulated in a geosyncline on the edge of the Dharwar land mass. Volcanic flows and basic intrusions accompanied sedimentation.		
	1600	Regional metamorphism of the sediments at high temperatures and pressures. Folding in Taprobanian pattern.	Khondalite and Charnockite metasedimentary groups, typical of Ceylon's central hills.	*Highland series* which runs as a broad band from the north-east to the south-west of Ceylon. It includes the central highlands.
	1500—1300	Metamorphism involving recrystallisation.	Gneissic Charnockites.	
Cambrian	600	Intrusion of pegmatites.	Balangoda granite and other pegmatites.	
Ordovician	500	Metamorphism and folding in Vijayan pattern. Migmatisation, granitisation and profuse intrusion of pegmatites into Highland series.	Granitic and migmatitic gneisses and granites.	*Vijayan series* which flanks the Highland series on the north-west and south-east. The Vijayan folds are highly irregular and small scale, in contrast to the Taprobanian ones.
Silurian—Carboniferous.	440—300	Continued migmatisation, granitisation and intrusion of pegmatites.	Tonigala complex, gneisses of the south-western region, Arangala granite and Ambagaspitiya granite.	

The dolerite dykes which are found cutting through both the Highland and Vijayan series are probably of *Cretaceous* age (135 million years) when Gondwanaland began to disintegrate. The Indian Rajmahal lavas are probably related to these. [5: 245]

The island's thermal springs, frequent earthquakes, oscillation of the shore levels and historical references to loud reports and fissures in the earth during the 17th century A.D. indicate that the crust is till tectonically active. [39: 166-167] Noteworthy is what appears to be an extinct volcano at Minihagalkanda in south-east Ceylon. [33: 149-152] Should this in fact prove to be a volcano, Ceylon would be placed on an aberrant branch of the main volcanic belt which stretches across north India and down into Indonesia. There is said to be a ridge of pumice about 1½ miles off the north-east coast of Ceylon. [5: 193] Diamond, chalcedony, jasper and natural glass are to be found in Ceylon. [39: 167]

Ceylon's *Jurassic* sediments are of an estuarine facies. They rest unconformably upon the earlier crystallines and appear to have been laid when the sea began to encroach upon Gondwanaland. [5: 125-135, 240-242] These sediments include Ceylon's oldest known fossils which are exclusively botanical. The earlier beds found at Andigama, which are over 1000 ft. in thickness, comprise carbonaceous shales alternating with sandstone, which is indicative of a rapid rhythmic variation in sedimentation. [46] These beds have been correlated with the Rajmahals of India [8: 193] and the later Tabbova beds with the Indian Kotas. [55: 206] The Tabbova deposit has been faulted into the crystalline rocks.

The *Miocene* rocks of Ceylon rest unconformably upon the Jurassic. They are mostly limestones of marine origin indicating that the Tethys sea had transgressed into north-west Ceylon during this period separating India from Ceylon, probably for the first time. Another tongue of the Tethys reached into Minihagalkanda in south-east Ceylon. [5: 135-141, 242-244]

Arnakallu, in the north-west, has yielded Ceylon's earliest known vertebrate fossils. [6: 191-192; 7: 356-366] The deposits occur between the present tide marks and comprise rolled gravels of fluviatile origin embedded in a calcareous matrix. The fauna consists of sharks, rays and teleostean fishes of which the most characteristic is *Labrodon sinhaleyus* Deraniyagala. With these were a large marine turtle, a terrapin, a land tortoise, a dugong and a cetotheriid cetacean that was about 13 ft. long.[44] Note the admixture of marine and land forms in what was undoubtedly an estuary. [43: 50] The Miocene beds at Minihagalkanda which belong to a marine facies yielded the puffer fish *Diodon sinhaleyus* Deraniyagala. [18: E4]

PART II

The Quaternary

The Ratnapura Fauna

The older members of the fossil Ratnapura fauna of Ceylon [12: 25] resemble the extinct upper Shivalik fauna of north-west India and, to a more marked degree, the fossil Narmada fauna of west India. [29: 36-42] Both the Indian faunas have tentatively been assigned to the middle Pleistocene. [29: 37-42] Certain members of the Ratnapura fauna have survived up to the present day, some having become extinct within the historic period.

The fossilized remains of the Ratnapura fauna have been found in the heavy mineral horizons of the alluvial Ratnapura beds. [12: 21-23] These alluviums are denudation products from the central mountains. The systematic excavation of the alluvial gravels by gem miners has yielded fossils within a stratigraphic context. The fossiliferous region is approximately bounded by the towns Gatahaththa, Balangoda, Ambilipitiya and Kalavana (fig.2). The gravel lenses, which rarely exceed 3 ft. in thickness, may be overlain by as much as 60 ft. of sand, silt and clay strata. [29: 23] At times, several gravel lenses occur within a single vertical profile. The strata often change over short horizontal distances.[12: 21-23]

A typical section of the fossiliferous alluvium is as follows :

1½ ft.	Humus
3 ft.	Lateritized loam
5 ft.	Blackish clay
5 ft.	Grey clay
3 ft.	Clay with sub-fossil rushes
1½ ft.	Sand
1½ ft.	Gravel
½ ft.	Fossiliferous heavy mineral gravel
—	Weathered bed rock

Many of the fossiliferous gravels have been redeposited as they often contain recent objects such as beads, pottery and iron implements. Their fossils would have been derived from older alluvial deposits which had been eroded by what were probably rejuvenated streams.

The Ratnapura fauna comprises: [29: 42-146]

1. *Geoemyda trijuga sinhaleya* Deraniyagala which was somewhat larger than the living hard shelled terrapin of Ceylon. [13] Its corselet ossification was also thicker than in the latter.

2. *Trionyx punctata sinhaleya* Deraniyagala was larger than the living soft shelled terrapin of Ceylon. [13] The granular prominences upon the external surfaces of the plastral secondary ossifications were fewer and more pronounced than in the living animal.

3. *Crocodylus* sp. is known from a single tooth which is more slender and recurved at the apex than in the living species of Ceylon.

4. *Hypselephas hysudricus sinhaleyus* Deraniyagala was probably identical with the Indian sub-species.

5. *Palaeoloxodon namadicus sinhaleyus* Deraniyagala was somewhat smaller than the Indian sub-species (pl. 1).

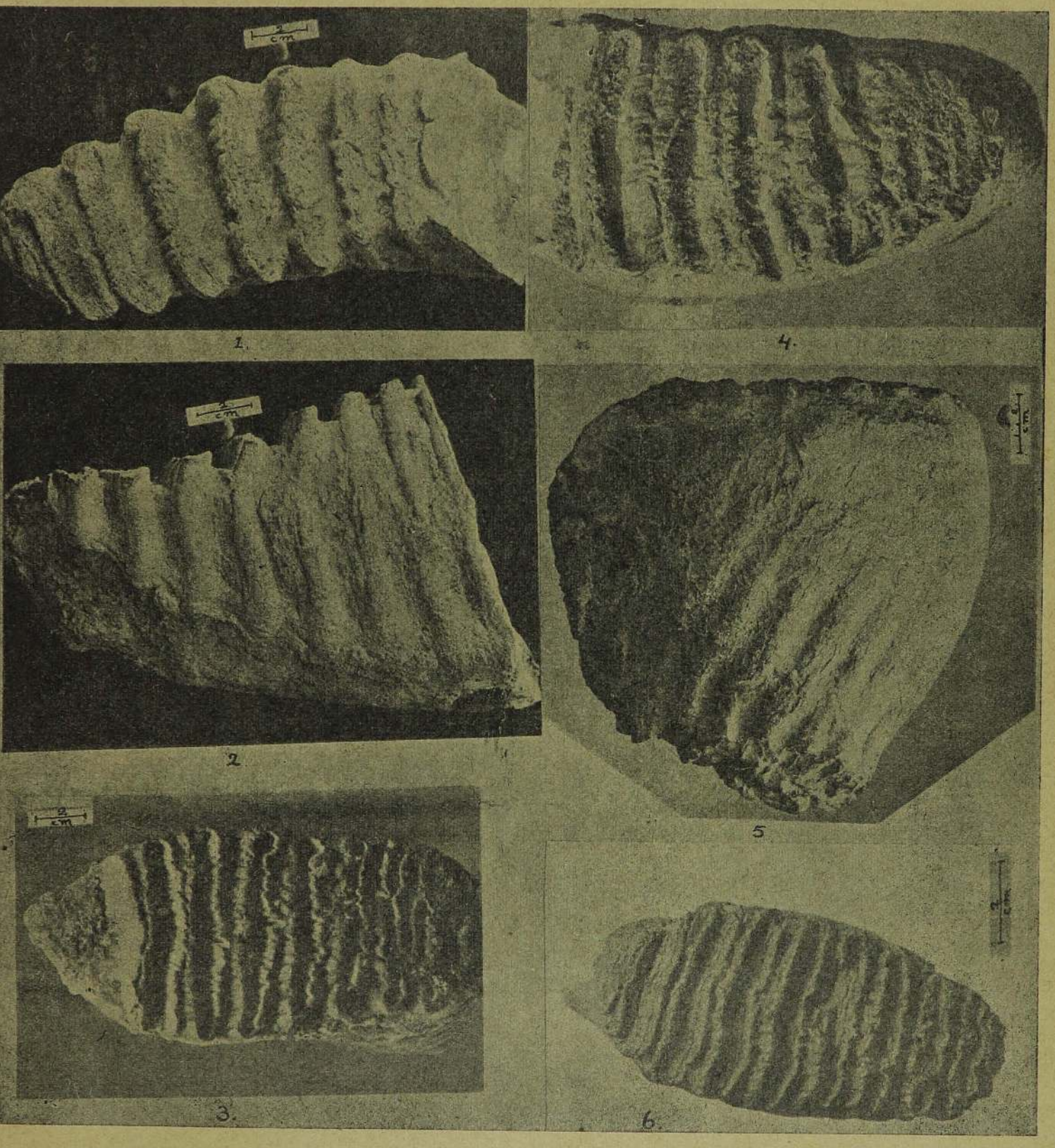
6. *Rhinoceros sinhaleyus* Deraniyagala possessed one horn, low crowned teeth and relatively short limbs. The last was probably an adaptation to swamp conditions. [40: 291-292] The mandible possessed a curved lower edge, as in the modern African rhinoceros, and a strong gonial prominence, which occurs in the Indian animal (pl.2).

7. *Rhinoceros kagavena* Deraniyagala was single horned but possessed more specialized, higher crowned and larger teeth than *R. sinhaleyus*. Both *R. sinhaleyus* and *R. kagavena* possessed blade-like upper incisors and procumbent, conical lower incisors.

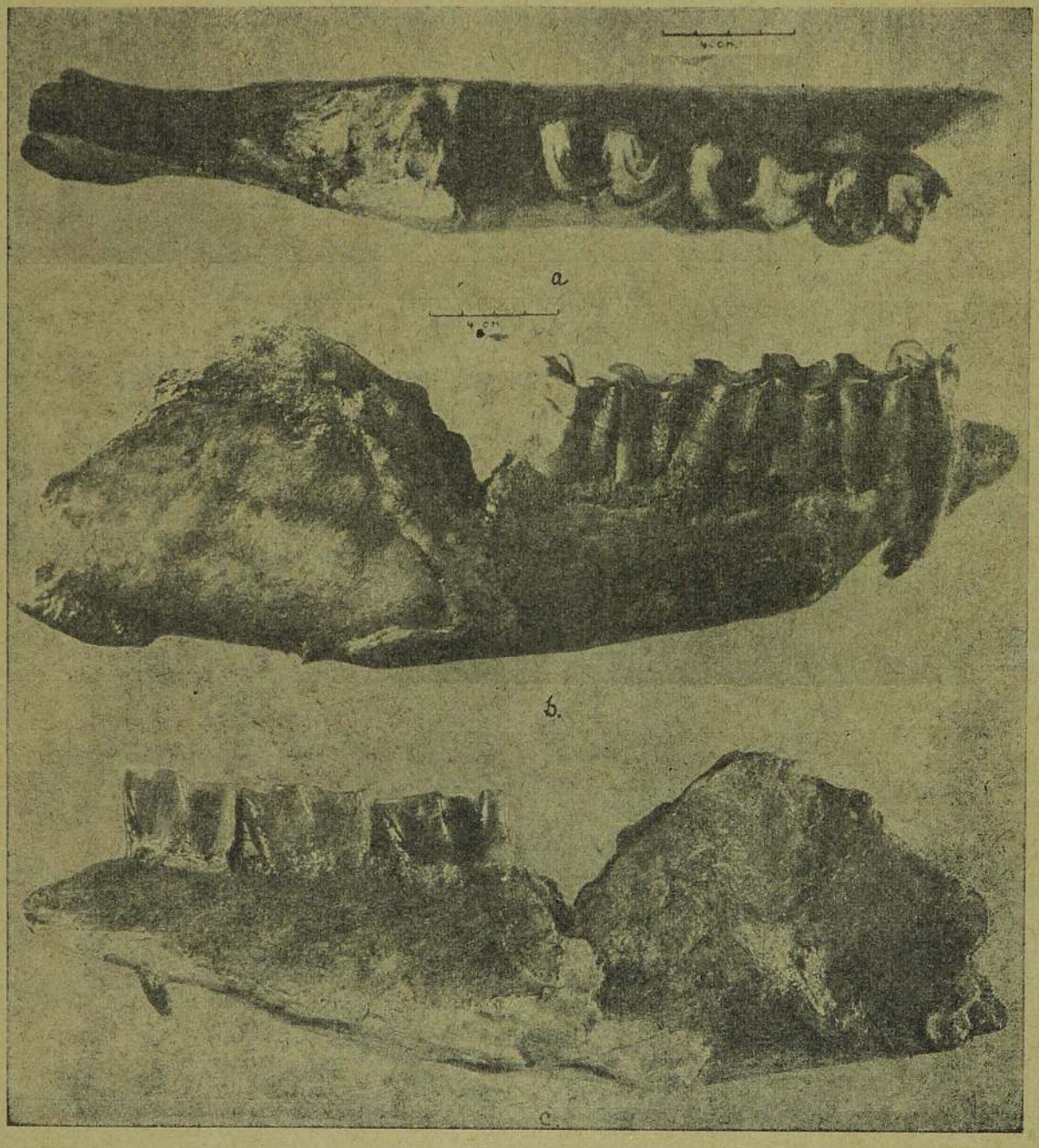
8. *Hexaprotodon sinhaleyus* Deraniyagala was almost identical with the Narmada *H. palaeindicus* F. et C. although the symphysial length is slightly less. [45] The skull is short and square with a short mandibular symphysis (pl. 3). The first lower incisor is smaller than the third. The second lower incisor, which is the smallest, has been pushed upwards by its neighbours so that the tooth line resembles an inverted 'W'. Since *H. namadicus* and *H. palaeindicus* occur together in the Narmada beds, it is likely that Ceylon also had *H. namadicus*. The Ceylon hippopotamus was probably as large as the living African animal.

9. *Hystrix sivalensis sinhaleyus* Deraniyagala was similar to but smaller than the Shivalik porcupine *Hystrix sivalensis* Lydekker.

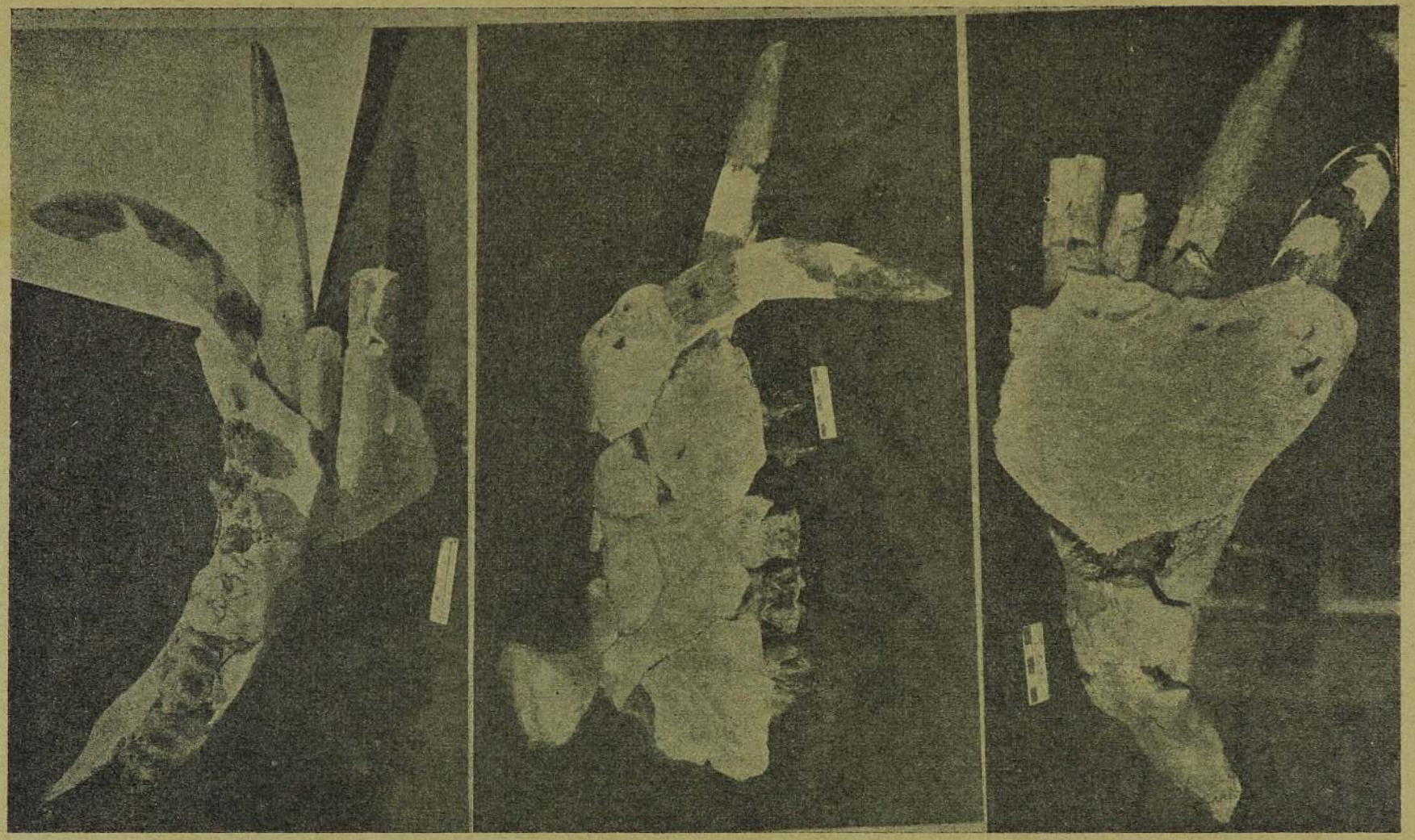
10. *Homopithecus sinhaleyus* Deraniyagala. The upper first incisor, minus the root, of a Hominoid was discovered in the gravels of a gem pit at Karangoda near Ratnapura.[31: 3-6] In association with the incisor were remains of *Hexaprotodon sinhaleyus*, *Rhinoceros kagavena*, *Elephas maximus sinhaleyus*, *Axis axis ceylonensis*, and *Rusa unicolor unicolor*. [38: 31] These hippopotamus, rhinoceros and elephant fossils have been assayed for their uranium content (see below). A probable scraper of rock crystal was also found in association with the *Homopithecus* incisor. [31: 6] The uranium assay on the associated remains appears to indicate that they are all of the same age.



(1—2) Lower molar of *Palaeoloxodon namadicus sinhaleyus.* (3—6) Molars of *Elephas maximus sinhaleyus.*
(After Deraniyagala, P. E. P.; Courtesy, Director, National Museums).

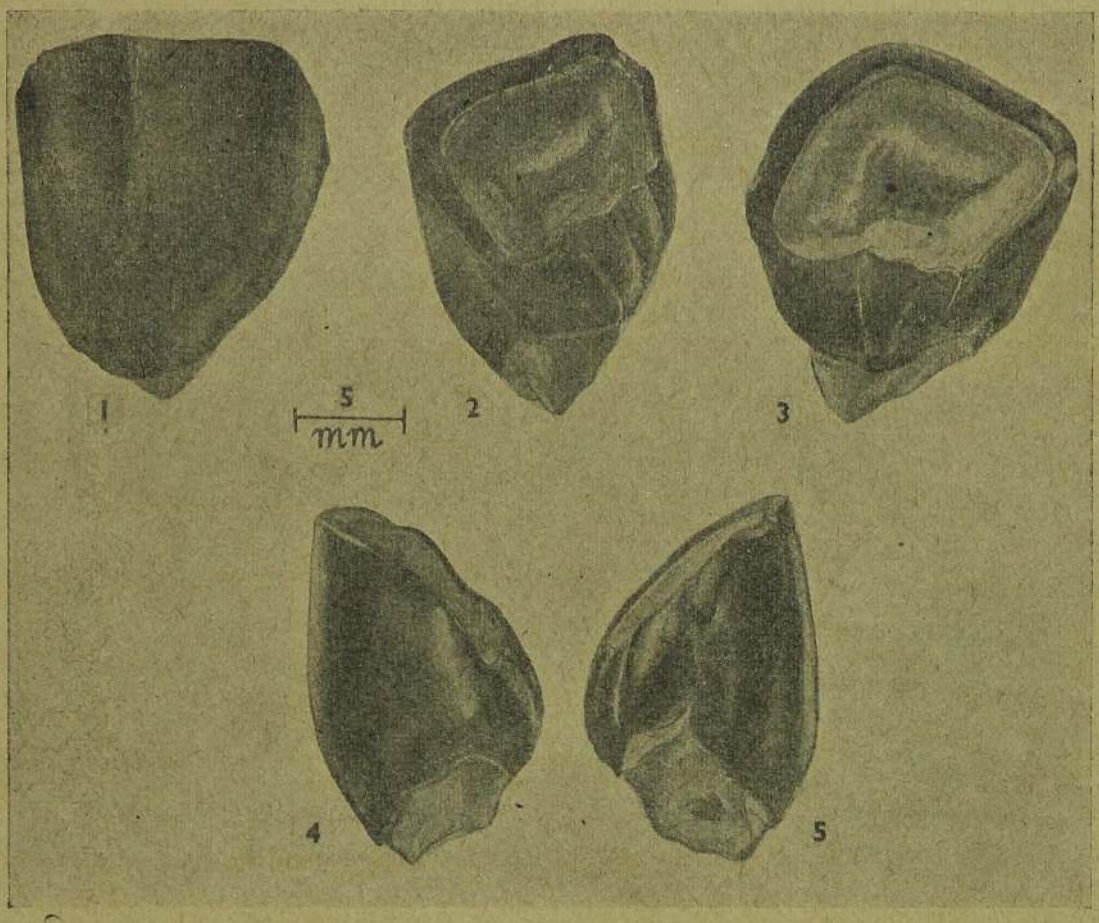


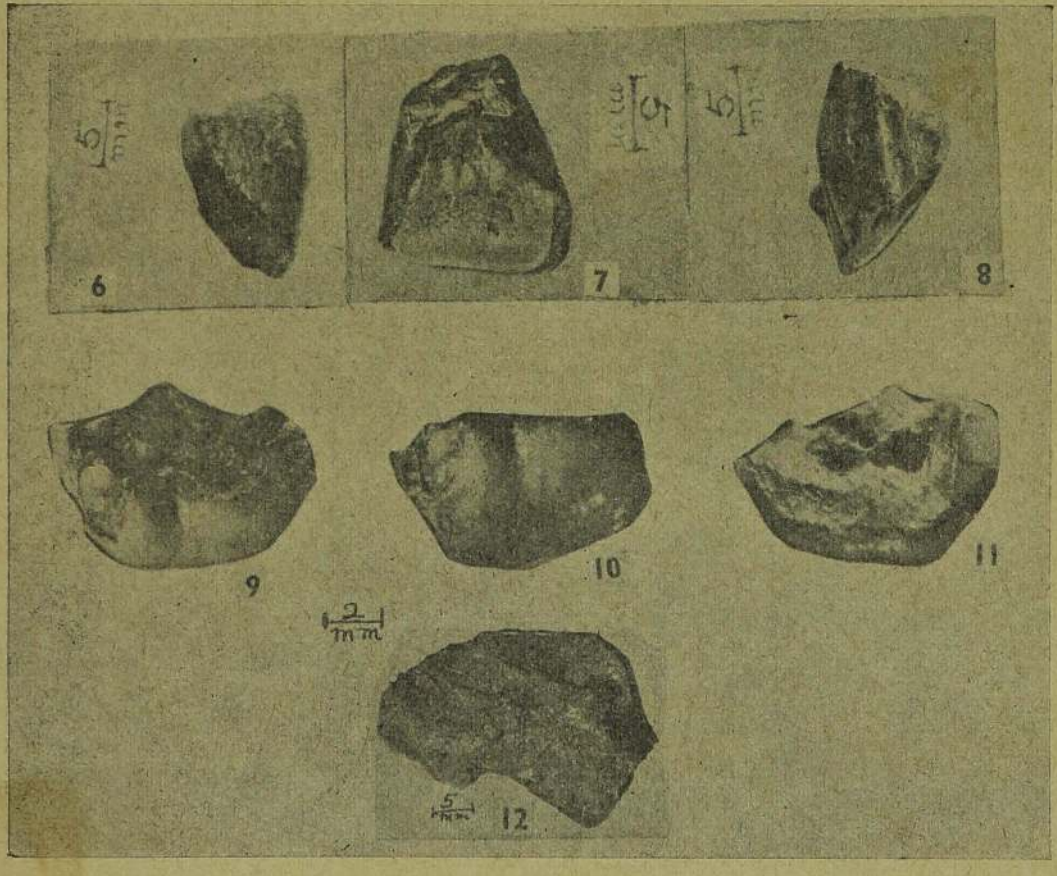
Right mandibular body of *Rhinoceros sinhaleyus*.
(*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).



Left mandibular body of *Hexaprotodon sinhaleyus*.

(After Deraniyagala, P. E. P.; Courtesy, Director, National Museums).





(1—5) Upper first incisor of *Homopithecus sinhaleyus*. (*Wijesekera del.*).

(6—8) *Homopithecus* incisor. (Photographs).

(9—11) Left molar of *Homopithecus*, views of the occlusal, labial and under surfaces respectively.

12) Left brow-ridge of *Homo sinhaleyus*. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).

The strata of the pit which yielded the *Homopithecus* fossil were as follow : [31: 5]

6 ft. Black mud
6 ft. Lateritized earth
3 ft. Leaf fragments and sand
1½ ft. Blue clay
1 ft. Fine white sand
½ ft. Compacted sand
1 ft. Fossiliferous gem gravel
— Greenish micaceous decomposed rock
— Bed rock

The enamel of the incisor is black, the dentine being grey. The tooth bears a resemblance to the incisors of a gorilla, orangutan, gaur, and buffalo and also the premolar of a rhinoceros. However, the slope of its occlusal surface is not as steep as in the incisors of a gorilla, orangutan, gaur or buffalo. The lower premolar of a rhinoceros would also possess a steeper slope of occlusion.[31: 3] The neck of the *Homopithecus* incisor is thick and sub-cylindrical and gradually enlarges into the crown. The crowns of the teeth of the gaur, buffalo and rhinoceros expand abruptly above the neck. [31: 3] The *Homopithecus* incisor possesses three well developed vertical ridges on the enamel of its labial and lingual aspects (pl. 4). Neither the buffalo nor the rhinoceros possess these ridges and the gaur's incisor has three feebly developed ones only upon its labial aspect. [31: 3-4] The almost square shape of the occlusal surface is a Hominid feature. Dr. Adolf Remane of Kiel University who has had considerable experience with Pithecanthropid remains believes that the incisor belonged to a Hominoid.

A comparison of the fossil with the incisors of a man and a gorilla is as follows:[31: 4]

	Fossil	*Gorilla*	*Man*
Ant.-post. thickness ..	10 mm.	12·5 mm.	7 mm.
Height of enamel anteriorly	16 mm.	14 mm.	11 mm.
Width of crown ..	15 mm.	15 mm.	8 mm.

It is suggested that the tooth belonged to a Hominid.

The size of the *Homopithecus* incisor approximates to that of *Pithecanthropus robustus* von Koenigswald of Java and *Gigantopithecus blacki* von Koenigswald of China. [38: 30] Both the latter may be placed in the family *Pithecanthropidae*, sub-family *Australopithecini*. [38: 30]

About ¾ mile upstream from the site where the *Homopithecus* incisor was found, a fragment of an upper left molar* of a Hominoid was discovered in the gem gravel. The associated fauna consisted of

* It is not a premolar, contrary to the initial identification (Deraniyagala, P.E.P. : pers. comm.)

Hexaprotodon, *Rhinoceros kagavena*, *Leo* and bovines. The bedding of the gem pit was as follows: [35: 20]

6 ft. Clayey loam
11 ft. Greyish clay and sand
½ ft. Fine black sand and gravel
2½ ft. Compact black clay and leaf remains
1 ft. Black gem gravel with fossils
— Bluish micaceous decomposing bed rock

The two gravels which yielded the *Homopithecus* incisor and the Hominoid molar may be correlated with each other on the grounds of their proximity and the similarity in thickness and in composition of their overlying sediments. The fossils associated with the molar fall within the same chronological bracket as the fauna found with the incisor (see below); hence it is probable that the former too belonged to *Homopithecus*.

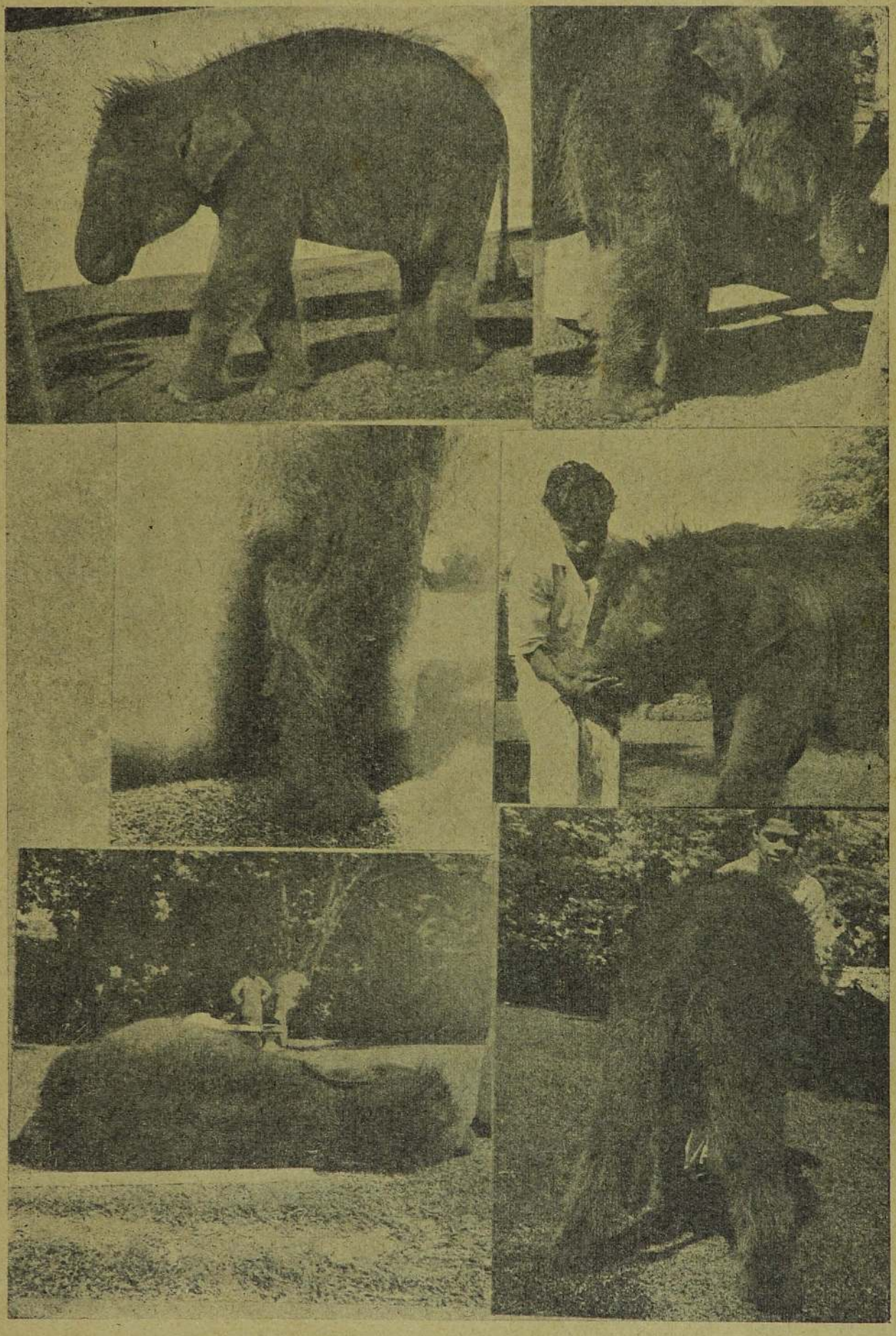
The molar, when reconstructed, would probably be about 20 mm. long, 13 mm. wide and 4.5 mm. high.[38: 31] The cusps are rounded, a Hominid character.

11. *Homo sinhaleyus* Deraniyagala. A heavily mineralized left supra-orbital ridge of a Hominid was secured from a gem gravel near Ratnapura (pl.4). The associated fossils belonged to *Hexaprotodon* and an elephant which was probably *E.m.sinhaleyus*. The bedding of the pit was as follows: [31: 3]

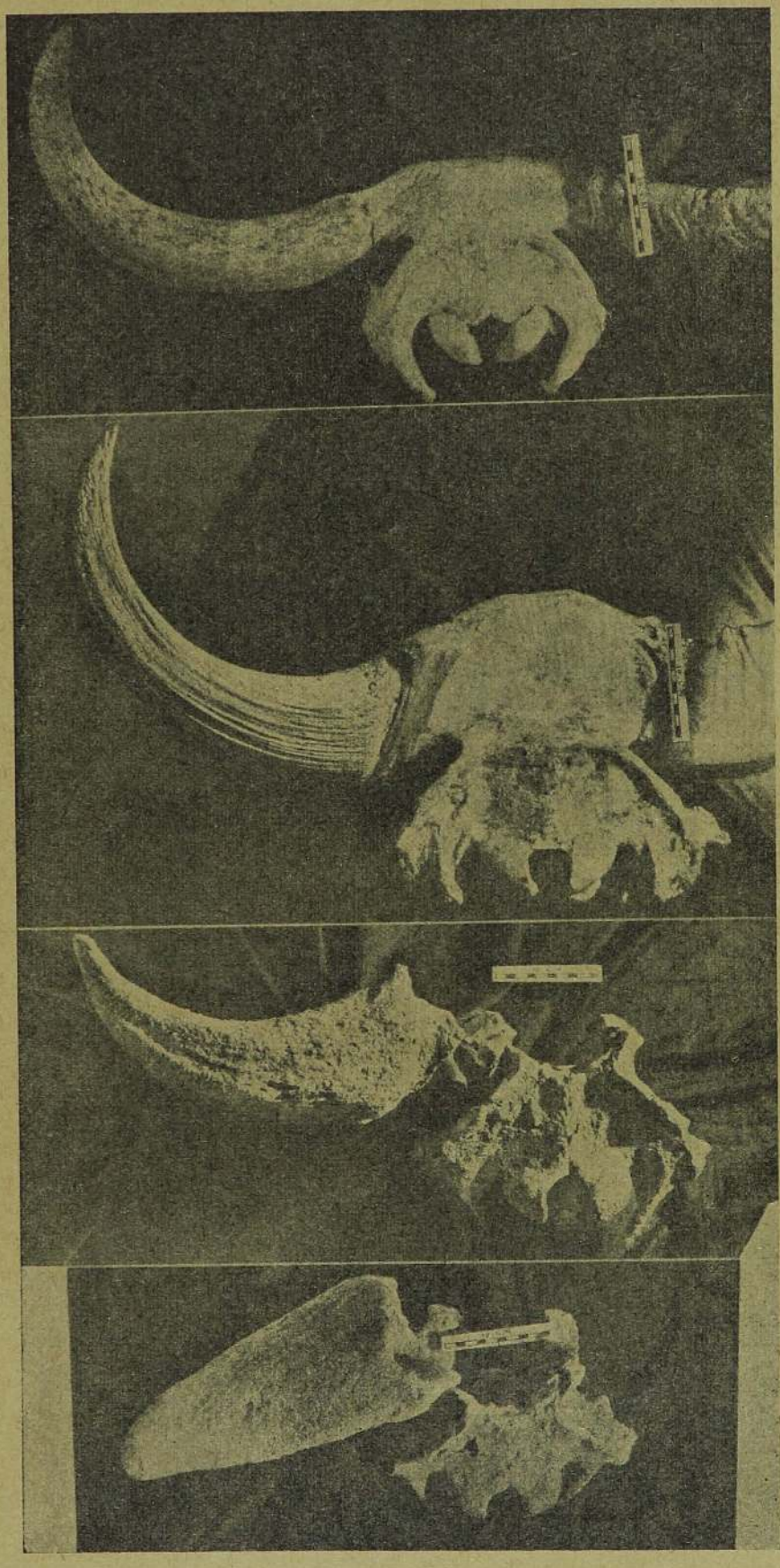
3 ft. Humus
2½ ft. Lateritized earth
4 ft. Blue clay
1 ft. Leaf and clay deposit
2 ft. Black sand
½-2 ft. Fossiliferous gem gravel.
Micaceous kaolinized bed rock.

The supra-orbital ridge is thick and bends abruptly downwards over the nasal bones. The orbit is rather small.[38: 31] The affinities of *H.sinhaleyus* might prove to be with the Neanderthaloids. [31: 2]

12. *Elephas maximus sinhaleyus* Deraniyagala possessed molars which were generally smaller and lower crowned than in the living Ceylon elephant (pl.1). The mandibular spout is shallower and wider. Unlike in the living animal, there is no nutrient foramen in the solitary femur secured. [35: 23] The frequency with which remains of tusks have been found with fossils of *E.m.sinhaleyus* suggests that a greater percentage of tuskers occurred in this race than in the living sub-



Hair tracts of an 1½ year old *Elephas maximus maximus*.
(*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).



1

2

3

4

(3—4) Occiput and left horn core of *Bibos gaurus sinhaleyus* compared with those of a gaur from Mysore (2) and a wild buffalo from Ceylon (1).

(After Deraniyagala, P.E.P.; Courtesy, Director, National Museums).

species of Ceylon. The hairiness of the young of the living sub-species suggests that the adults of *E.m.sinhaleyus* were hirsute, indicating a cold zone of origin (pl.5).[34: 246-248] So far, only Ceylon has yielded such abundant fossilized remains of *E. maximus*. [23: 108]

13. *Leo leo sinhaleyus* Deraniyagala was somewhat larger than the modern Indian lion. Its teeth were more bilaterally compressed than in the latter. The Ceylon animal was probably sparsely maned.[16: 224]

14. *Muva sinhaleya* Deraniyagala was a small deer with the bezel of the antler 1½ times as long as it is wide. The distance from the bezel to the junction between the brow tine and the beam is less than the width of the bezel.

15. *Cuon javanicus sinhaleyus* Deraniyagala was almost identical with the living hunting dog of peninsular India.

16. *Sus sinhaleyus* Deraniyagala was about 2/3 the size of the living wild pig of Ceylon and was more brachydont than the latter. Gem miners claim to have dug up unusually elongate pig skulls which were smaller than in the living animal.

17. *Bibos gaurus sinhaleyus* Deraniyagala was somewhat smaller than the living Indian gaur. The horns were shorter, wider and thicker than in the latter (pl.6). [35: 16-19] The animal became extinct in Ceylon during the 19th century.

18. *Gona sinhaleya* Deraniyagala. A mineralized horn core of what was probably the ancestral form of *Bos indicus* was discovered in the North-Central Province.

19. *Tatera sinhaleya* Deraniyagala. The teeth were larger, thicker bilaterally and more curved than in the living gerbil rat of Ceylon *Tatera ceylonica* Wroughton. [31: 13] The growth corrugations on the dentine were less prominent than in the latter.

20. Fossil remains of the spotted deer *Axis axis ceylonensis* Fischer, the sambhur *Rusa unicolor unicolor* Kerr and the buffalo *Bubalus bubalis migona* Deraniyagala have been found in the gem gravels. These animals were identical with the living forms.

THE RATNAPURA INDUSTRY [10: 359]

The Ratnapura Lithifacts [14: 124-134, 29:57-64] occur in the gem bearing gravels, often in association with the Ratnapura fauna. Since the Ratnapura gem gravels appear to have been subjected to redeposition, the chronological sequence within the industry itself and also relative to the Ratnapura fauna is obscure. It is likely that several industries or phases of industries occur in association.

The lithifacts were usually manufactured from quartz, both of the milky and clear varieties, and chert which displays a bronze patina if overlain by leaf beds. [29: 54] Chert and quartz occur as veins in Ceylon's crystalline rocks.

The intractability of the raw material was responsible for the absence of definite types in the Ratnapura industry. It is a chopper industry bearing a vague resemblance to the Sohan of north-west India. [10: 359] Many of the artefacts were manufactured from pebble cores and, as in the Sohan industry, a relatively large area of cortex was often left unflaked on the finished product. A small proportion of implements was made from large flakes. The Sohan quartzites were superior as raw material and the finish on the implements was better than in the Ratnapura industry.

The Ratnapura artefacts range in size from approximately 9 ins. to 2 ins. The shapes of some conform vaguely to discoid, cleaver and hand-axe forms. The cleavage planes of milky quartz were often utilized in producing a cutting edge. Large quartz crystals have also been trimmed into artefacts which often retain crystal facets. Secondary work is rare and irregular.

Those members of the Ratnapura fauna which differ from Ceylon's living fauna solely in sub-specific characters, e.g. *Elephas maximus sinhaleyus*, may be regarded as sub-recent or of upper Pleistocene age.[29: 59] The implements found in association with such a faunal assemblage often display a higher degree of workmanship than is generally associated with the Ratnapura industry; hence these have been attributed to a late phase of the industry.[29: 59] A typical form of the late Ratnapura industry is the tortoise-backed scraper which was made by splitting a pebble through its middle and thereafter removing flakes from the convex surface to produce a sharp peripheral edge.[29: 64] However, the occasional occurrence of meso-neolithic lithifacts in the Ratnapura gravels complicates the issue.

It is noteworthy that the Ratnapura industry occasionally occurs in association with the hippopotamus. Neither the Narmada nor the Shivalik hippopotami have been found in association with artefacts.[22]

DATES AND CORRELATION

Isotopic dating :

The assistance of Dr. Kenneth Oakley of the British Museum has enabled uranium assays to be conducted upon four groups of fossil teeth belonging to the Ratnapura fauna.[21:51,29:123,31:8,38:29] The conclusions derived from the individual tests are as follow :

1. *Hexaprotodon* was older than *Elephas maximus sinhaleyus.*
2. *Hexaprotodon* was somewhat older than *Rhinoceros kagavena.*

3. *Hexaprotodon, E.m. sinhaleyus* and *R. kagavena* were contemporaries. Since the *Homopithecus* incisor belonged to this assemblage, it was in all probability of the same age as the others.

4. *Rhinoceros sinhaleyus* was nearly twice as old as *E.m. sinhaleyus* which was slightly older than *Hexaprotodon.*

Tests for Carbon 14 were conducted at the Tata Institute, Bombay on two lots of wood which had been procured from fossiliferous gem gravels near Ratnapura. [3: 189-191] The results are as follow :

1. *Mesua* sp. more than 47,000 years B.P. (Wurm 2/3 I.st.)
2. *Lagerstroemia speciosa* 7520±150 B.P.

Both plant forms are to be found in this region today. It is not possible to state their provenance with exactitude as the degree of river transportation undergone is not known. The date obtained for the *Mesua* sp. should be viewed with caution as C/14 dates are apt to register large errors when approaching the 50,000 year mark. One could only conclude that the *Mesua* sample is of Pleistocene age.

Conclusions : *Rhinoceros kagavena, Hexaprotodon* and *Elephas maximus sinhaleyus* were probably contemporaries. A rhinoceros, probably *R. sinhaleyus*, lived during an earlier age.

Dates by correlating with other extinct faunas:*

1. No hyaena, antelope or horse fossils have been discovered in Ceylon. The last named occurs in the Narmada beds but not in Java.[29: 36-38] In the Shivaliks the Mastodon last occurs in the Tatrot zone (Astian[56: 279]) and the Stegodon in the Pinjaur zone (Villafranchian [56: 279]). In Java a Stegodont occurs in the Djetis beds which have been regarded as somewhat more recent than the Pinjaur ones.[56: 279]. No Stegodont or Mastodont remains have been found in the Ratnapura gravels; hence the latter, at its earliest, post-dates the Pinjaur and Djetis beds. The Shivalik upper Boulder Conglomerate, the Narmada and the Trinil beds have been correlated with the Alpine Mindel[56: 277,279] Ceylon's earliest Pleistocene faunal remains may be correlated with those of the Shivalik Boulder Conglomerate, Narmada and Trinil beds. An age of 490,000 years (Gunz/Mindel I.gl.) has been attributed to the Trinil beds by potassium/argon testing of the Muriah rocks.[52: 117] The Shivalik lower Boulder Conglomerate has been correlated with the Alpine Gunz/Mindel I.gl.[56: 277]

2. The Indian palaeoloxodont, *Hypselephas hysudricus*, first occurs in the Pinjaur zone of the Shivaliks (Villafranchian). The animal disappears after the Shivalik Boulder Conglomerate stage (Mindel). Its remains were also found in the Narmada gravels. Hence, the Ceylon sub-species might be placed in the early middle Pleistocene (Gunz/Mindel I.gl. and Mindel).

* The lower dates assigned to the Ceylon sub-spp. might well be too late in view of the rapidity with which migrators cover ground.

Fig. 3. Early middle Pleistocene—*Hypselephas* and *Rhinoceros sinhaleyus*. (*P. Deraniyagala del.*).

3. *Palaeoloxodon namadicus* occurs in the Shivalik Boulder Conglomerate (Mindel) and in the Narmada deposits. Assuming that this species spread to Ceylon from India, one might attribute a Great Interglacial age for the Ceylon sub-species which would have had sufficient time to evolve a smaller stature. *Palaeoloxodon namadicus* had a wide distribution in Asia, ranging as far eastward as China and Japan.

4. *Hexaprotodon* ranges from the Shivalik Dhok Pathan stage (Pontian) [56: 277] into the Boulder Conglomerate (Mindel). *H. palaeindicus* and *H. sinhaleyus* were more specialised than *H. sivalensis*; hence they were probably more recent. The degree of mineralization of Ceylon's *Hexaprotodon* fossils is highly variable. This probably indicates that the animal had lived upon the Island for a considerable length of time, which is in accordance with the evidence from isotopic dating. The frequent association of *H. sinhaleyus* remains with those of *Elephas maximus sinhaleyus* suggests that they were contemporaries at one stage. Uranium assays appear to confirm this surmise. Since *Elephas maximus sinhaleyus* is being regarded as an upper Pleistocene animal, *H. sinhaleyus* might have lived from about the Great Interglacial into the Wurm glaciation or later.

The traditional ' Makara ' motif of Ceylons art appears to have been the stylized representation of the hippopotamus. [39: 208] The points of similarity between the ' Makara ' and the Hippopotamus are as follow : both are aquatic creatures possessing heavy mandibles, elevated eyes, quadricuspid molars and feet with their digits apart. The ears of the two animals are very much alike. A fading traditional description has caused the transposition of the hippopotamus, elongate lower canines into the upper jaw of the ' Makara ' by analogy with the tusks of an elephant. It is possible that Ceylon's prehistoric man had seen the hippopotamus in the not too distant past, although its remains have not been found in the human habitation levels excavated so far. [39: 208]

Hippopotamus fossils have been found within an elliptical area, 19 miles long and 7 miles wide, extending from Gatahaththa to Ratnapura. [40: 291] This was probably a lake area during the middle Pleistocene. Reeds growing in shallow water probably formed much of the diet of the hippopotamus. The frequent occurrence of sub-fossil rushes in the Ratnapura alluviums confirms the existence of extensive reed beds within sub-recent times.[29: 30] The meso-neolithic finds at Vak Oya appear to have been deposited in a swamp. Ceylon's meso-neolithic man probably saw the hippopotamus and also the end of one of the later lake phases.[39: 186]

The large artificial reservoirs (tanks) of Ceylon have been built within the last 2,500 years. The degree of variety of their aquatic fauna suggests that it had originated under natural lake conditions;

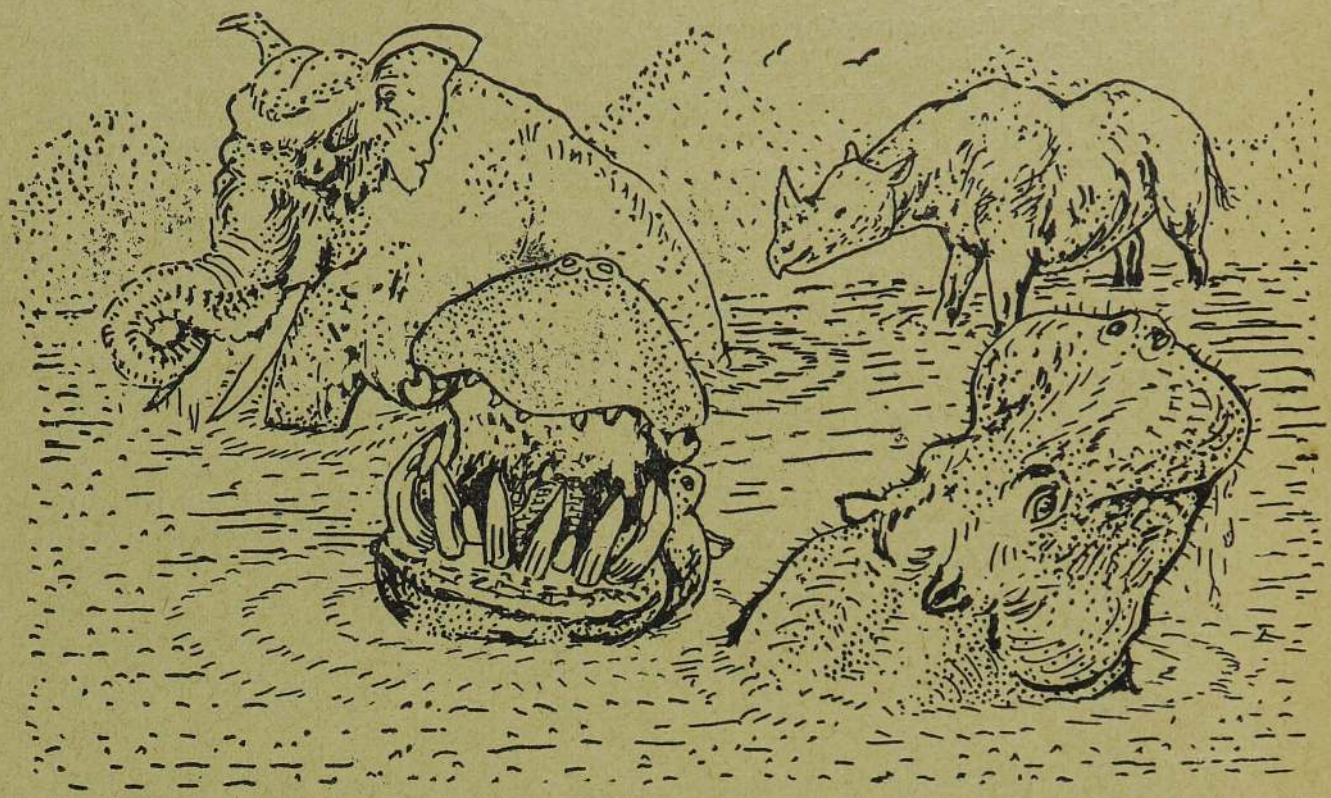


Fig. 4. Late middle and early upper Pleistocene—*Palaeoloxodon*, *Hexaprotodon* and *Rhinoceros kagavena*. (*P. Deraniyagala del.*).

Fig. 5. Upper Pleistocene—*Elephas maximus sinhaleyus*, *Rusa*, *Bibos*, *Cuon*, *Leo*, *Sus*, *Melanochelys* and *Crocodylus*. (*P. Deraniyagala del.*).

hence the replacement of the (Hippopotamus containing?) natural lakes with artificial ones, due possibly to regional desiccation, might have occurred within proto historic times. [25: 129] The evidence from south Ceylon (see Part III, *climate*) supports the sub-recent desiccation theory.

5. *Elephas maximus sinhaleyus* differs from the living sub-species in minor features. Its remains have been found together with those of *Axis* and *Rusa* which were identical with the living forms and may be assigned to the upper Pleistocene. The living *E. maximus* possesses a vestigial fronto-parietal crest and, occasionally, worn teeth display the loxodont sinus (pl 7).[27: 190-192] In view of such atavistic characters it is difficult to state with any certainty whether a molar belonged to one of the palaeoloxodonts or to *E. maximus*. It is probable that the various elephant teeth found in the Ratnapura gravels represent a complete evolutionary sequence from *Hypselephas* to *Elephas*.

The swamp elephant of Ceylon, *Elephas maximus vilaliya* Deraniyagala, lacks externally visible tushes and possesses proportionately shorter legs, a wider pelvis and a thicker trunk than *E.m. maximus* Linne, the common elephant of Ceylon.[23: 104-107] The above-mentioned physical characters of *E.m. vilaliya* may be regarded as adaptations to swamp conditions during a lake phase. The present swamps are not extensive enough to warrant sub-specific adaptation by such a far ranging animal as an elephant. *E.m. vilaliya* is one of the largest and most massive races of *E. maximus*.

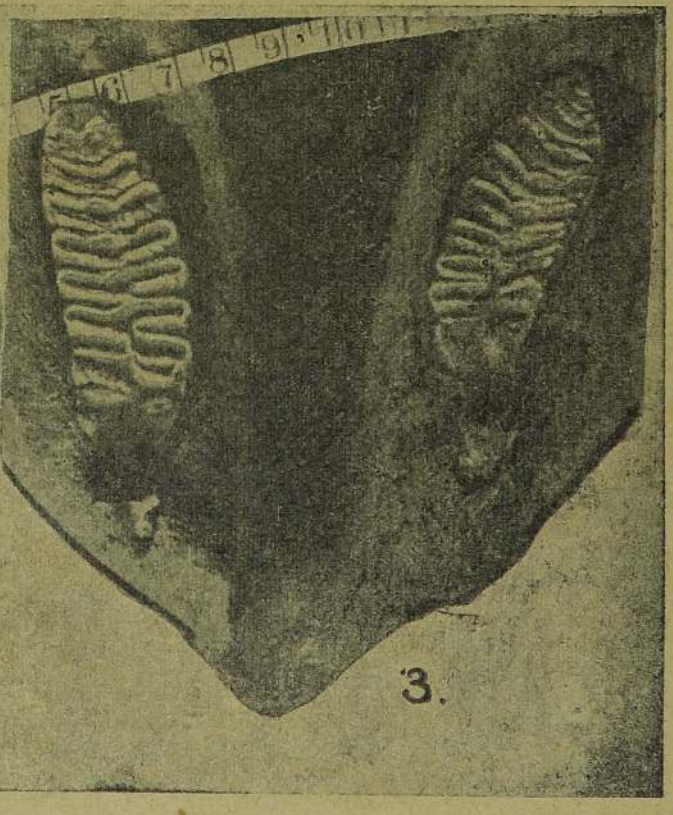
The gaur and lion are said to have inhabited Ceylon within historic times and the Sinha Raja forest is reputed to have been the last haunt of the latter. The early Sinhala sculptures of lions were more realistic than the latter ones, suggesting extinction within early historic times. [6: 223] A fossil metacarpal found in the Kurnool caves of South India has been suspected of being that of a lion. [49: 120-122] Late mediaeval literature refers to Sinhala kings testing the mettle of their warriors by arming them with sword and spear and pitting them against wild gaurs.[29: 141] The men were expected to stand their ground when the beasts charged.

6. The frequency with which fossils of *Rhinoceros kagavena* have been discovered in association with those of *E. maximus sinhaleyus* suggests that they were contemporaries. This has been further confirmed by the uranium assay on the fossils in association with the *Homopithecus* incisor. *R. kagavena's* dentition was more specialized than in *R. sinhaleyus*; hence it was a more recent form, probably of the late middle and upper Pleistocene.

7. *Homopithecus*, if of the same age as the other associated fossils, could have been a late middle and upper Pleistocene survival in Ceylon of the Javanese *P. robustus* which lived during the Gunz/Mindel interglacial.

A TENTATIVE CHRONOLOGY FOR SOME MEMBERS OF THE RATNAPURA FAUNA

DIVISIONS OF THE PERIOD	Middle Pleistocene					Upper Pleistocene		Holocene
ALPINE GLACIATIONS	Günz	I.gl.	Mindel	Great I.gl.	Riss	Last I.gl.	Würm	Post Glacial
YEARS B.P. (*After Zeuner* 1958)	550,000:	500,000:	450,000:	250,000:	200,000:	125,000:	75,000:	0—10,000:
Hypselephas		×	×					
Rhinoceros sinhaleyus		×	×					
Palaeoloxodon				×	×			
Hexaprotodon				×	×	×	×	×
Homopithecus					×	×		
Rhinoceros kagavena					×	×	×	
Leo					×	×	×	×
Elephas maximus sinhaleyus						×	×	
Homo sinhaleyus						×	×	
Bovines						×	×	×
Rusa						×	×	×
Axis						×	×	×



Atavistic characters in a female *Elephas maximus maximus*. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).
(1) Skull. (2) Abnormal left upper molar. (3) Lower molars with prominent loxodont sinuses.

Prehistoric Land Connections postulated upon similarities between present day faunas

1. India and Ceylon

Certain animals and plants not found south of the Himalayas (some of them occur in the Nilgiri mountains) are to be found in the cool, high altitudes of Ceylon's mountains. [10: 355-357,39:173]

Among such forms are :

(*a*) Certain mountain stream fishes such as *Nemacheilus botia* Day.

(*b*) The Lamellibranch *Pisidium vincentianum* (B.B. Woodward).

(*c*) The ant *Acantholepis capensis lunaris* Em.

(*d*) The swamp deer *Axis porcinus* (Zimmerman) which does not occur south of the Indo-Gangetic valley.

(*e*) The plant *Rhododendron*.

Conclusions.—These forms could only have had a continuous distribution between the Himalayas and Ceylon when the Island was connected to the mainland during cool phases. These phases, or phase, which have been termed the *Ratnapura phase*,[29:32] were probably contemporary with one or more of the Himalayan glaciations which were in all probability accompanied by a general drop in temperature and of the mean sea level. The latter event would have created a land bridge between India and Ceylon, as the straits which separate them today are very shallow. Since the tiger and king cobra of India do not occur in Ceylon, they appear to have arrived in south India after the Island had separated finally from India. Most of the Ceylon animals have evolved only sub-specific characters since their isolation from the mainland; hence, although parts of south India were under glaciers during the upper Carboniferous, the Ratnapura phase most probably belonged to the Quaternary. The onset of a warm and probably arid climate, which has been termed the *Palugahaturai phase*,[29:33] subsequent to the cool phase, caused the isolation of the above mentioned forms in the cool altitudes of the mountains. The warm and humid climate obtaining at present has been termed the *Colombo phase*. Several such cycles might have occurred during the Pleistocene.

The occurrence of submerged river channels, cutting across the continental shelf which separates north-west Ceylon from India, when considered in conjunction with the close similarity between the fresh water fishes of the two countries, suggests that the Island had been connected to India in fairly recent, probably Holocene, times.[29:14]

A point to be noted is that tectonic elevation and subsidence of the coasts would also have played an important part in the sequence of land connections with India. Even within the last three centuries, parts of north-west Ceylon have undergone subsidence and elevation,[39:166-167] and a correlation between the Pleistocene glaciations of the Himalayas, eustasy and the land connections between India and Ceylon cannot be effected.

2. There are animals that are common to Ceylon and certain other countries which do not occur in India.[9,17:9-10,39:172-173] Since some of these countries are separated from Ceylon by deep oceans, the continental drift theory might explain this occurrence. Some of the forms are :

(*a*) The fresh water fish *Belontia* Myers—**Ceylon** and **Malaya.**

(*b*, *c*) The bat *Leuconoe hasseletti* (Temminck) and the plant *Kayea* Wall—**Ceylon, Assam, Malaya, Siam, Java** and **Sumatra.**

(*d*) The water monitor lizard *Varanus salvator* Laurenti—**Ceylon,** the **Andaman** and **Nicobar Islands, Assam, Malaya, Java, East Indies** and **China.**

(*e*) Snakes of the genus *Cylindrophis* Wagler—**Ceylon, Burma, Malaya, Indo-China** and **Celebes.**

(*f*) The lizard *Cophotis* Peters—occurs only on the highest mountains of **Ceylon** and **Sumatra.** Usually it dies within a few days of being brought into the warm coastal plains. A constant climate would have prevailed in the terrain which lies between Ceylon and Sumatra for the animal to have distributed itself from one country to the other.

(*g*) Snakes of the genus *Aspidura* Wagler—**Ceylon** and the **Maldive Islands.**

(*h*) Skinks of the sub-family *Acontianinae*—**Ceylon, Madagascar** and **South Africa.**

Conclusions.—The animals common to Ceylon and the Maldives on the one hand and Ceylon, Madagascar and South Africa on the other appear to have evolved sufficiently after isolation to be given generic or specific status of their own. The forms which are common to Ceylon and south-east Asia have not evolved independently to the same extent as say the *Acontianinae*. It seems likely that the land connections existed when Africa, Ceylon and south-east Asia formed a part of Gondwanaland. Africa appears to have broken away from Ceylon at an earlier date than did south-east Asia. Africa separated from Indo-Ceylon during the Cretaceous.

PART III

The Balangoda Culture (*Late Stone Age*)

INTRODUCTION

The Balangoda culture[10:361] comprises the mesolithic and neolithic phases of Ceylon's stone age. The mesolithic artefact assemblage consists of stone and bone implements. The neolithic phase heralded : (1) the technique of producing stone implements by abrasion, (2) the solid core drill and (3) pottery. It is proposed to deal with the two phases as a single unit, pending the accumulation of data. The neolithic aspects of the Balangoda culture will be pointed out in passing.

The Balangoda culture has had an Island-wide distribution, at any rate in its mesolithic phase. The people lived in caves, on dunes and on hilly terrain near water. They probably resorted to caves during the rains.

The two C14 dates obtained for the culture are 114 B.C.± 200 years and 1448 A.D.± 150 years, suggesting that Balangoda man had survived well into the historic period which commenced c. 500 B.C.

LITHIFACTS

1. The microlithic element is dominant. The raw materials consist of quartz and less frequently chert. Artefacts made of corundum, jasper and translucent chert occur but are rare.

   The diffuse bulbs of percussion and the unifacetted platforms present on the majority of flakes suggest that they were detached by indirect percussion. Some of the points found in the bone industry could have been used for this purpose. The bulb of percussion is obscure in artefacts made of milky quartz due to the tendency to fracture along cleavage planes and the granular texture of the material. The maximum use was made of the cleavage for producing a cutting edge.

   The core types are as follow :

   (*a*) Unclassifiable cores on which any suitable surface has been utilized as a striking platform.

   (*b*) Discoidal cores from which flakes have been removed from alternating sides in rotation.

   (*c*) Cores that are intermediate between polyhedric and discoidal.

   After exhaustion the cores have often been used as choppers or scrapers.

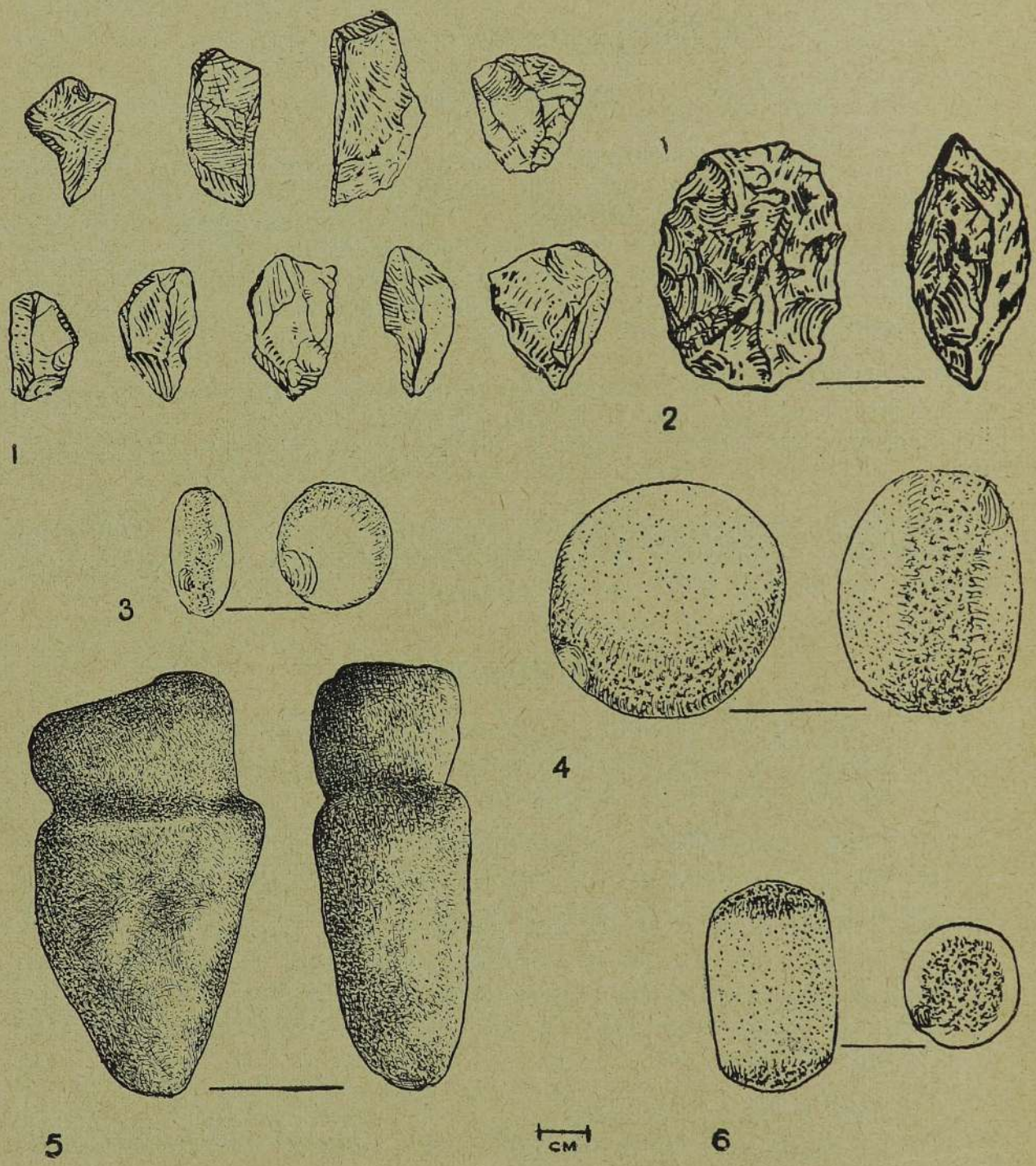


Fig. 6. Balangoda Lithifacts. (*After Deraniyagala, P. E. P.: Courtesy, Director, National Museums*). (1) Microliths, (2) Scraper, (3, 4, 6) Hammers; from Bellan bandi palassa. (5) Grooved hammer from Vatapotha.

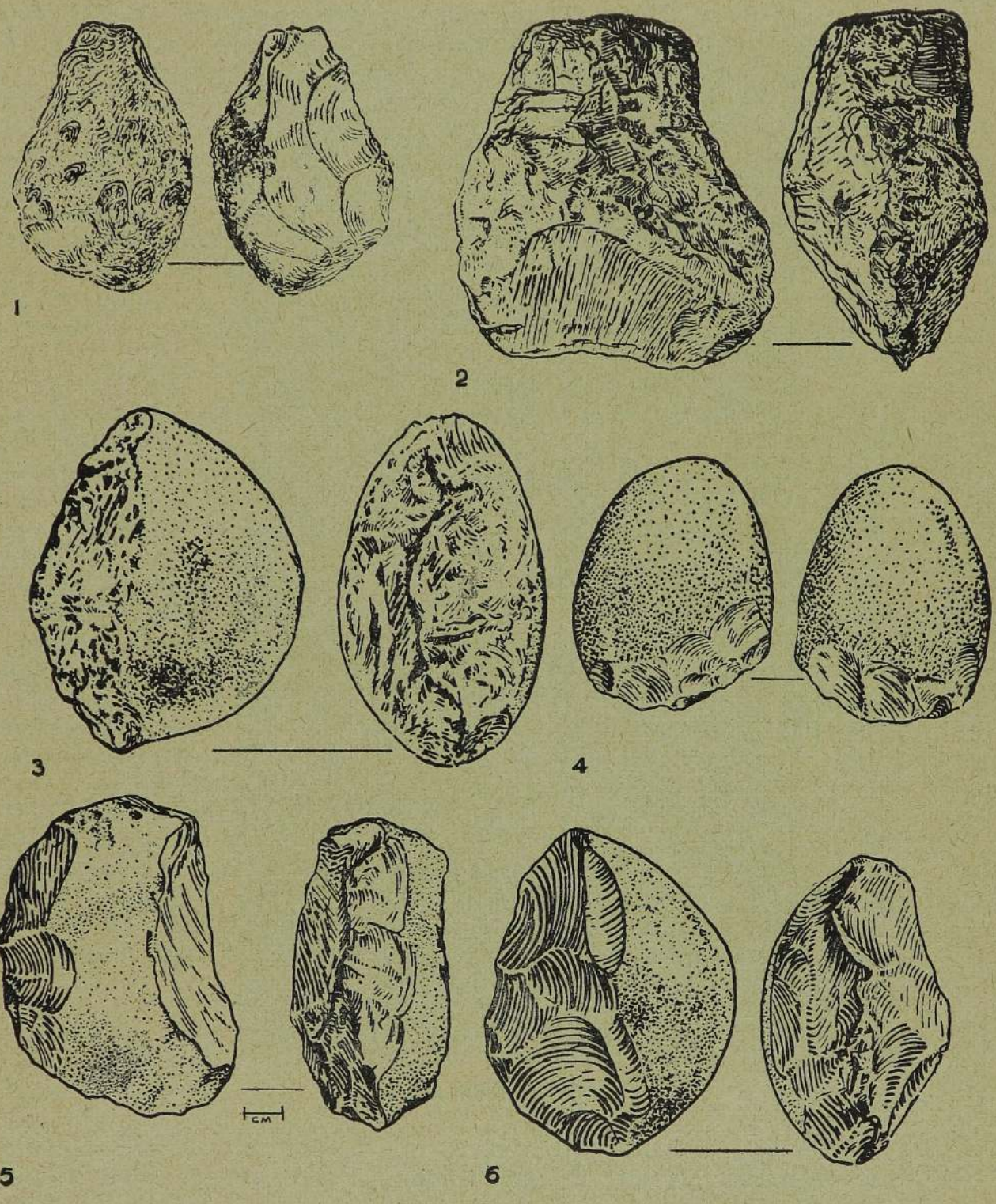


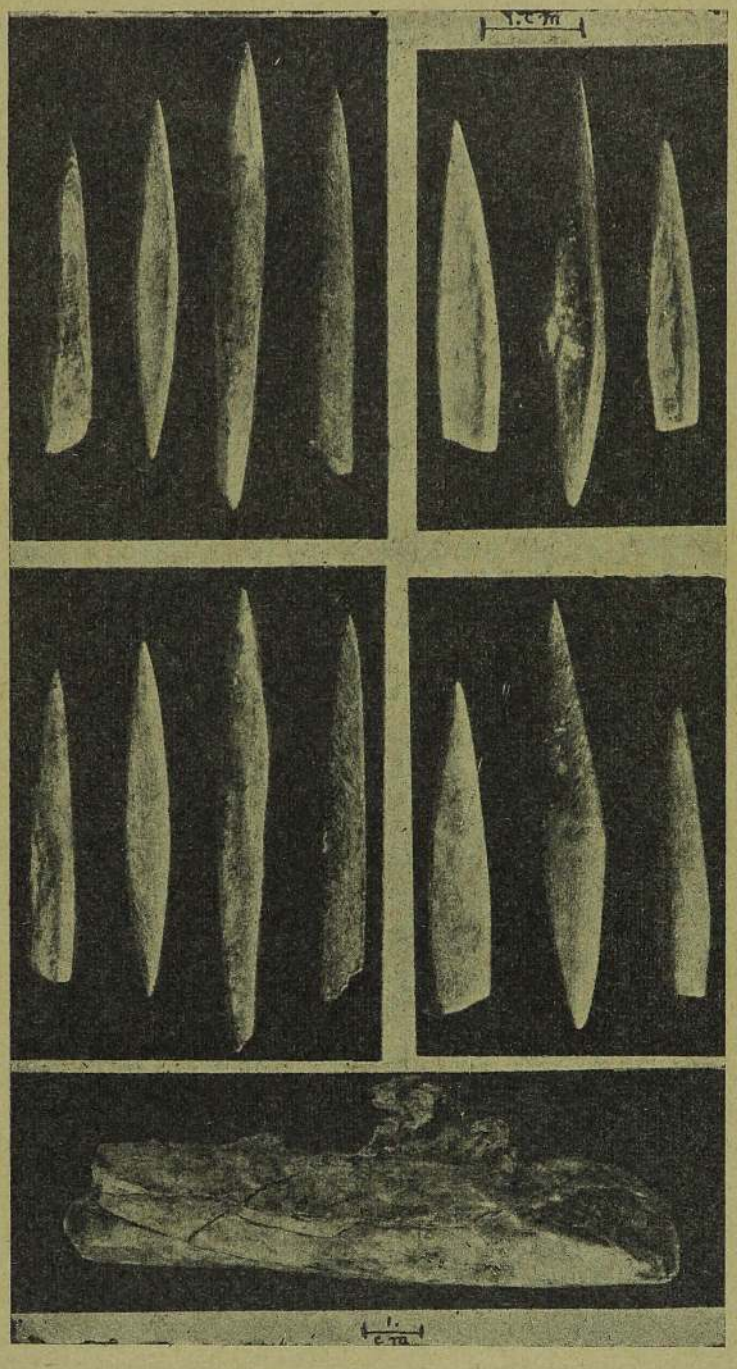
Fig. 7. Balangoda Lithifacts. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).
(1) Chopper from Udupiyan Galge. (2) Cleaver from Minihagalkanda. (3—6) Choppers from Bellan bandi palassa.

Only about 2% of the implements possess retouch. It is difficult to recognize secondary work done on granular milky quartz. Of the retouched implements the commonest types comprise points and lunates. The bifacial points, although very rare, display an extremely fine degree of workmanship.[2:195-199] In India, they are restricted to its southern extremity. Varied scrapers with convex, straight and concave edges are common. Borers and thumbnail scrapers are somewhat rare. The same forms may vary in size from less than $\frac{1}{2}$ in. in length to 3 ins. or more. At Lunu Galge and Udupiyan Galge the microliths in the lower layers are nearly twice as large as the overlying ones which also display finer production technique.[10:362-365] At Bambaragala large spikes of vein quartz had been utilized as tools.[10:102]

2. Chopping tools made of chert and quartz ranging in size from microlithic proportions to artefacts exceeding 6 ins. in length have been found at various sites inhabited by Balangoda man. The flaking is generally crude and the forms not standardized; hence a precise classification is not possible. Some of the choppers however, display a relatively high standard of workmanship, notably the chert specimen found in a rocky cleft outside Udupiyan Galge,[11:99] the chert and quartz ones from Bellan bandi palassa,[29:74] and the cleaver from Minihagalkanda where the tranchet technique had been applied.[33:159] A crude chopper on a large gneiss flake has been recorded from Bellan bandi palassa.[33:99] It is noteworthy that the chopper element is absent from several Balangoda culture sites. A cluster of 12 hammer pebbles, each being about $\frac{3}{4}$ in. in diameter, was found besides a skeleton at Bellan bandi palassa. It is possible that these were contained in a pouch and placed besides the corpse.[30:256,259] Cylindrical pebbles showing signs of having been used as pestles and spheroidal ones as grinders, notably of haematite, are of frequent occurrence.[11:109;30:251,252] A grooved grindstone from Batadomba lena contained haematite stains.[11:108] Pumice recorded from the Balangoda culture deposit at Batadomba lena was probably used as an abrasive.[11:96]

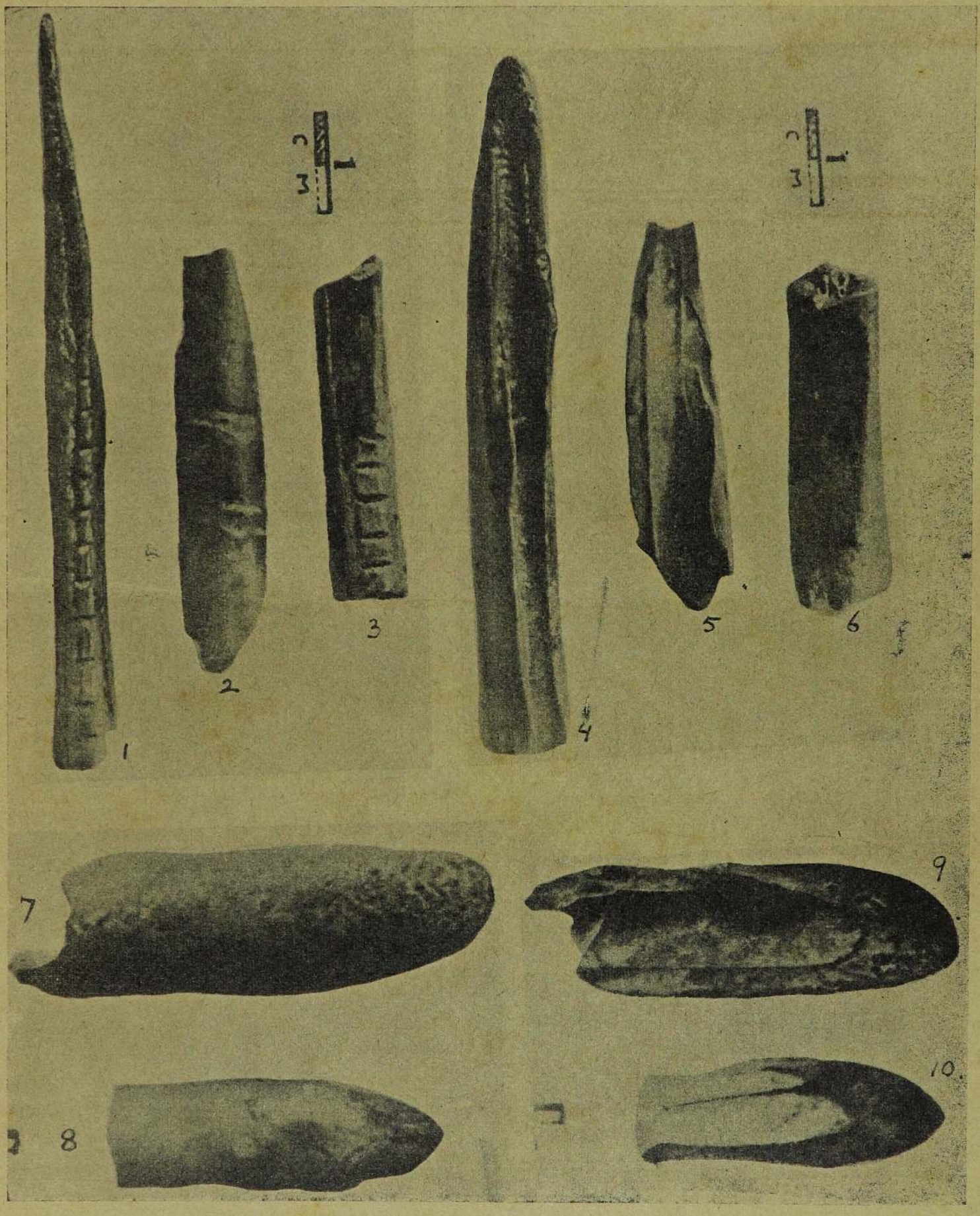
ZOOFACTS (Pls. 8, 9)

1. Slivers were removed from bones by splitting or by incising with an engraver.[11:110;36:100] The small points which are at times double ended, were made by abrading against a rough surface.[11:100] These may well have been used as poison carrying darts in blow pipes.[30:256] Some of the larger points were transversely incised to facilitate hafting.[19:130] A ? needle secured at Udupiyan Galge had its marrow cavity running up to the apex, so that it resembled a hypodermic syringe needle.[11:100]



Zoofacts of the Balangoda Culture.
(*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).

(1—2) Bone points from Ravanalla; obverse and reverse aspects.
(3—4) Bone points from Telulla; obverse and reverse aspects.
(5) Antler spatula from Telulla.



Zoofacts of the Balangoda Culture. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*). Bone tools from Ravanalla; note incisions.

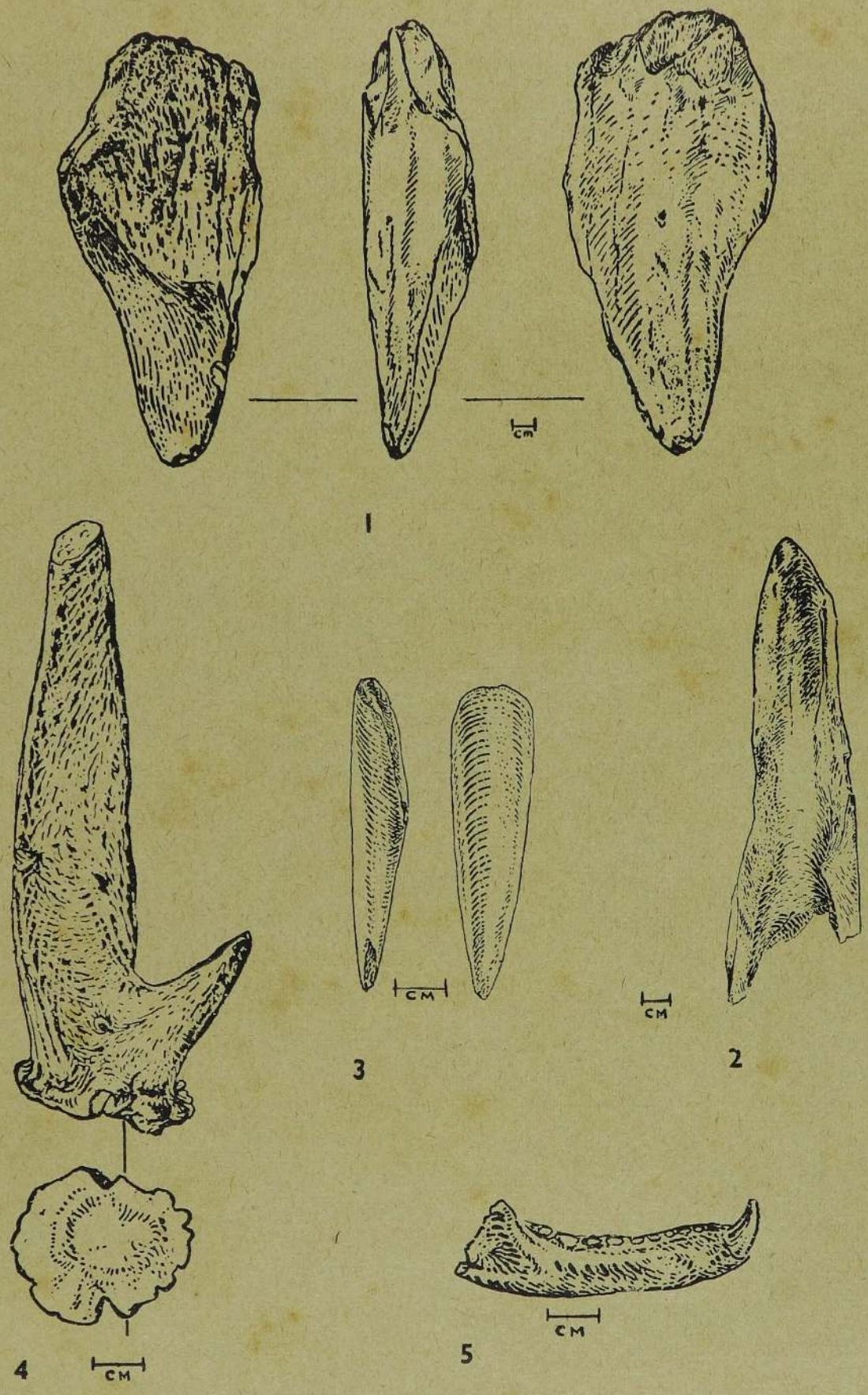


Fig. 8. Balangoda Zoofacts from Bellan bandi palassa. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*). (1) Celt of elephant bone. (2) Bone point. (3) Bone scoop. (4) Muntjac antler with notches for attachment. (5) Awl from mandible of civet cat.

2. Large chunks of bone and antler were abraded and flaked to produce spatulate or gouge edged tools.[30:240-244,32:98-101] Noteworthy is an 8 in. long hand-axe celt made of elephant bone which was found at Bellan bandi palassa. The excising and flaking had been effected with stone implements.[32:98-99]

3. Pieces of antler appear to have been utilised as hafts for bone points.[32:100] A sambhur calcaneum seems to have served as a pressure flaking tool.[36:100]

4. Fragments of animal mandibles with isolated canines, longitudinally split monkey teeth, the shanks of the Ceylon jungle fowl with the spurs on them and the jaws of pythons which have been found in Balangoda culture deposits cou'd have served as awls or fish hooks. [11:110,19:130]

NEOLITHIC COMPONENTS (Pl. 10)

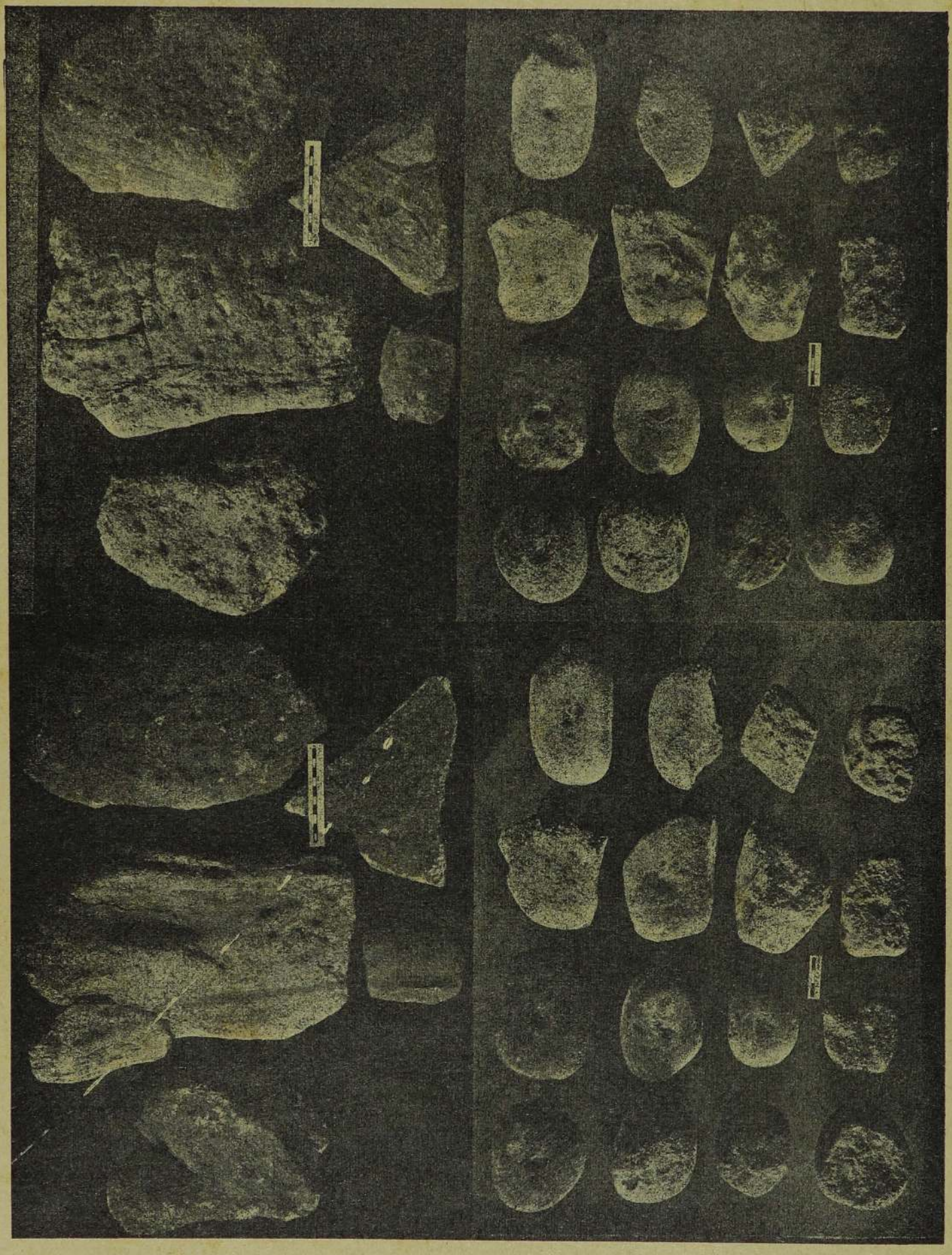
Where a strata sequence was visible the neolithic components were restricted to the upper layers, *e.g.*, at Bambaragala, Lunu galge, and Udupiyan galge.[10:362-365,11:102-103,111] The components are :

1. Celts.[19:131] An adze was found on the surface of the interior of a cave near Kegalla. Longitudinal grooves found in certain stone slabs were probably formed by the grinding of celts.[41]

2. Pebbles about 5 ins. in diameter with one or more shallow pits formed with a solid core drill are of frequent occurrence.[11:105-107] The drill striations are often visible. At times one or more surfaces were abraded to give a flat surface prior to or after drilling. The pits probably aided in hafting the pebbles which appear to have been used as hammers and grinding stones. In one instance a belt of chips had been removed along the plane of the pits in order to increase the contact between the binding and the pebble. The pebble hammers are often found in a fractured state. Small unpitted pebbles with facets produced by abrasion have been found.

3. Anvil-cum-grindstones are slabs of stone measuring approximately 2 ft. $\times 1\frac{1}{2}$ ft. $\times \frac{1}{2}$ ft. with numerous dimple pits drilled on one or more surfaces. In addition, these slabs often possess large ovate hollows on one or more surfaces, indicating that they had served as grindstones for pigments and perhaps grain.[41:4] The small pits might have been used as anvils for flaking quartz, cracking nuts and extracting poisons for use on blow pipe darts.[11:107] The pits of the Tunmodera specimens had been drilled slantwise.[40:298]

4. A sub-rectangular block of amphibolite, measuring approximately 7 ins. $\times 4$ ins. $\times 4$ ins. $\times 1$ in., was found in Bambaragala cave. The flat surfaces had been formed by abrasion.[11:102]



Macroliths of the Balangoda Culture. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*). Anvil-cum-grindstones and pitted pebbles; obverse and reverse aspects. The scales are in centimetres.

5. Pottery. The two dominant forms are: [14:139]

   (*a*) Gourd shaped.

   (*b*) Dish with vertical upper body and convex lower body.

The exteriors of these vessels often bear beater impressions. The slender finger prints found on some of the pots suggest that the makers were women. The paste is usually coarse and about ½ in. thick, although a fine red ware occurs at times, *e.g.* at Bambaragala. [11:102]

The blotched appearance of the pots is indicative of poor firing in an open hearth. A few sherds appear to have been sun baked.[26:9]

DIET (Pl. 11)

That Balangoda man knew how to produce fire is attested by the frequent occurrence of ash deposits and hearths in stone cists. [11] The scarcity of calcined bones amongst his food remains indicates that flesh was generally eaten raw.[30:257] The diet consisted of :[30:257,36:88]

1. Elephant, gaur, buffalo, bear, pig, sambhur, deer, porcupine, pangolin, hare, chevrotain, rock squirrel, civet cat and monkey.

2. Jungle fowl and spurfowl.

3. Python, land monitor lizard, hard and soft shelled terrapins, star tortoise and the now extinct, or very rare, tortoise *Geoemyda conica* Deraniyagala which is said to resemble the star tortoise.[36:88,105] The hard shelled terrapin was often the large sub-sp. *Melanochelys trijuga parkeri* Deraniyagala.

4. Mahsier.

5. Fresh water crabs and snails, marine bivalves, and land and tree snails.

6. The nut *Canarium zeylanicum*.[11:103] Coconut shell remains are unknown.[10:368]

7. Sorghum grains from Ravanalla cave might indicate a rudimentary knowledge of agriculture, probably during the neolithic phase.[24:301]

8. Amongst the food debris at Bellan bandi palassa were longitudinally cracked human bones, fractured mandibles and calvaria which had been smashed probably for extracting the brain.[26:9] A human femur was found with an incision which was probably made during the stripping of the flesh.[36:90] Ancient Sinhala literature refers to cannibals in Ceylon. These data indicate that Balangoda man was a cannibal.[39:186]

The lower occupation levels of Kabaragalge near Ratnapura were rich in vertebrate remains whereas the upper ones showed a marked increase in snail remains.[24:300] It is probable that the thinning of the vertebrate fauna was caused by a dense population of Balangoda man who had to rely increasingly on mollusca for food.

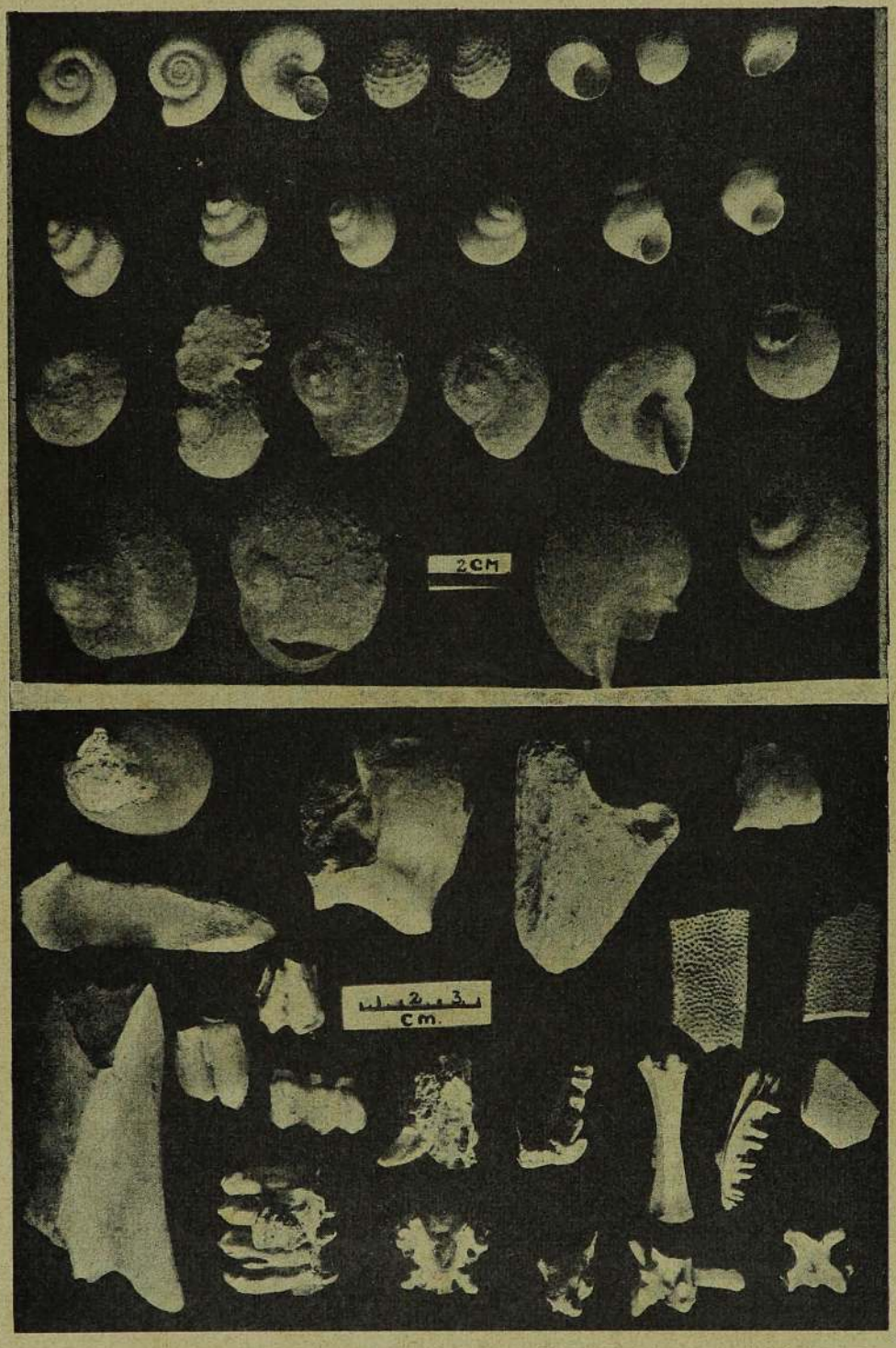
The teeth of Balangoda man display much attrition, which indicates a high sand content in his diet.[24:301]

BURIAL

Most of the individuals from Bellan bandi palassa belonged to the 25-35 year age group.[30:257] This was also the case with the specimen from Ravanalla.[19:128] Occupation and food debris overlying and underlying the burials indicates that the camp site continued to be inhabited subsequent to the burials.[40:297] The cave burials were often situated near the entrances.[14:135] The skeletons at Bellan bandi palassa belonged to both sexes and were often found in pairs.[26:9-11,30;223,257,36;90,104] Burial orientation was usually to the east and south-east. They were in a flexed posture with the knees drawn up and the arms either fully or partially flexed. The position was supine or on the side. The tilt of the skull in some instances suggests that the body had been inserted into a bag prior to burial. Isolated skulls and calvaria had been fractionally interred in association with complete skeletons. Some of the latter also lacked their mandibles. Occasionally, a large stone slab had been placed over the head or chest and its weight had crushed the underlying bones.

PHYSICAL TRAITS (Pls. 12, 13, 14)

The skeletal fragments of a thick skulled race were first discovered at Batadomba lena cave near Kuruvita.[10:367-368] Their fragmentary nature made description difficult. The holotype was the complete frontal bone and a molar from Ravanalla cave.[14:140] The next find was a damaged skeleton from Alu galge cave near Telulla.[24:296-299] At the above sites the strata had been partially disturbed by people digging for guano. Subsequently, remains of more than ten individuals, some of which are very fragmentary, were found at Bellan bandi palassa within an undisturbed strata context.[26:8-11]



Food remains of Balangoda man from Telulla: snails, reptiles and mammals. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).

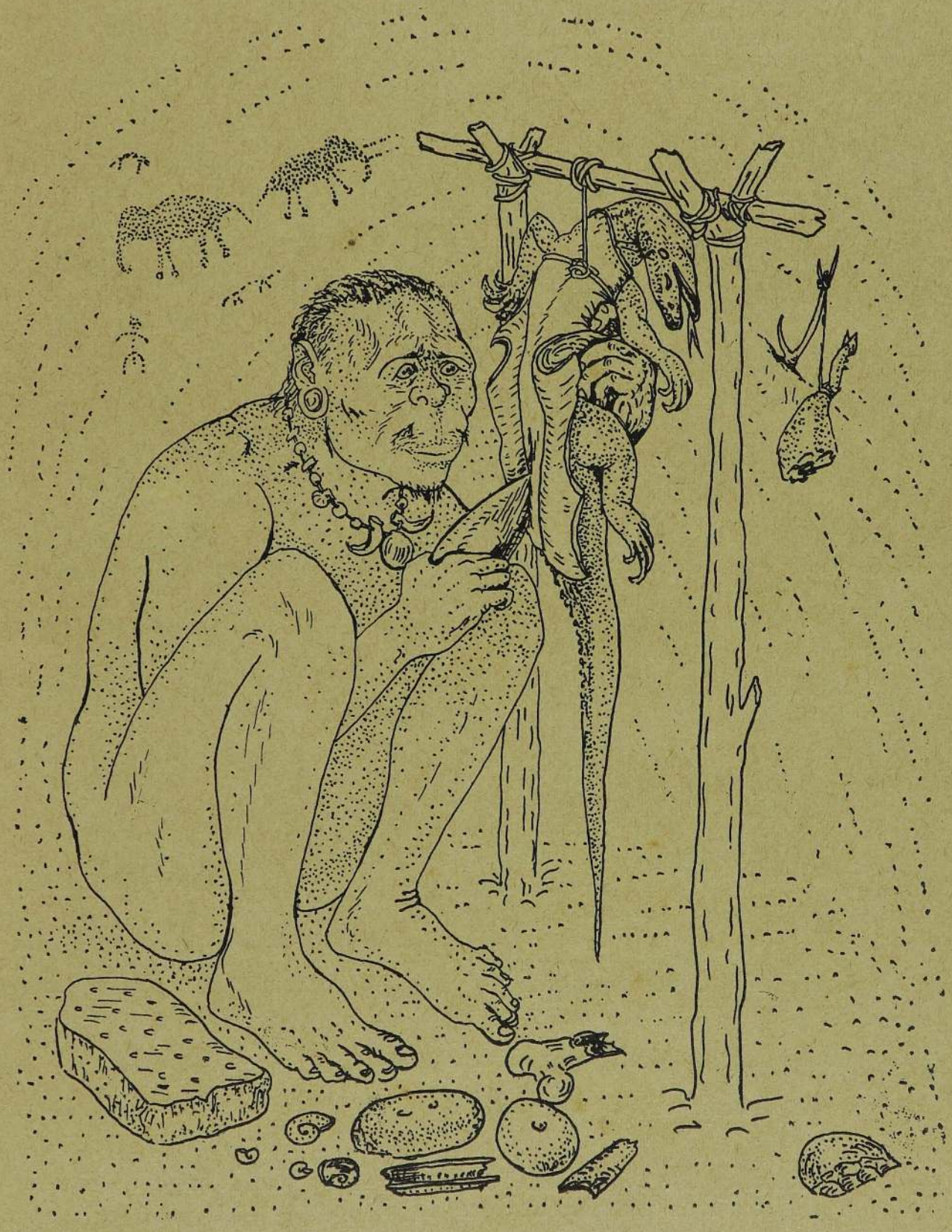


Fig. 9. Balangoda man. (*P. Deraniyagala del.*).

Balangoda man, also termed "Balangodan" by Carlton Coon,[4:424-425] has been assigned sub-specific status as *Homo sapiens balangodensis* Deraniyagala[14:140] on account of his strikingly primitive morphology. The physical characters are predominantly Australoid with Neanderthaloid[26:10] undertones. The Vadda aboriginals of Ceylon, who are the mixed descendants of Balangoda man, the Sinhalese and the Tamils, are physically the closest to Balangoda man from amongst the living Ceylonese races.[40:298] Balangoda man's physical characteristics are most evident in Vadda children between the ages of 10 and 16 years.[37:113] In the following description, (N), (A) and (V) would indicate similarities with Neanderthaloids, Australoids and Vaddas, respectively. (X) denotes features which are absent in the Vaddas.

Estimated heights of Balangoda man :

(*a*)	Male	.. 5 ft. 6 ins.	[29:66]
	Female	.. 5 ft. $1\frac{1}{2}$ ins.	
(*b*)	Male	.. 5 ft. $8\frac{1}{2}$ ins.	[50:165]
	Female	.. 5 ft. $5\frac{1}{4}$ ins.	

Balangoda man appears to have been taller than the modern Sinhalese and Tamil. However, the vertebrae are disproportionately small for the estimated stature.[50:190]

Skull :

1. Cranial capacity: variable. A male's could have been as much as 1589.72cc. and a female's as low as 919.66 cc.(X).[50:155]

2. General conformation: dolichocephalic (V).[30:255]

3. Vault: low and flat (N).[30:255]

4. Forehead: sometimes markedly receding, particularly in males (N, A).[26:10;30:255] The temporal lines are prominent on the frontal bone but not on the parietals.[50:153]

5. Occipital curvature: pronounced. About 1/3 of the occipital bone is visible in norma verticalis.[30:255] Occipital torus: sometimes very strongly developed (N,X)[55:153]

6. Skull bones: at times very thick (V).[40:299]

7. Malar bones: thick and wide.[30:255] The face would have been wide (V).[36:97]

8. The skull is narrow anteriorly relative to its widest region which is located towards the posterior part of the parietals.[36:95]

9. Post-orbital constriction: marked.[50:151]

10. Supra-orbital ridges: very thick at times and divided (N,A,V).[50:151]

11. Orbits: subrectangular (N,V) and larger than in the Sinhalese and the Tamils (N).[36:97,50:188]

12. Nasal bones: concave dorsally and depressed (N,A,V).[36:97] Nasal aperture: wide, short and piriform (V).[50:188] One specimen had a leptorrhine nose which caused Coon to classify it as Caucasoid.[4:425]

13. In some adult males the distance from the lower margin of the nasal aperture to the base of the upper incisors (nariale-prosthion) is conspicuously great (N,X), being as much as 33 mm.[36:93,97]

14. The lower margin of the nasal aperture has no ridge, unlike in the Sinhalese and the Tamils, but slopes directly on to the maxillo-premaxillary area (A)[36:93]

15. Premaxillary bones: well fused, but occasionally they are poorly fused to the maxillae, (X).[30:255,36:92]

16. Canine fossa: ill defined, giving the maxillae a filled in appearance (N).[36:97]

17. Alveolar prognathism: evident in most adult males (V)[50:153]

18. Palate: larger, wider[29:66] and at times noticeably deeper than in the Vaddas.[50:189]

19. Mandible: more powerful than in the Vaddas.[50:189] The gonial prominence anchoring the masseter muscle is sometimes very prominent (X)[30:255] Sigmoid notch: shallow.[36:93] Ascending ramus: higher than in the Vaddas[50:189] and wide (A).[30:255] The base of the mandible: wide.[30:255] Corpus: deeper than in the Vaddas.[50:189]

20. Chin: pointed (V) but better developed than in the Vaddas.[30:255] However, the Telulla chin was weak (V).[24:296]

21. Line of occlusion between the jaws slopes at a steeper angle than in the Sinhalese and the Tamils (V).[30:231]

22. Mastoid process: stronger than in the Vaddas.[50:186]

Dentition :

1. Dental arch: rectilinear in some adult males (X).[40:299]

2. Teeth: usually large.[50:165]

3. Attrition: pronounced, even in the 3rd molars.[26:10]

4. 3rd molar: often as large as the 2nd (N,X.)[30:255]

5. Pulp cavities: large (N).[36:92]

6. Cusp and groove pattern: highly variable (X).[50:194] Pronounced wrinkling in the patterns.[36:92] The 5th cusp of the molars is well developed and the Dryopithecus pattern occurs in some lower molars.[29:66]

7. Canines, smaller and the premolars and molars, larger than in the Vaddas.[50:193-194]

8. Incisors: smaller than in the Sinhalese, [36:97] shovel shaped in females and project outwards (A,V).[36:93;50:171]

9. Bite: edge to edge, [30:255] although over-bite is evident in some (V).[50:201]

Long bones :

1. Upper arm: longer and more muscular than in Vaddas.[50:160]

2. Fore arms: more muscular than in Vaddas.[50:191]

3. Shin bones: straight and heavy with only moderate musculature (V).[50:162,192]

Pelvis :

1. Small when compared with those of the Sinhalese and the Tamils.[30:255]

2. More robust than in the Vaddas.[50:193]

3. Resembles the Australian pelvis.[50:193]

4. The obtuse angled greater sciatic notch, the slant of the ischium, the outline of the iliac crest and the antero-posterior elongation of the ileum of the Telulla pelvis suggest that the individual was steatopygic (X)[24:296-297]

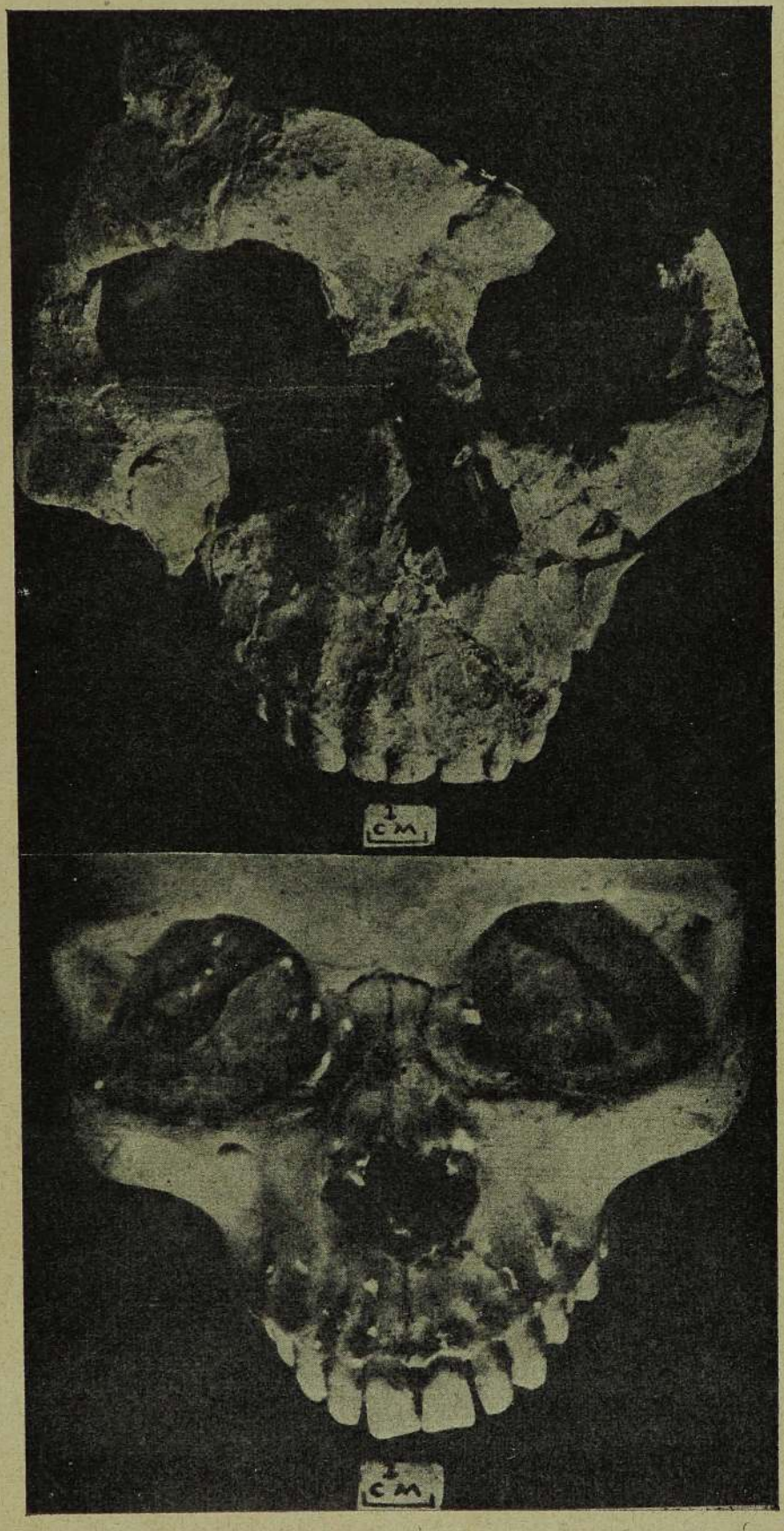
Miscellaneous :

1. The axis vertebra and its odontoid process are remarkably short.[36:95] The neck would have been short, which character is also present in the Sinhalese and very characteristic of their early sculptures.

2. Pre lumbar vertebrae: small (V).[50:157]

3. Lumbar vertebrae: robust (X).[50:190]

4. Calcaneum: shorter, deeper and more rounded than in the Sinhalese and the Tamils (N).[30:255]



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2

(1) Reassembled face of Balangoda man, $\frac{BP3}{15(a)}$, from Bellan bandi palassa. Note the great distance from nariale to prosthion.
(2) Skull of modern Sinhalese.

(*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).

Balangoda man from Bellan bandi palassa. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).

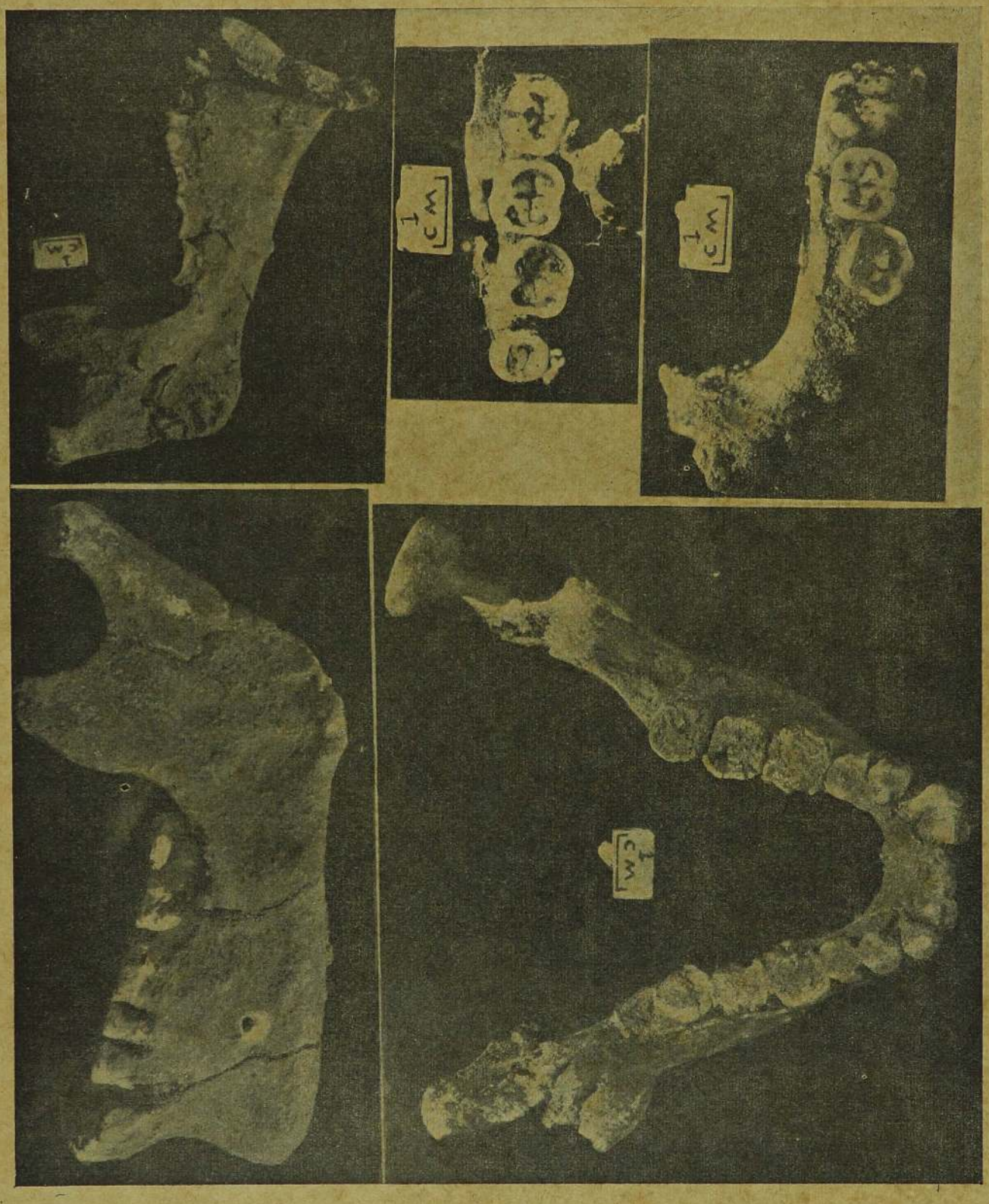
(1) Calvarium of $\frac{BP3}{15(a)}$; unreconstructed. Note premaxilla. (2) Right maxilla and malar of $\frac{BP3}{15(a)}$.

(3) Palate of $\frac{BP3}{15(a)}$. Note well worn 3rd molars.

(4) Right supra-orbital ridge, left malar arch and maxilla of $\frac{BP3}{15(a)}$. Note filled in canine fossa.

(5) Right malar and maxilla of $\frac{BP4}{8(f)}$. Note massiveness of latter.

2 4 5



1 3

Balangoda man from Bellan bandi palassa.
(*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).

(1—3) Mandible of $\frac{\text{BP } 3}{15\ (a)}$. Note wide ascending ramus and sigmoid notch, well developed 3rd molars and the rectilinear arch. (4—5) Mandible of $\frac{\text{BP } 1}{6}$. Note large 3rd molar.

5. Scapula: more robust than in the Vaddas.[50:191]

6. Hands: larger than in the Vaddas.[50:160,192] The terminal phalange of thumb: very strong.[30:236]

7. Glenoid cavity: larger than in the Sinhalese and the Tamils.[29:66]

8. Blood group: ' AB ' in one sample. The 'A' gene is absent in the Vaddas.[50:182]

9. A high degree of sexual differentiation is present.[39:188]

The negroid characters of the negroid type are as follow :[26:10-11]

1. Rounded forehead.
2. Weak supra-orbital ridges.
3. Arched cranial vault.
4. Weak fronto-parietal lines.

Although less dolichocephalic, he resembles the Australoid type in several features. Stratigraphically, he falls within the upper levels of Bellan bandi palassa.[26:10]

The negroid element in the Vaddas[37:113] probably had its origin in the meso-neolithic man of Ceylon.

Comparison with human skeletal material from Brahmagiri, Adichanallur, Nevasa, Chandoli, Maski, Piklihal, Lothal, Raigir, Ruangarh, Langhnaj, Nal, Bayana, Sialkot, Harappa, Niah, Talgai, Keilor and also with Wadjak man and the Vaddas, revealed the Vaddas as being physically the closest to Balangoda man.[50:183] However, the Vadda phenotype being relatively unknown, the comparison was not as precise as one would have wished.[50:204-207]

Homo sapiens balangodensis displays considerable phenotypic variation.[50:183] Whether the negroid type was one of these variations or a definite intrusion needs checking.

DECORATIVE TRAITS

1. The human frontal bone from Ravanalla[19:128] had been bifacially perforated with a solid core drill. It is possible that the bone was suspended by a string upon the person of a mourner. The rough sutural edges had been chamfered to reduce discomfort to the wearer. The bone had been smeared with haematite on both the dermal and cerebral aspects although none of the other skeletal remains of Balangoda man had been smeared in this manner.

2. From amongst the skeletons at Bellan bandi palassa the mandibles were missing in several instances.[36:104] It is possible that Balangoda man followed a custom similar to that of the Onge negritos of the Little Andaman Islands and the Trobriand Islanders. The widows of the two latter groups wear the mandibles of their dead husbands about their necks as a sign of mourning.[36:104]

3. Two perforated sea shells dug up at Ravanalla,[18:E8] and a cowrie shell found at Bellan bandi palassa which is about 60 miles inland from the sea, probably served as ornaments.[29:82]

4. An antler of a muntiac deer was found with two notches cut on either side of its base. The notches could have facilitated the antler being bound to a ceremonial head-dress.[32:100]

5. Haematite, limonite, molybdenum, mica, graphite, blue clay, kaolin and charcoal appear to have been used as pigments.[11:96·20:119·29:82] A part of the cave art found in various parts of Ceylon may be attributed to Balangoda man and the remainder to his descendants, the Vaddas.[37:121] The figures are depicted in line, monochrome, and polychrome as at Ganegama, Mandagalge and Bagura, respectively.[20:118-119,23:113,28:G7,29:154] The animals at Doravakakanda had been engraved in the rock (pl. 15).

REGIONAL VARIATIONS

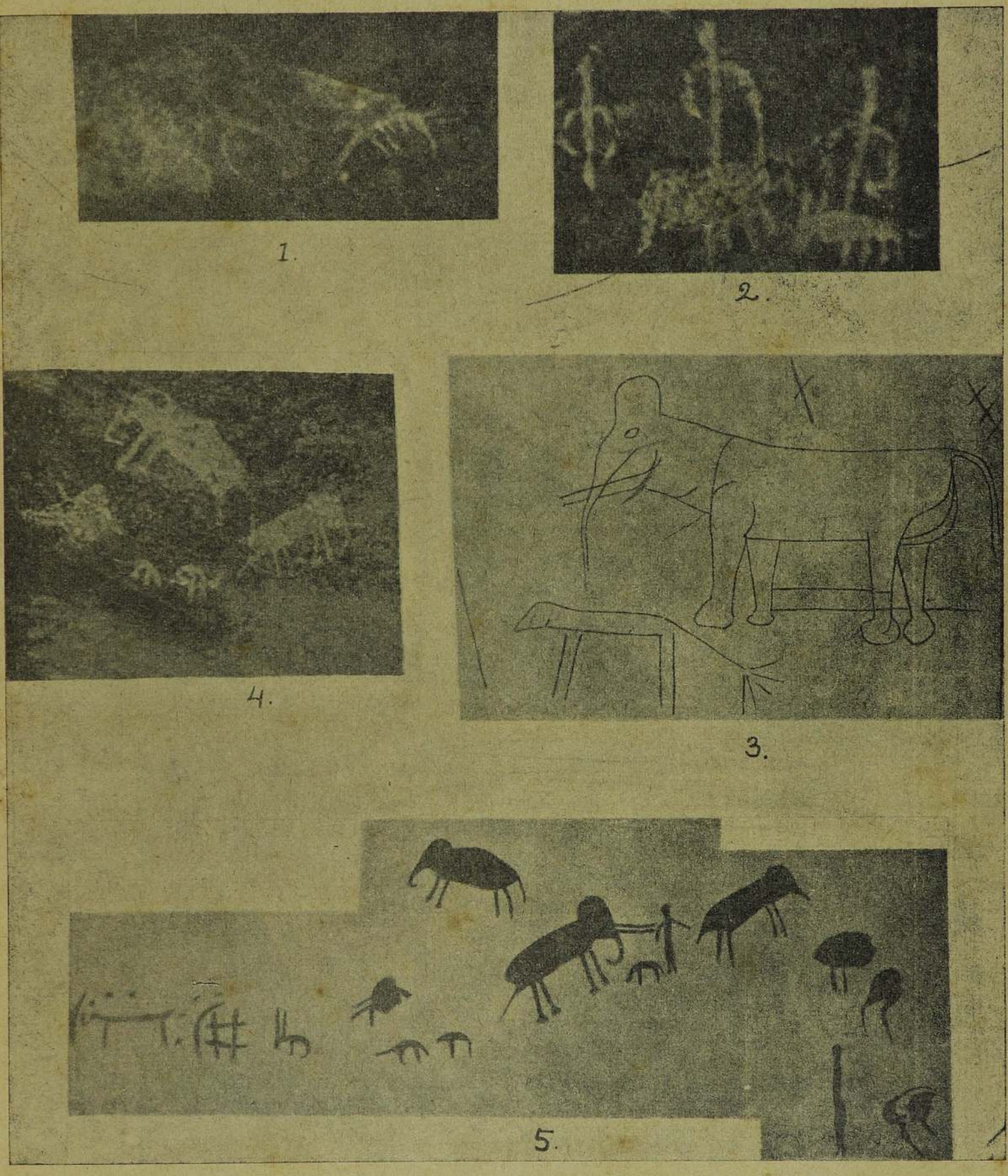
It is significant that pitted pebbles and anvil-cum-grindstones have not been found in the Balangoda culture of the Uva and Eastern provinces.[20:120] It appears as if the neolithic intrusion did not reach these areas. The presence of marine bivalves at Kabaragalge in Sabaragamuva and at Ravanalla indicates widespread inter-group contact.[24:300]

DATING

Two samples of charcoal from Bellan bandi palassa were assayed for their C/14 content by Isotopes Inc. U.S.A.[30:259] The dates obtained were 114 B.C.± 200 years and 1448 A.D.± 150 years. However, since the samples appear to have been contaminated with shellac and cotton wool, it would be as well not to rely too much upon these dates. Both were secured from about 3 ft. below the surface.

The following tests were conducted by Dr. Kenneth Oakley of the British Museum on human bones from Bellan bandi palassa :[32:97-98·39:188]

1. Nitrogen tests :
   Femur = 1.3%. Rib. = ·25%
   Dr. Oakley's deduction was that the site had been occupied over a long period during the Holocene.



Cave Art. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).
(1) Billava rock shelter of the North Central Province. (2) Komarika rock shelter of the N.C.P. (3) Engraving from Doravakakanda near Kegalle (*copy*). (4) Mandagalge of the Eastern Province. (5) Copy of (4).

2. Uranium assay on the same femur as above=c.6 p.p.m. According to Dr. Oakley, its age is to be reckoned in millenia rather than in centuries, in which case the C/14 date of 114 B.C. ± 200 years is more likely to be accurate.

Since no metal objects have been recovered from the site, a pre iron age date may be suggested for it. Copper reached south India c. 2000 B.C. and iron c. 1000 B.C. Taking into consideration the lengthy occupation of the site, one might tentatively date it between 1000 and 500 B.C.

CLIMATE

1. The Balangoda culture deposits in Ravanalla cave show an alternation of layers with high and low nitre content.[19:127] This was probably the result of humidity fluctuations.

2. The Tunmodera deposits were laid in boggy conditions which were probably contemporaneous with the end of one of Ceylon's Quaternary lake phases.[39:185-186]

3. *Acavus* snail shells occur in the habitation layers of Bellan bandi palassa. The present climate there is too dry for this genus.[29:71;36:88]

The above data suggest that wetter conditions than at present had prevailed then.

CORRELATION

1. The physical correlation with the **Vaddas** has already been dealt with under the heading ' Physical Traits '.

   (*a*) Cultural similarities with the **Vaddas :**

   The skull bones of the larger animals are rarely found amongst the food remains of Balangoda man. The explanation probably lies in the Vadda custom of offering the head of the kill to a forest deity before transporting the carcass back to camp.[2:200] The Vaddas refer to their small metal axe as *gal rakki*, stone guardian. This is a direct survival of stone age terms.[32:108]

   (*b*) Cultural dissimilarities from the Vaddas :

   The Vaddas do not eat snails[40:299] and are too scared of the elephant, buffalo and bear to hunt them.[30:258] The flesh of the porcupine, the jungle fowl and the buffalo is tabu.[40:299] The last is probably a recent Hinduisation.[37:117] The Vaddas do

not inter their dead in the camp floor. Instead, they immediately abandon the scene of death.[2:188] Group and flexed burial is not practised among them.[40:299]

2. The **Onge negritos** of the Little Andaman Islands bury their dead in the camp floor.[36:97]

3. The widows of the **Onge,** and also of the **Trobriand Islanders,** wear their husbands' mandibles about their necks as a sign of mourning. The absence of mandibles in several of the Bellan bandi palassa skeletons suggests that a similar practice had prevailed in Ceylon.[36:104]

4. Pitted pebbles, akin to those of the Balangoda culture, have been discovered in the following places :

   (*a*) Pitted pebbles and cuboids akin to those from Ceylon have been recorded from the Kaimur plateau, Allahabad, Bellary and the Kolar gold fields of Mysore, **India.** The pits of the Bellary and Kolar finds were large, as in the specimen from near Nika vava of the North-Central Province of Ceylon.[14:135-137] No anvil-cum-grindstones have been reported from India.

   (*b*) **New Guinea.**[39:187]

   (*c*) **Congo.**[39:187]

   (*d*) The Fayum B neolithic, **Libya.**[17:13]

   (*e*) Khartoum, **Sudan,** and Wilton and Smithfield cultures of **E. Africa.**[17:13]

   (*f*) **South Australian** aboriginal industries.[36:97-98]

   (*g*) **Kangaroo Island** where they were used by the now extinct aborigines. Here they were found in association with a chopper industry as in Ceylon.[36:98]

   (*h*) **Japan.**[39:187]

   (*i*) **North America,** Copena village complex in the Pickwick basin of Tennessee.[14:139]

   (*j*) **South America,** La Plata of the Pueblo 2 complex (7-9th century A.D.). The makers of these tools are regarded as having been Australoids.[14:139]

   (*k*) The lake and bog cultures of **Europe,** including Britain.[14:139]

5. The singing dogs of **New Guinea,** the Bassenji of the **Congo** and the **Australian** dingo closely resemble the Sinhala hounds of Ceylon.[39:187,193] The dominant type amongst the Sinhala hounds is terrier-like with pointed, erect ears and a tightly curled tail. The

eyes are black or yellowish. The fur is black and tan, reddish yellow or yellow. Puppies of the pure breed possess a dark median dorsal stripe extending from the snout as far as the neck, as in the New Guinea dogs. The Sinhala hound has a tendency to combine barks and howls like the vocalization of the Congo and New Guinea dogs. It is possible that these dogs spread with the users of the pitted hammer pebbles.

6. The pelvis of Balangoda man shows points of resemblance to that of an **Australian,**[50:193] a **Bushman** and, to a lesser extent, a **Bantu.**[24:296]

7. The **Danis of New Guinea** and the **aborigines of Australia** resemble *H. sapiens balangodensis* physically.[36:97]

8. It is noteworthy that the elephants depicted at Mandagalge, Mahalenama and at Doravakakanda possess projecting posteriors as do those represented in the neolithic rock shelters of Abka at the **second cataract of the Nile.**[17:13, 28:69]

Conclusions.—*Homo sapiens balangodensis* formed a unit in an Australoid racial chain. The course of the latter appears to have been India-Ceylon-South-east Asia-Australia-East Asia (Japan)-North America-South America.

Ramifications appear to have been present in Africa and Europe.

10. Vadda characters which were probably present in Balangoda man (Pl.16):[37:113-114]

(*a*) Hair: wavy. In children between the ages of 6 and 7 years it is sometimes tow coloured, turns to a reddish brown between 7 and 13 years and is almost black in the adult (A). The hair of women does not reach below half way down the shoulder blades. Body hair: almost absent. Sparse face hair which is absent on the cheeks and in the region of the ears.

(*b*) The iris: brown, unlike in the Tamils whose eyes are nearly black.

(*c*) The thick brow ridge often conceals the external corner or half of the upper eye lid.

(*d*) Frequent occurrence of the internal epicanthic eyefold.

(*e*) Ear lobe: concave and cup-like.

(*f*) Skin: smooth and oily.

(*g*) Breasts of females: seldom pendulous.

(*h*) Feet: flat with a large big toe which is apt to curve away from its neighbour.

(*i*) Wide palate.

(*j*) Nose: rounded and broad with a depressed root.

(*k*) A negroid type with long shins, prominent rolling eyes showing much of their whites within shallow sockets, rounded foreheads and small, lobeless, rounded ears.

The Vaddas have degenerated physically and culturally from the ancestral Balangoda man. The Sarasins estimated the average height of a Vadda to be 5 ft. 3/8 in. [37:112] as compared to 5 ft. 8½ ins. for Balangoda man.[50:165] The mating, however, of two small Vaddas occasionally results in tall offspring. This is probably a throw-back to the stature of Balangoda man.[37:112]

LEGEND

The south-eastern (Panama) tradition states that the *Nittavo* were hairy pygmies with short powerful arms and hands. They were carnivorous and hunted in roving bands. Strong clawlike nails, sticks and stones were used for offence and for securing their prey. They were expert climbers and lived on rocky outcrops. Head: large with a prominent snout. Speech: resembled monkey chatter. Colour: dark. The *Nittavo* were exterminated by the Vaddas about 1800 A.D. The northern (Madirigiriya) legend states that they were of human stature and covered with reddish hair.

A stump tailed, baboon-like monkey inhabits the Celebes. Fossils suspected of belonging to a similar form have been found in the Kurnool caves of south India. It seems likely that the *Nittavo* were a race of such monkeys,[15:16-17] although no remains suggestive of such an animal have been recorded from Ceylon.

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2. Permitting the copying of text figures from museum publications and for making available departmental blocks for the half-tone plates—

1 2 3

4 5 6

Vaddas of Manampitiya. (*After Deraniyagala, P. E. P.; Courtesy, Director, National Museums*).

(1—2) Vela. Note absence of face hair, heavy supra-orbital ridges, wide malars and steep angle of occlusion between the jaws. (3—6) Appuhamy. Note wide nose, small and pointed chin and flat feet with divergent big toe.

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NOTE :

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STONE IMPLEMENTS FROM A BALANGODA CULTURE SITE IN CEYLON—*BELLAN BANDI PALASSA*

S. DERANIYAGALA

INTRODUCTION

The present paper constitutes a probe at formulating a lithifact typology for Ceylon's Late Stone Age, having included in its consideration the less glamourous elements of a typical assemblage, namely the untrimmed and unspecialized tools which have hitherto been neglected. Since specialized types are rare in Ceylon, the unspecialized ones demand more attention.

Bellan bandi palassa is an open air habitation site on the banks of a seasonal stream in the plain directly beneath the Kaltota escarpment. The present rainfall, which is monsoonal in pattern, averages 60-70 ins. per year. The vegetation has been designated a dry mixed evergreen forest with stretches of savannah (Deraniyagala, P.E.P. 1958b: 228). The rocks belong to an undifferentiated group of the Viyayan series (Cooray, 1967:Geological map).

The occupation deposit comprises factory, habitation and burial facies which were not differentiated by the excavators.

The stratification in squares E2 and E3 was as follows (Deraniyagala, P.E P. 1963:89, Pl. I fig. 2):

8 ins.	Brown surface soil.
9 ins.	Light brown gravelly earth. Quartz chips.
12 ins.	Brownish gravelly earth. Few quartz chips.
8½ ins.	Fine brown earth, without gravel. Very few quartz chips.
6 ins.	Human and animal remains. Several quartz and chert chips. Large and small pebbles.
	Limestone bed-rock.

The above sequence may tentatively be regarded as typical of the site,

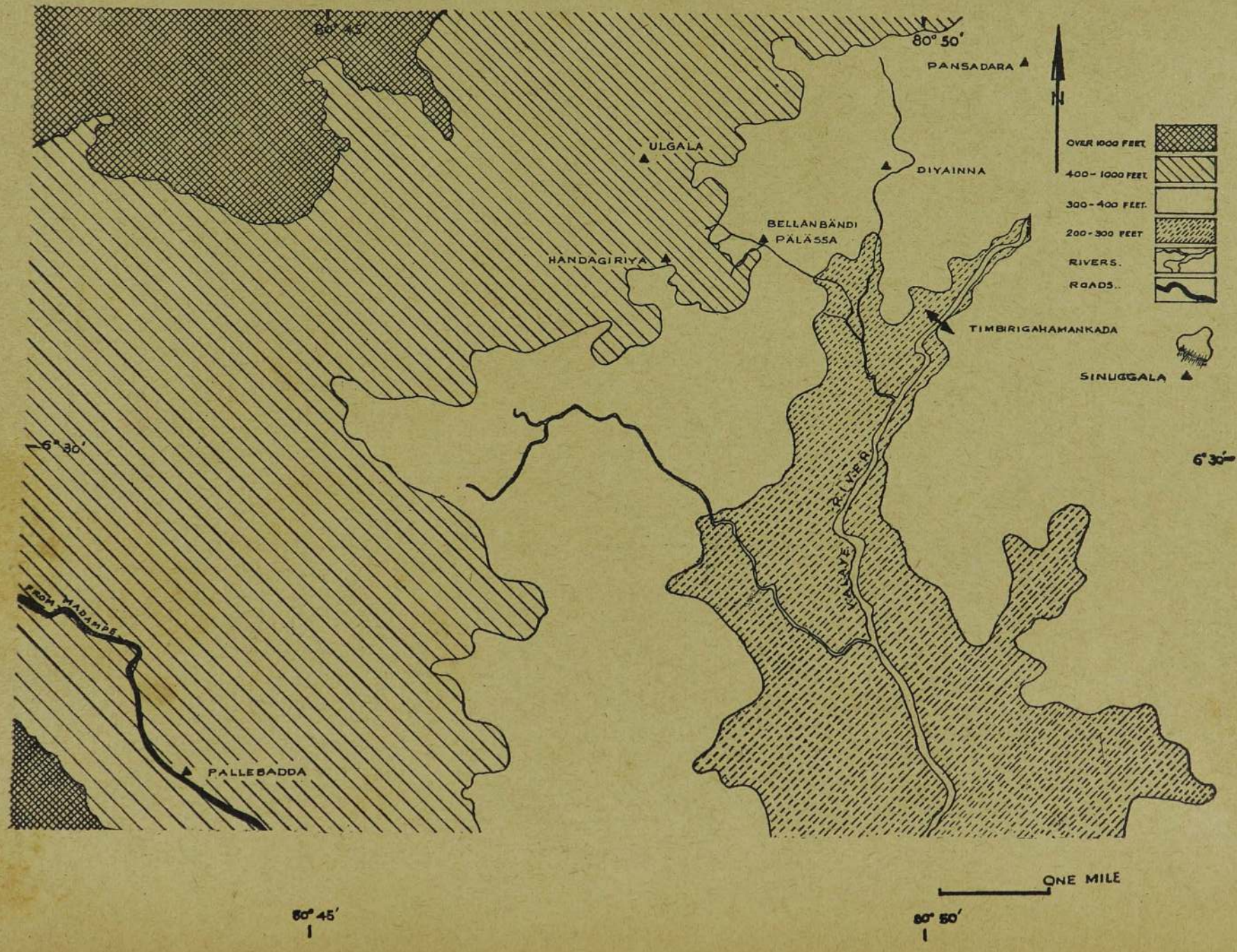


Fig. 1. Location of Bellan bandi palassa.

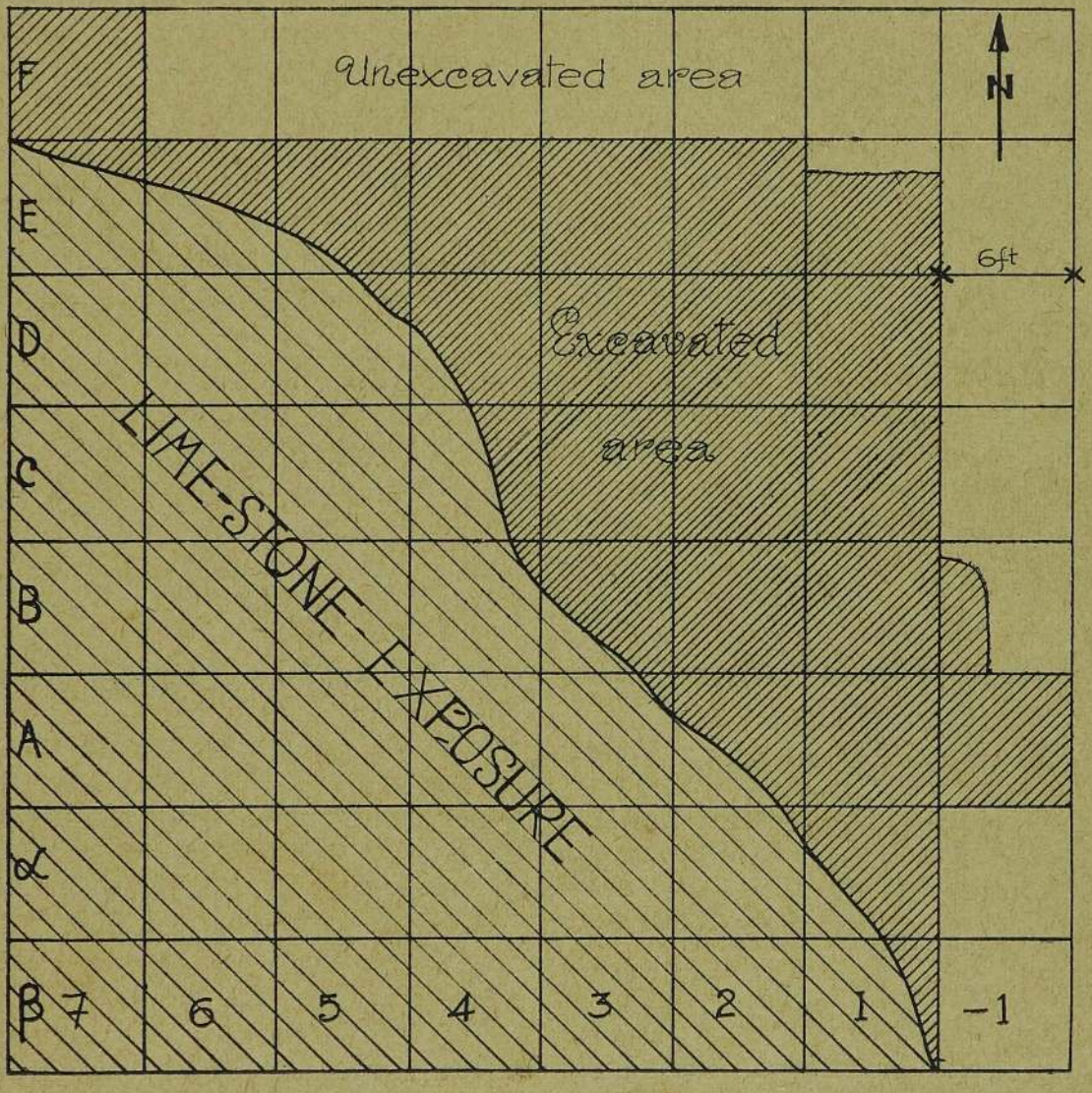


Fig. 2. Plan of excavation. (*After Deraniyagala, P. E. P.*, 1963).

The bed-rock slopes upward from A to C and downward from C to E (Deraniyagala, P.E.P. 1958b:227).

Lime bearing water, moving up from the basal limestone during periods of drought, has caused the organic remains to be highly mineralized and has also neutralized the destructive humic acids which are so active under tropical conditions. It is likely that rude prehistoric shelters protected the deposits from the monsoonal torrents during the period intervening between their deposition and consolidation. P. E. P. Deraniyagala has established that the climate was wetter then than now (Deraniyagala, S. 1970).

The site, which was first located by A. Delgoda of Morahala, was excavated in brief spells between 1956 and 1961 by P. E. P. Deraniyagala. Several reports have been published by him, and the stone implements described in Deraniyagala, P.E.P.1958 b:245-254/ 1960 :101-108/1963 : 97-100. However, their bias towards physical anthropology has necessitated this present supplement.

The excavation was not conducted stratigraphically. The earth was sieved through a ½cm. and, occasionally, through a ¼cm. mesh (Dela, T.: pers. comm.). There was but limited discarding of the excavated lithic finds although the material from the surface was collected more selectively (Dela, T. : pers. comm.).

METHOD

The tool classification is based upon the following factors in their order of precedence:

(1) Form, e.g. triangle.

(2) Functional edge type, or types, and their inter-relationship, e.g. (more than 2 scraper edges)+(2 cutting edges which are adjacent to each other) in a single tool= Scr. 2+/Cut. 2adj.

The data contained in (1) and (2) are combined in the formula—

$$\frac{\text{Scr. 2+/Cut. 2adj.}}{\text{Triangle}}$$

(3) Size, based upon the maximum dimension.
Small— Less than 4½cms.
Medium—4½-8 cms.
Large— Over 8cms.

Flakes and cores displaying a functional potential, as in possessing a sharp edge, are being regarded as artefacts. When a function, such as cutting or scraping, could have been performed by an unretouched tool, secondary work would have been redundant, unless a particular form was specified by cultural tradition and/or functional requirements. Data from studies of tool use amongst recent primi-

tive tribes validates the above definition of a tool. Use marks are of limited value in recognizing an artefact since they are dependant upon three variables: (1) hardness of the functional edge, (2) hardness of the object upon wh ch the tool is being used and (3) the amount of use the edge has been put to.

The extent of striking platform retained upon a flake is determined by the nature of the raw material, which is variable. Since the presence of a multi-faceted platform on a flake is largely determined, in turn, by the area of striking platform present, no analytical consideration has been given to the faceting of platforms.

Statistical treatment is invalidated in proportion to the degree of selective sampling employed by the excavator. Since of all the Late Stone Age collections available for study the present one seems to have suffered least in the above respect, I have considered it worthwhile publishing the charts included in this paper.

The collection was divided into five parts on the basis of provenance:

(1) Low level—More than 2ft. below the surface and less than 8 ins. above the bed-rock, or more than 3ft. below the surface.

(2) High level—Less than 2ft. below the surface and more than 8 ins. above the bed-rock.

(3) Intermediate level—between high and low levels, where the data is insufficient for establishing a relative location.

(4) Surface.

(5) Directly associated with human remains.

A statistical analysis of the above five categories did not yield positive results. The upper level is represented by too few artefacts (271) for such treatment, the low level artefacts outnumbering them 8 : 1. I tentatively propose that the low level, which appears to have contained all the human skeletal material recovered so far (accession register), is representative of a single culture phase and that the high level deposit comprises material derived from the former.

RAW MATERIAL

The materials from which the implements have been fashioned are listed below in their order of frequency of occurrence:

(1) Flake and core-tools — (*a*) Milky quartz
(*b*) Translucent quartz
(*c*) Opaque chert
(*d*) Quartzite
(*e*) Translucent chert
(*f*) Crystallines, such as gneiss

(2) Hammers, grinders and grindstones — (*a*) Crystallines
(*b*) Quartz
(*c*) Quartzite

The variability of fracture pattern within each of the raw material groups listed above, except the crystallines, is considerable. As there is often a greater similarity between the fracture of two rock types than between two variants of a single type, it has not been considered necessary to distinguish between the raw materials for the purposes of the classification. Apart from hammers, grinders and grindstones, scarcely any of the flake or core-tools have been fashioned from crystallines.

Milky quartz, chert and quartzite are relatively intractable and secondary work on them is rare Translucent quartz, however, lends itself better to fine retouch and has been so treated at Bellan bandi palassa. The more granular materials fracture without a prominent bulb of percussion. As is to be expected in a Late Stone Age assemblage, both the soft hammer and pressure-flaking techniques were known and, at times, employed. Most of the flaking appears to have been executed by indirect percussion. The above assertions regarding manufacture need to be tested by experiment.

The patina on chert is dependant upon variable internal structure and impurities. Its consideration serves no purpose since there are so many grades of chert present in the assemblage.

The sources of the raw material would probably have been:

(*a*) Numerous quartz outcrops situated within a radius of one mile from the site.

(*b*) The gravels of the Valave river, which flows at a distance of about $1\frac{1}{2}$ miles from the site

DESCRIPTION

The method of description is, as far as possible, visual. The illustrations, true to natural size, are based upon actual specimens with but slight accenting of the salient features.

List of abbreviations:

Cut. = Cutter
Scr. = Scraper
Scp. = Scoop
Ch. = Chopper
Adj. = Adjacent
Prl. = Peripheral

The data in the following descriptive and classificatory pages are set out as follow:

Type	Description	Number of Specimens / Maximum length in cms.	Total	Percentages relative to the total assemblage, which numbers 7513 specimens.

Fig 3a BASIC TYPES

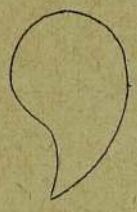
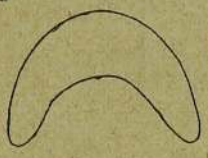
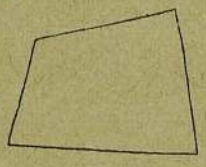
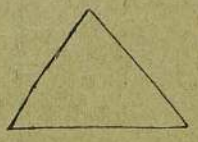
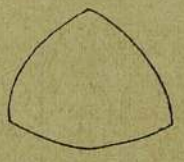
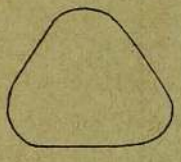
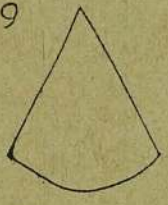
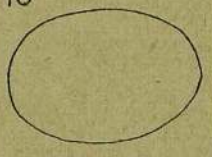
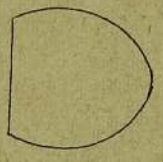
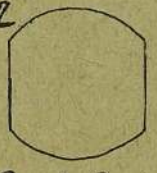
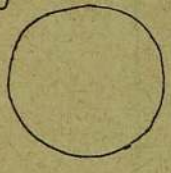
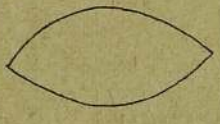
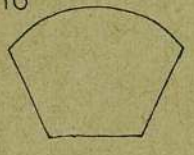
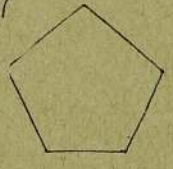
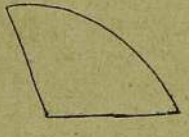
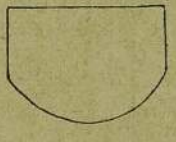
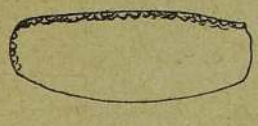
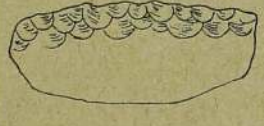
1 Miscellaneous flake & core tools	2 	3 	4  Trapezoid	5  Triangle	6 
7  Cordate	8  Amygdaloid	9  Sector	10  Ovoid	11  Semi-Ovoid Truncated once	12  Semi-Ovoid Truncated twice
13  Discoid	14  Leaf	15  Semi-Leaf	16 	17  Pentagon	18 Jangea
19  Segment	20  SemiSegment	21 	22 Awl	23 Engraver	24 Flake & Blade cores
25 Point	26 Miscellaneous	27 Hammer	28 Grinder	29 Hammer-cum-grinder	30 Pitted Hammer

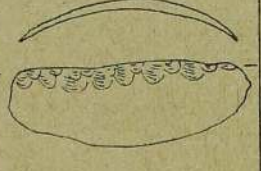
Fig3b EDGE TYPES



Cutter



Scraper

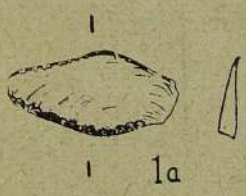


Scoop

Chopper

Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
1a	Cut. 1	717	4		1			722	9·610
		1–4½cms.	5–8cms.		4½cms.				
1b	Cut. 2	471						471	6·269
		1–4½							
1c	Cut. 2 adj.	153	3					156	2·076
		1–4	5–6						
1d	Irregular or combination of more than 2 edge types.	314	2					316	4·206
		1–4½	5½						
1e	Scr. 1	27	2		9	2		40	·532
		1½–3	5½		2–4	5½			
1f	Scr. 2					1		1	·013
						5½			
1g	Scr. 2 adj.	7						7	·093
		1–3¾							
1h	Scr.—/Cut.—	13	1					14	·186
		1½–4	5						
1i	Scp.—	6						6	·080
		1–1½							
1j	Scp.—/Cut.—		1					1	·013
			6½						
1k	Ch. 1	1			3	1	2	7	·093
		4½			2½–3½	6½	7½–10		

Fig. 4



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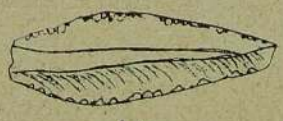

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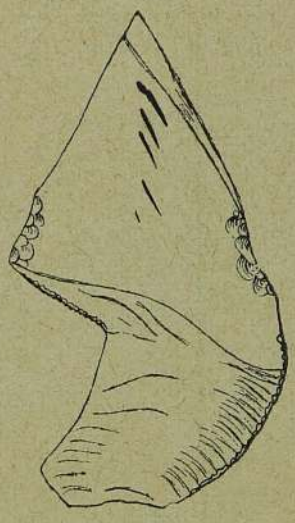

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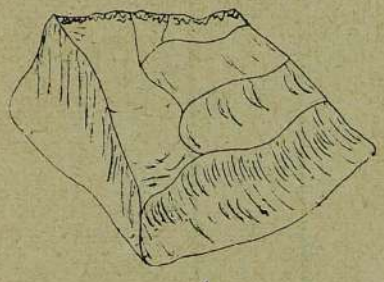

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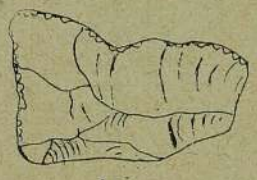

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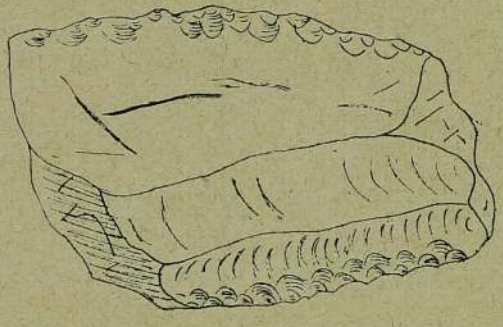

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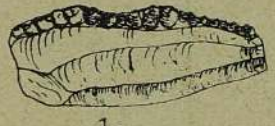
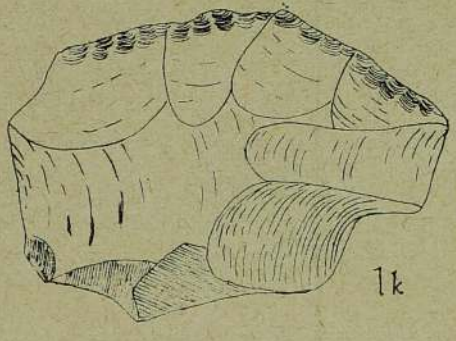
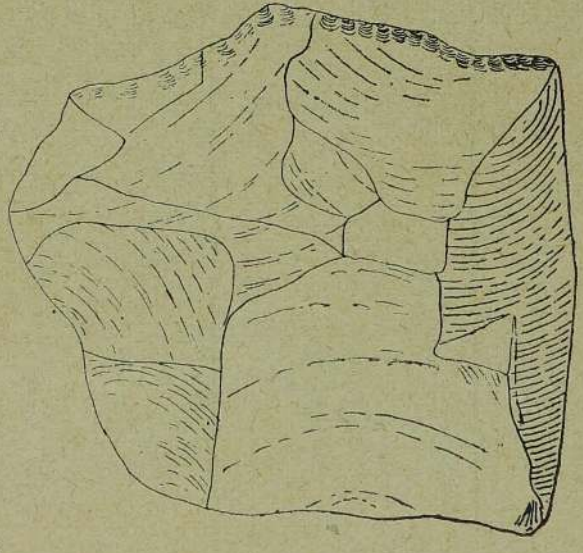


1e

1h

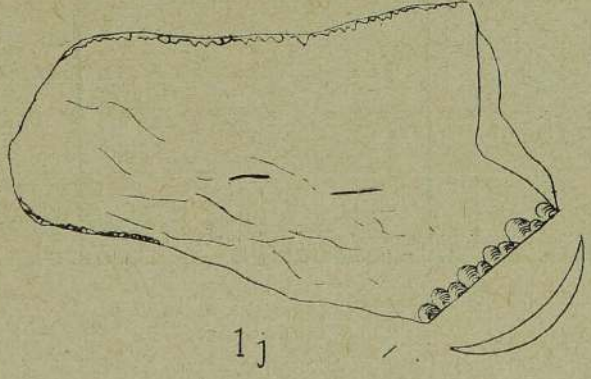


1k



1l

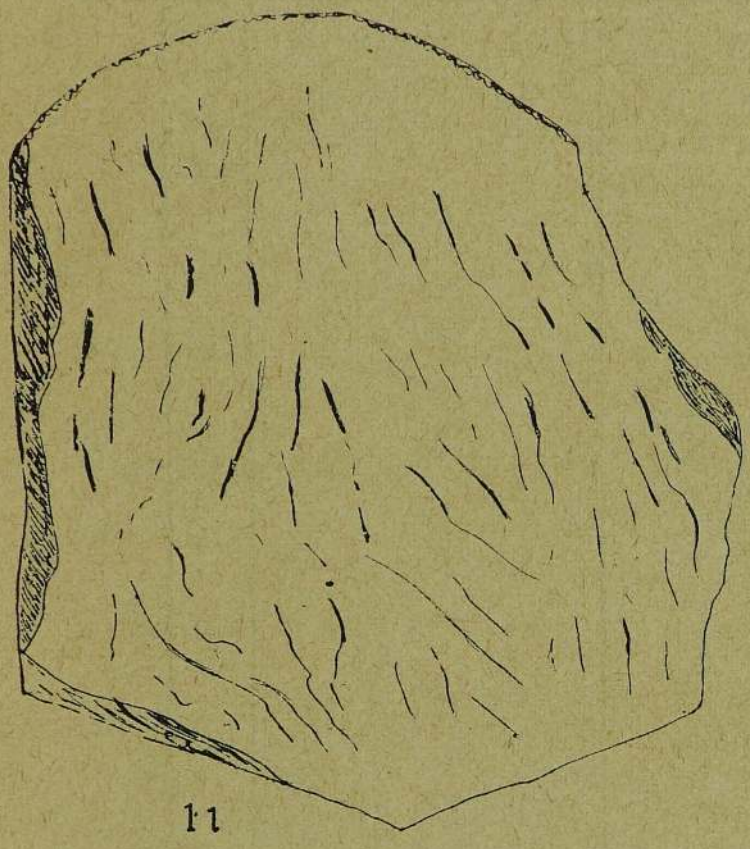
1i



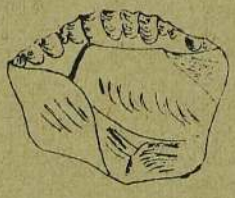
1j

Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
1l	Convex Cut. 1	29		1				30	·399
		1–3½		10½					
1m	Convex Scr. 1	1						1	·013
		2½							
1n	End Cut. 1	169	1					170	·240
		1–4½	5						
1o	End Cut. 2	26						26	·346
		1–4½							
1p	Convex End Cut. 1	4						4	·053
		1½–3							
1q	End Scr. 1	21			1			22	·293
		1–3¼			1½				
1r	Convex End Scr. 1	1						1	·013
		2							
1s	End Scp. 1	1						1	·013
		2							
1t	Concave Scr. 1	9				1		10	·133
		1¼–3				5¾			
1u	Concave Scr.—/ Convex Scr.—	2						2	·027
		2							
2a	Cut. 1	26						26	·346
		1–3¼							
2b	Cut. 1	26	2					28	·373
		1–4	5–5½						
2c	Cut.—	155	2					157	2·09
		1–4½	5–5½						
2d	Concave Scr. 1	1						1	·013
		1½							
2e	Scr.—/Cut.—	1						1	·013
		2½							
3a	Convex Cut. 1	1						1	·013
		3½							

Fig. 5



1 l



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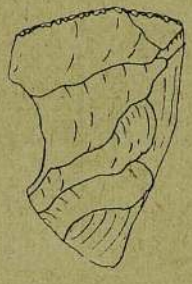
1 p



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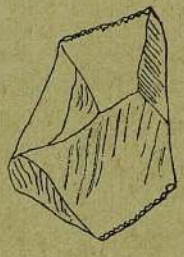


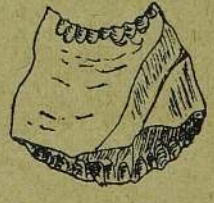
1 o

1 q

1 r

1 s

1 t

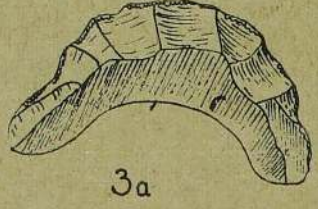


1 u

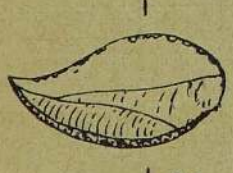
2 a

2 c

2 d



3 a

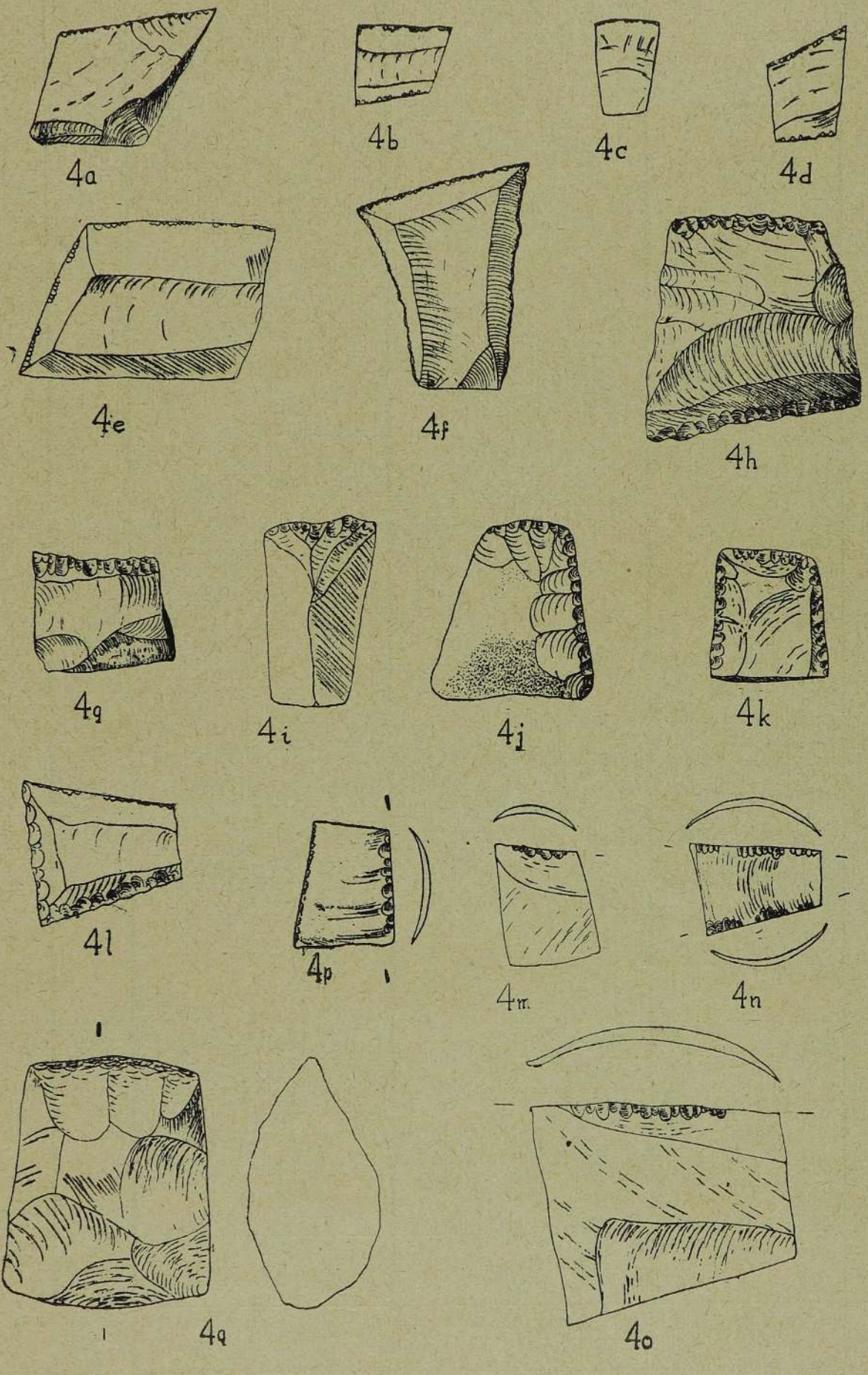


2 b

2 e

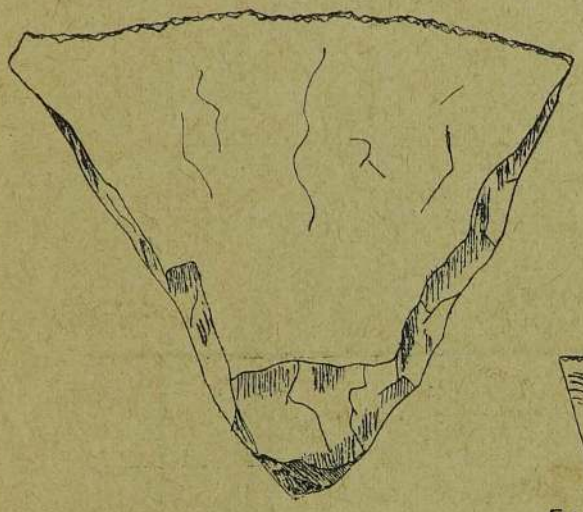
Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
4a	Cut. 1	680	3					683	9·091
		¾–4½	5–6½						
4b	Cut. 2	483						483	6·429
		¾–4							
4c	End Cut. 1	194						194	2·582
		1–4							
4d	End Cut. 2	135						135	1·797
		1–3							
4e	Cut. 2 adj.	251	3					254	3·395
		1–4½	5½						
4f	Cut. 3+	241	3					244	3·261
		1–4½	5						
4g	Scr. 1	21	3					24	·319
		2–4	5½–6½						
4h	Scr. 2	3						3	·426
		1½–3½							
4i	End. Scr. 1	14	2					16	·878
		2–4	5						
4j	Scr. 2 adj.	3						3	·426
		3							
4k	Scr. 3+	1						1	·013
		2							
4l	Scr.—/Cut.—	18						18	·240
		1¼–4½							
4m	End Scp. 1	2						2	·027
		1¾							
4n	Scp. 2+	1						1	·013
		2							
4o	Scp. 1	2						2	·027
		1½–4½							
4p	Scp.—/Cut.—	2						2	·027
		3–4¼							
4q	Ch. 1				1			1	·013
					4				

Fig. 6

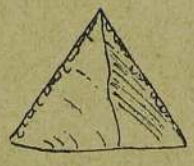


Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
5a	Cut. 1	66	1					67	·892
		¾–4	7						
5b	End Cut. 1	5						5	·067
		1–2½							
5c	Cut. 2	20						20	·266
		1¼–3							
5d	Cut. prl.	4						4	·053
		2½–3							
5e	Scr. 1	2						2	·027
		1–2¾							
5f	End Scr. 1	2						2	·027
		2–2½							
5g	Scr.—/Cut.—	1	1					2	·027
		2	5						
6a	Cut. 1	4						4	·053
		1½–4							
6b	Cut. 2+	6						6	·080
		1½–4							
7a	Cut. 1	8						8	·106
		1–3							
7b	Cut. 2+	28						28	·373
		1–4							
7c	Scr. 1	1						1	·013
		2½							
7d	Scr. 2+	2						2	·027
		2–3							
7e	Scr.—/Cut.—				1			1	·013
					3¼				
8a	Cut. 1	29	2		1			32	·426
		1½–4½	5		3¼				
8b	Cut. 2	24						24	·319
		1–3½							
8c	Cut. prl.	3						3	·040
		1¼–2¼							
8d	End Cut. 1	2	1					3	·040
		2¼–2¾	6½						
8e	End Scr. 1	1						1	·013
		3½							

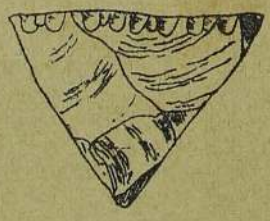
Fig. 7



5a

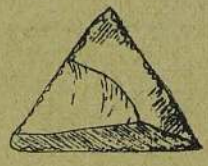


5c



5e

5h

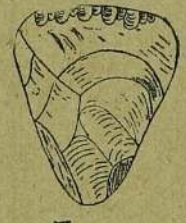


5d

5f

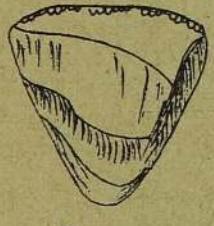
6a

6b



7c

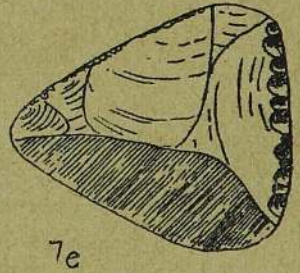
5g



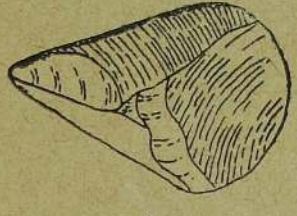
7a

7b

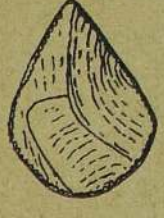
7d



7e



8a



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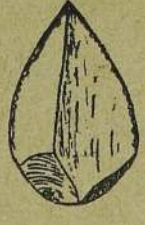

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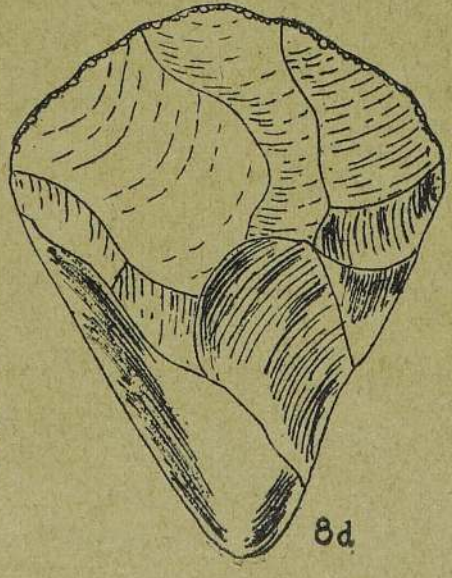

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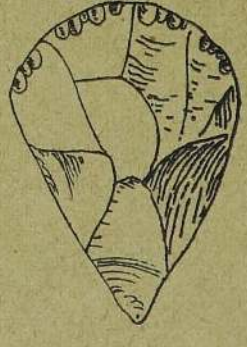
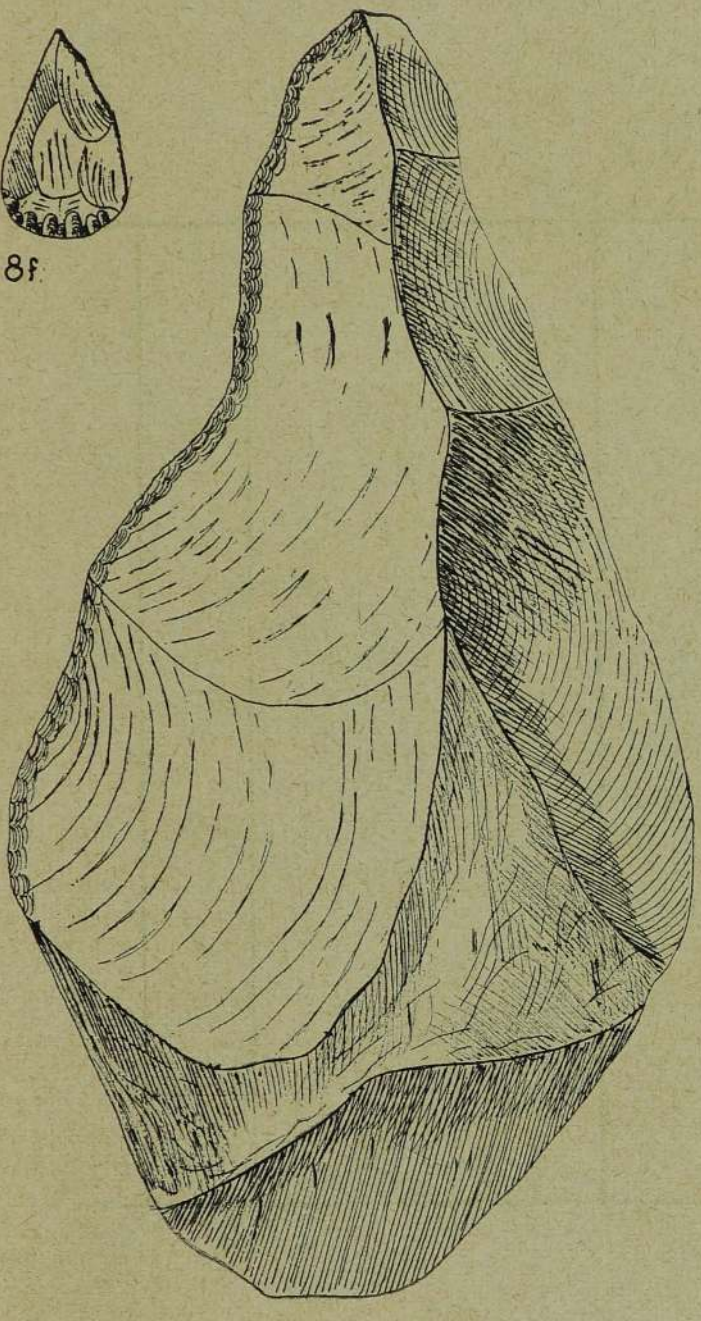


8e

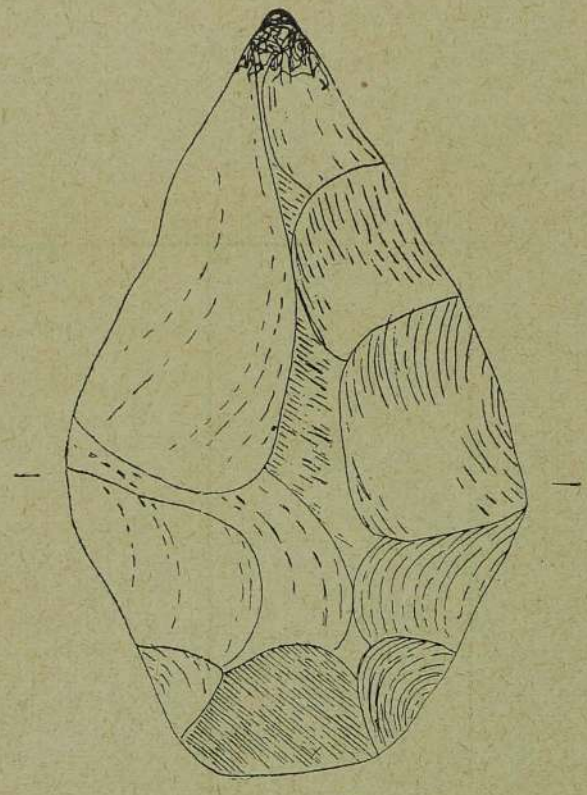
Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
8f	Scr.—/Cut.—	1						1	·013
		2							
8g	Ch. 1			1				1	·013
				15½					
8h	Pick 1						1	1	·013
							9		
9a	Cut. 1	4						4	·053
		1–2½							
9b	Convex End Cut. 1	18						18	·240
		1¼–2½							
9c	Cut.—	2						2	·027
		2–3							
9d	Convex End Scr. 1	1						1	·013
		2							

Fig. 8

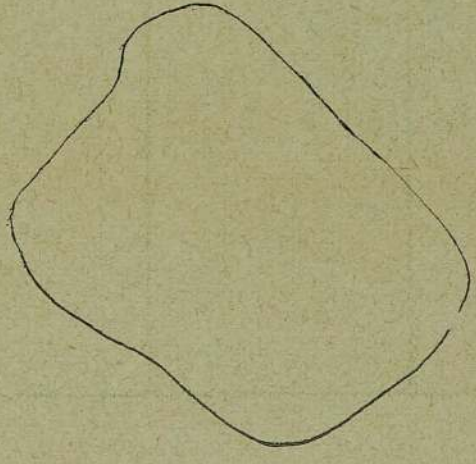
8f



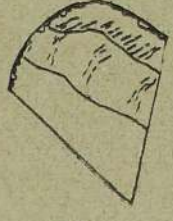
8g



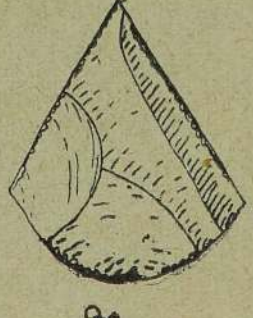
8h



9a



9b

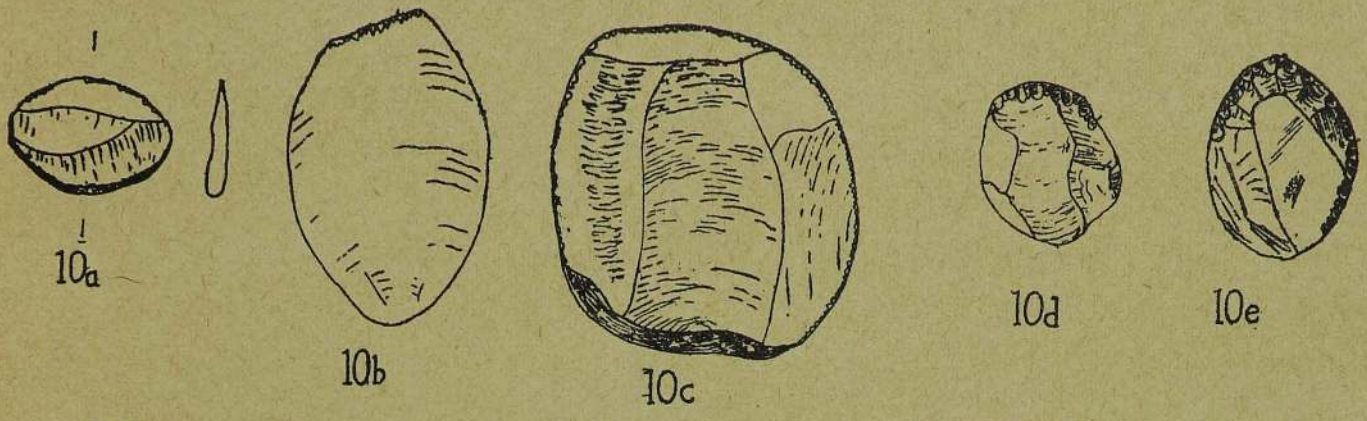


9c

9d

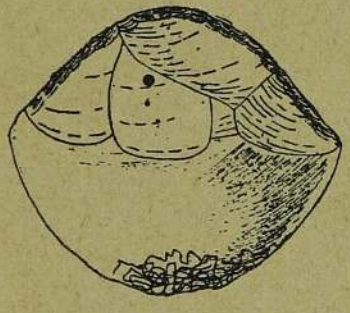
Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
10a	Cut. 1	72	5		2	1		80	1·065
		1–4	4½–5½		3¼–3¾	6			
10b	End Cut. 1	6						6	·080
		2–3½							
10c	Cut. 2+	141	3					144	1·917
		1–4	4½						
10d	Scr. 1	2	1		2			5	·067
		1½	5		1¾				
10e	Scr. 2+	1				1		2	·027
		2¼				5			
10f	Scr.—/Cut.—	1						2	·027
		2							
10g	Ch. 1				2	2	4	8	·106
					4	5½	9		
10h	Ch. 2+	1	1	1				3	·040
		4½	6½	8					
10i	Ch. 1	1						1	·013
	Hammer fragment	4							

Fig. 9



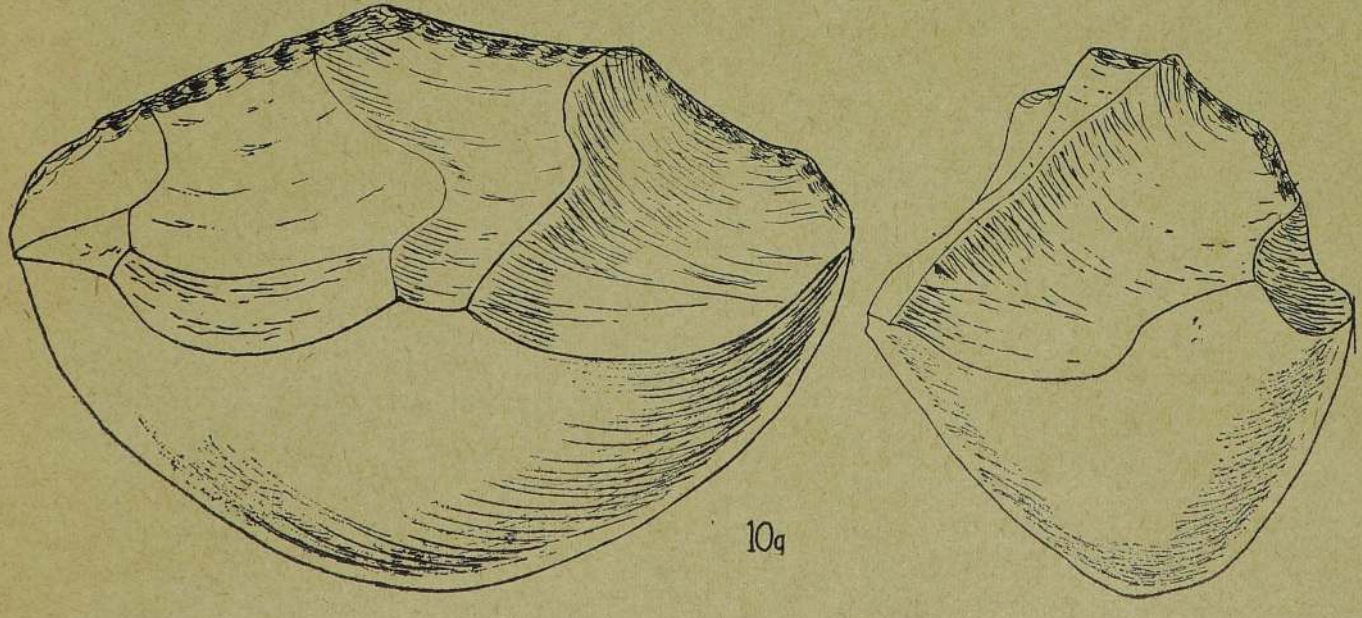
10a 10b 10c 10d 10e

10f



10i

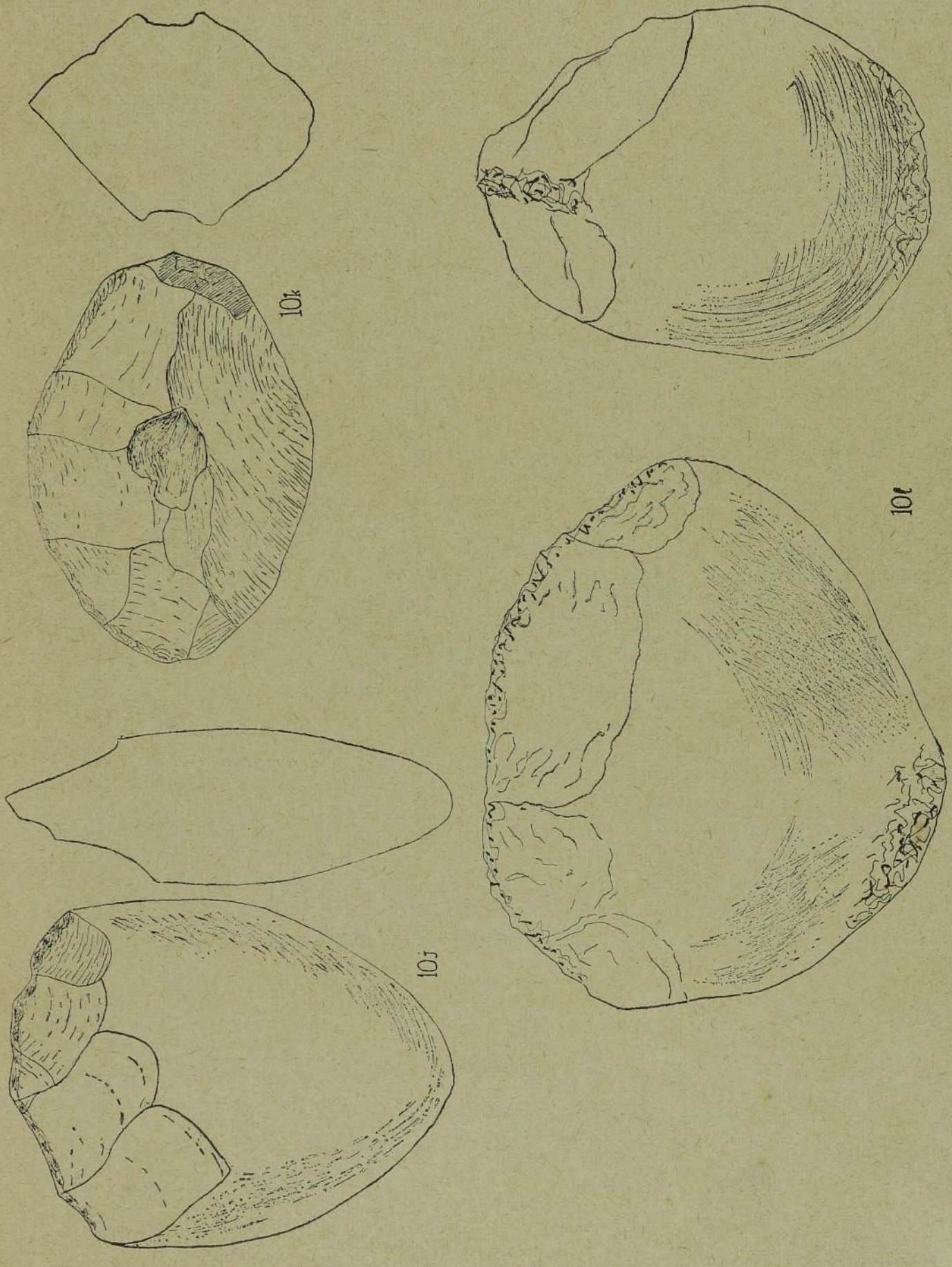
10h



10g

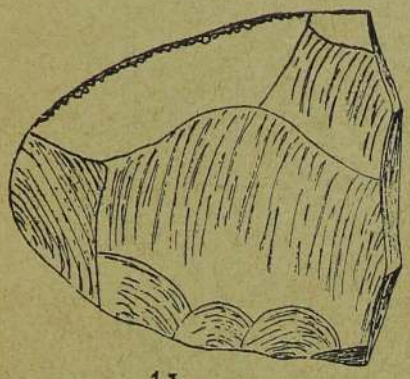
Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
10j	End. Ch. 1						2	2	·027
							8–10		
	Ch. 1								
10k	Core with 2 pits (flaked, not drilled)					1		1	·013
						7			
10l	Hammer/Pounder (A pounding edge is too blunt for chopping)						1	1	·013
							10		

Fig. 10

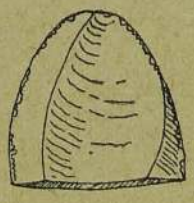


Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
11a	Cut. 1	30	1		1			32	·426
		1–2½	4		3				
11b	Cut. 2+	66						66	·878
		1–4							
11c	Scr.—/Cut.—		1					1	·013
			4½						
11d	Ch. 1					1		1	·013
						7½			
12a	Cut. 1	1						1	·013
		2½							
12b	Cut. 2	23						23	·306
		1–3							
13a	Ch. 1					1		1	·013
						6			
14a	Convex Cut. 1	13						13	·173
		1¼–3							
14b	Convex Cut. 2	15						15	·199
		1½–4½							
14c	Convex Ch. 1					1		1	·013
						6			

Fig. 11



11a



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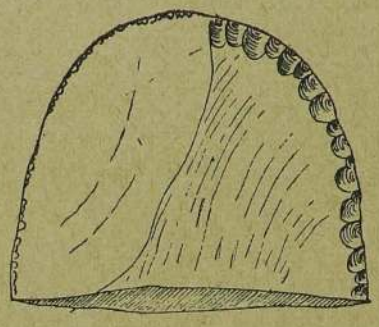

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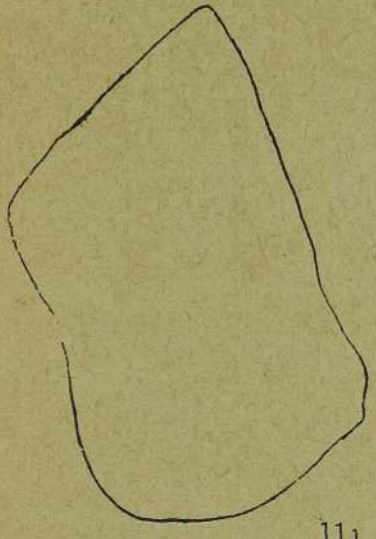

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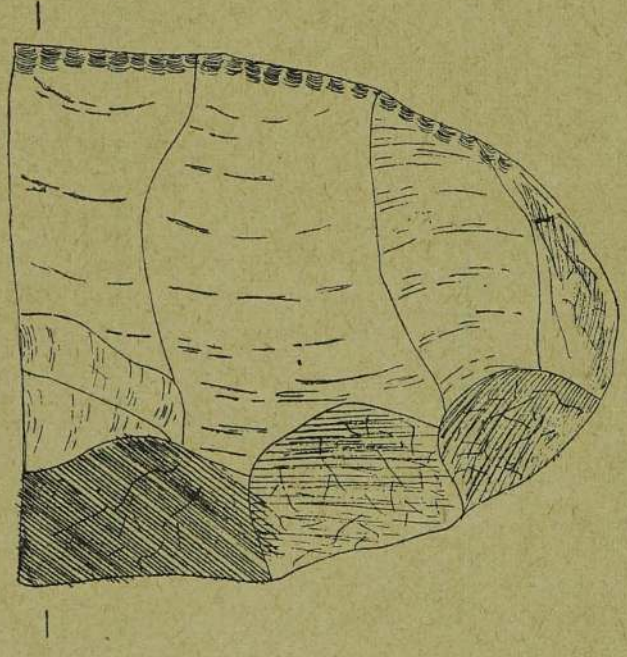
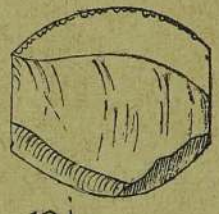
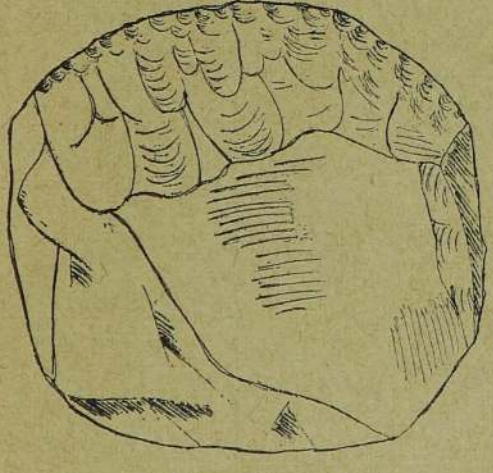


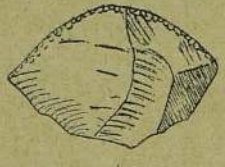


12a

12b

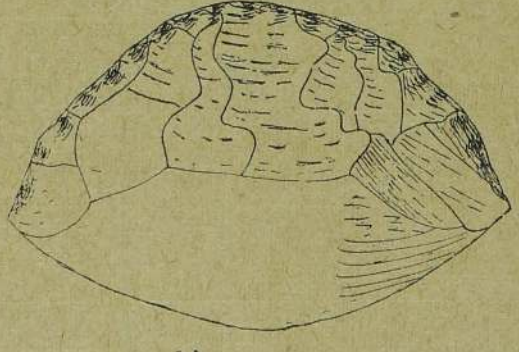


13a



14a

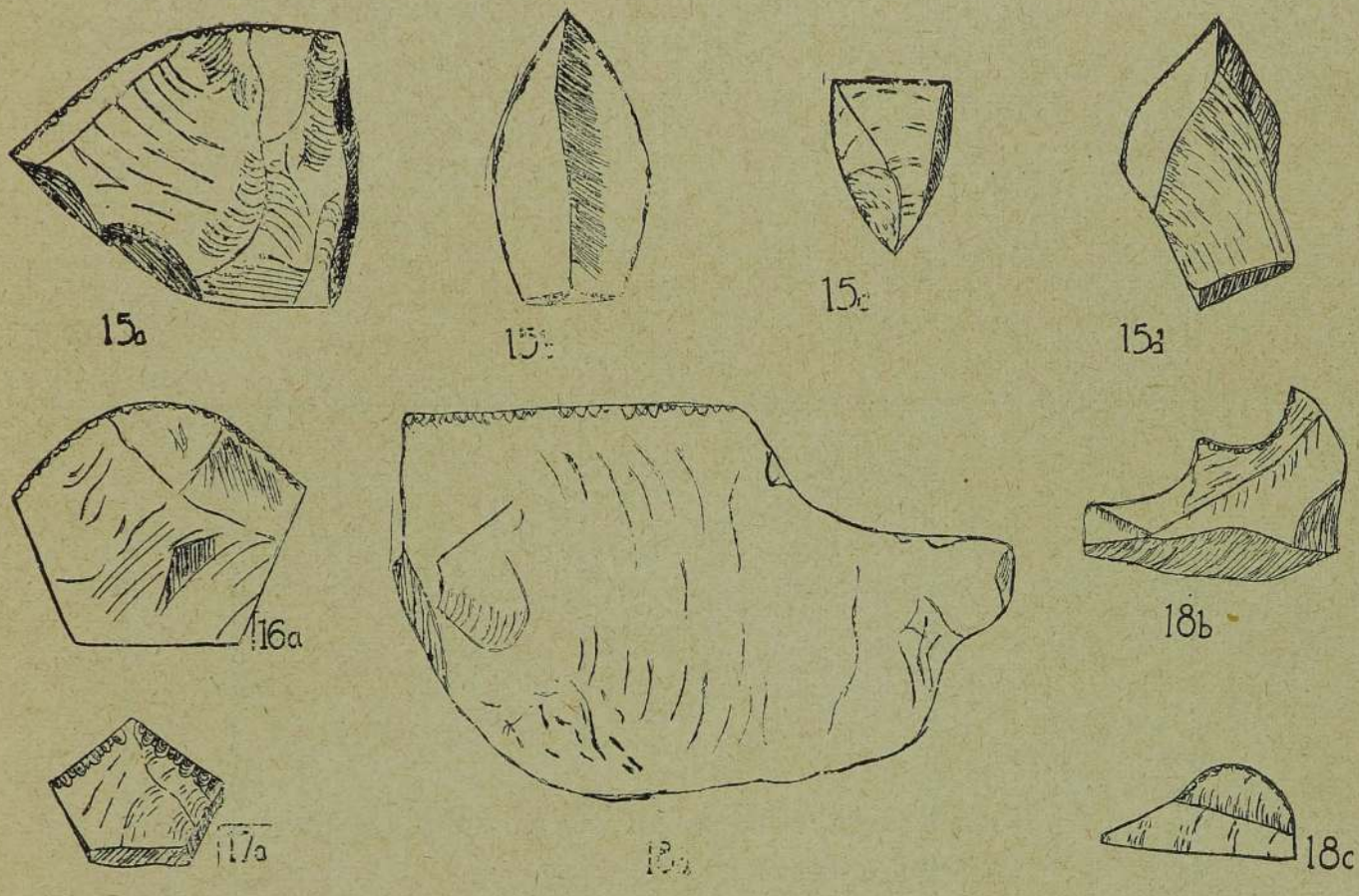
14b

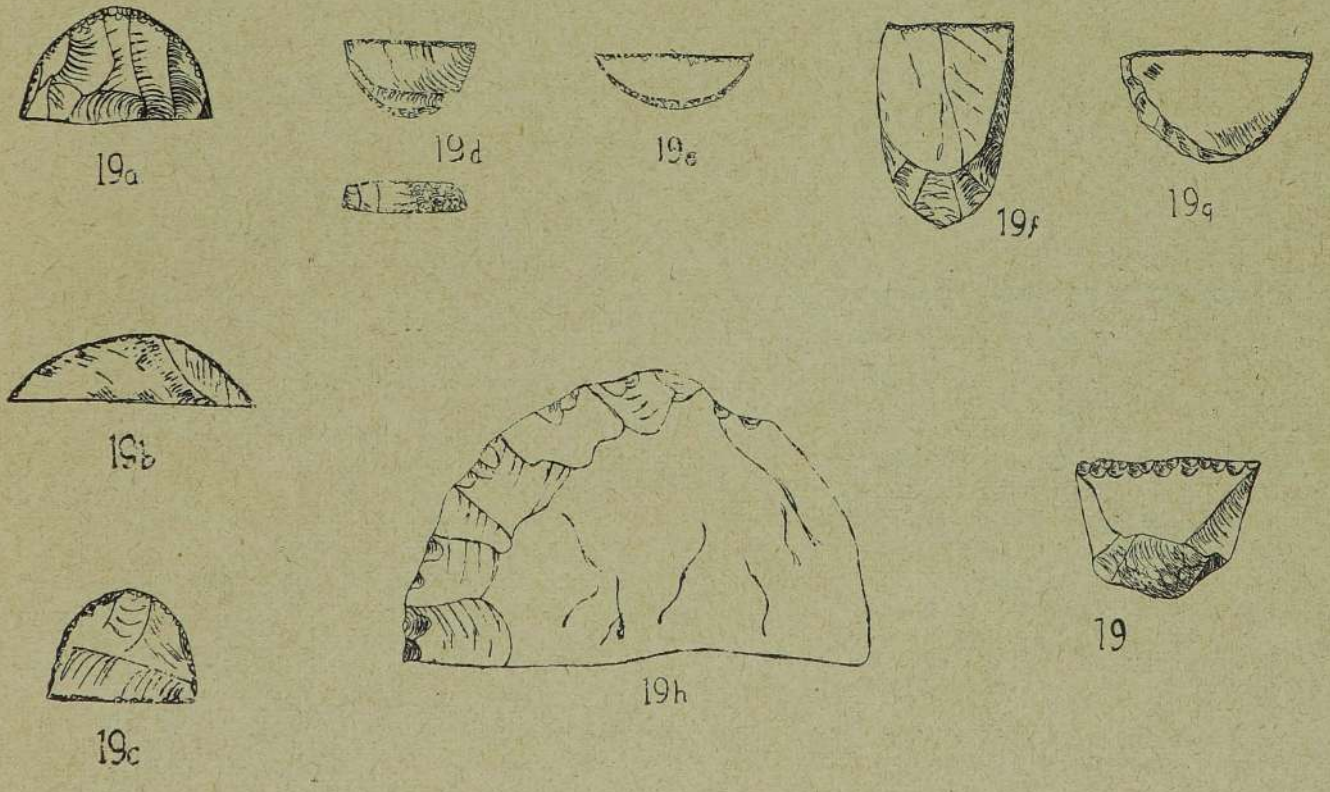


14c

Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
15a	Cut. 1	30	1					31	·413
		1½–3	5½						
15b	Cut. 2	33						33	·439
		1–4½							
15c	Cut.—	3						3	·040
		1–3							
15d	Cut. 2	8						8	·106
		1¾–3¼							
16a	Convex Cut. 1	10						10	·133
		1–3½							
17a	Scr. 2 adj.	1						1	·013
		2							
18a	Cut. 1	2	1					3	·040
		3	7						
18b	Cut. 1	1						1	·013
		3							
18c	Cut. 1	1						1	·013
		2¼							
19a	Convex Cut. 1	28						28	·373
		1–4							
19b	Convex Cut. 1 Narrow segment	1						1	·013
		3							
19c.	Cut. prl.	4						4	·053
		2–3							
19d	Cut. 1	65						65	·865
		1½–4½							
19e	Cut. 1	1						1	·013
	Narrow Segment	1¾							
19f	Cut. 1 Deep Segment	6						6	·080
		1–2½							
19g	Cut. 2	3						3	·040
		2–2¼							
19h	Convex Scr. 1		1					1	·013
			5½						
19i	Scr. 1	4			1			5	·067
		1½–2			3½				

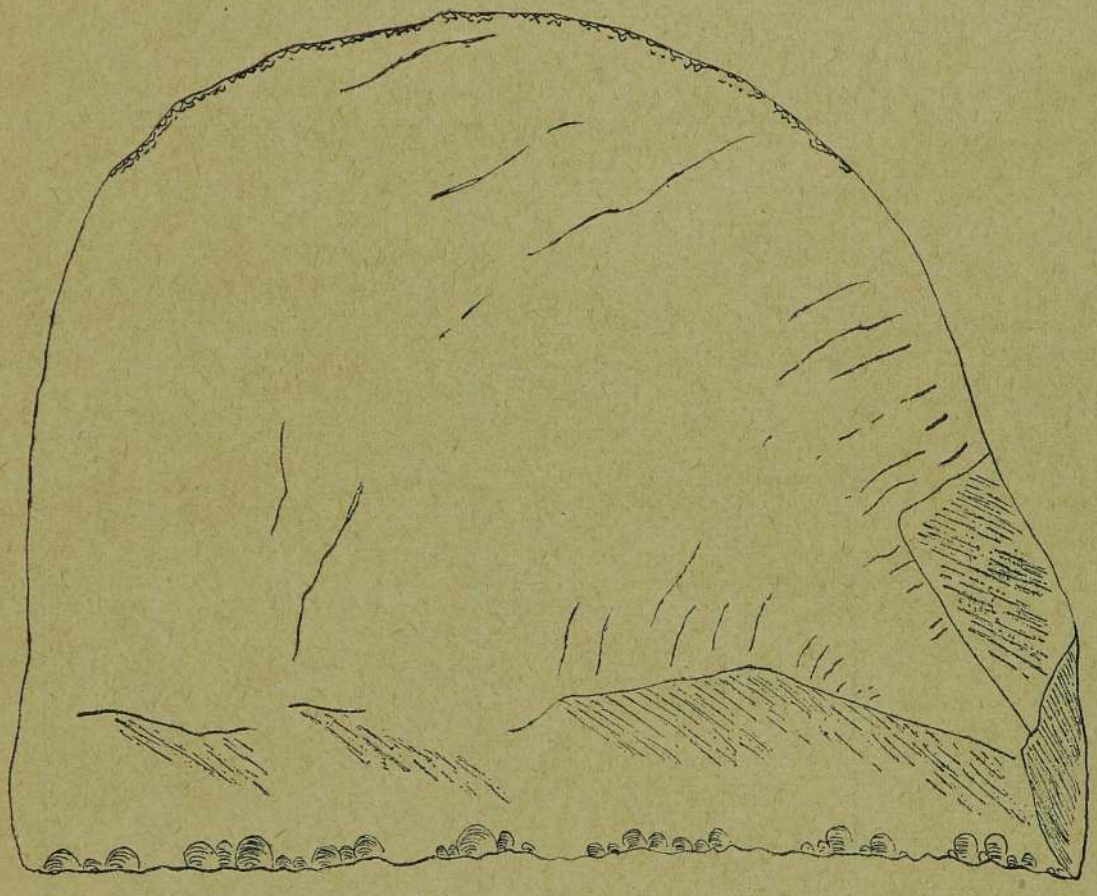
Fig. 12



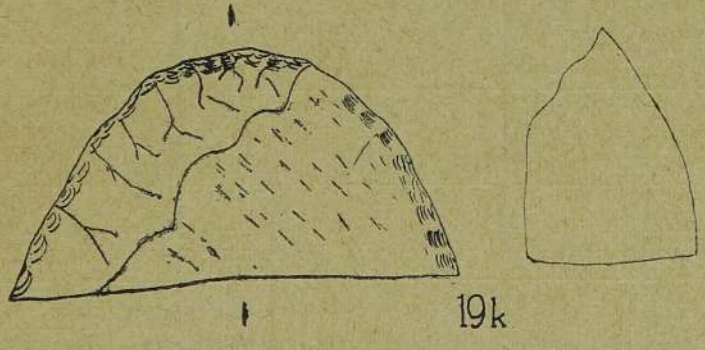


Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
19j	Scr.—/Cut.—	1		1				2	·027
		4		14					
19k	Convex Ch. 1				2			2	·027
					$4\frac{1}{2}$				
19l	Ch. 1	2						2	·027
		$2\frac{3}{4}$–$4\frac{1}{2}$							

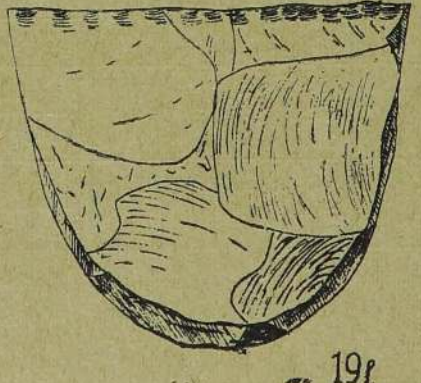
Fig. 13



19j



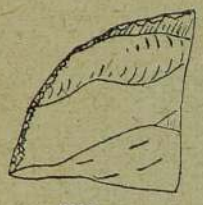
19k



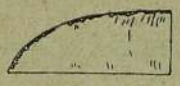
19l

Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
20a	Convex Cut. 1	93	2					95	1·264
		1–4	5½						
20b	Convex Cut. 1	8						8	·106
	Narrow semi-segment	1½–2¾							
20c	Convex Cut. 1/ Cut. 1	81	3					84	1·118
		1–4½	5–6½						
20d	Cut. prl.	3						3	·040
		2½							
20e	Cut. I	51	1					52	·692
		1½–3½	6						
20f	Cut. 1	3						3	·040
	Narrow semi-segment	2–2¾							
20g	Cut. 2	5						5	·067
		1½–2½							
20h	End. Cut. 1	5						5	·067
		1½–4							
20i	Scr. 1	3	1					4	·053
		1½–3	5						
20j	Scr. 2		1					1	·013
			6						
20k	Scr. prl.	1						1	·013
		3							
20l	Scr. 1	3						3	·040
		1½–3							
20m	End Scr. 1	2	1					3	·040
		2–2½	6						
20n	Scr.—/Cut.—	4						4	·053
		2–3							

Fig. 14

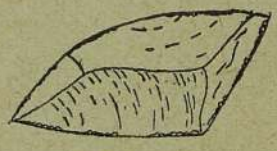


20a

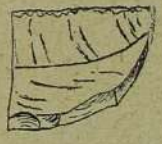


20b

20c



20d



20e

20f

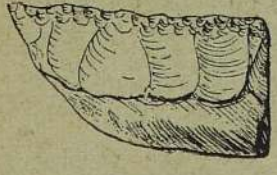
20g

20h

20i

20j

20k



20l

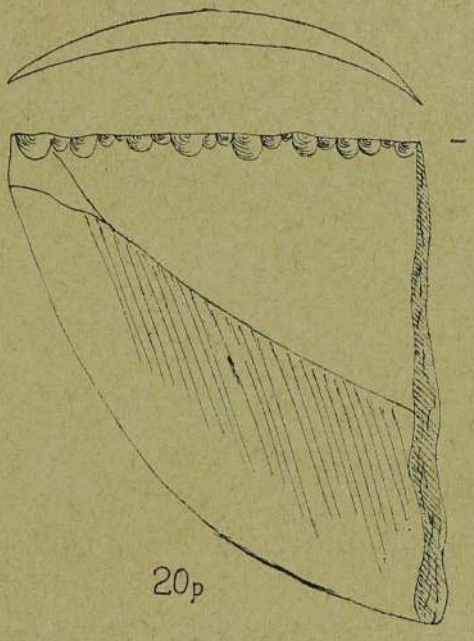
20m

20n

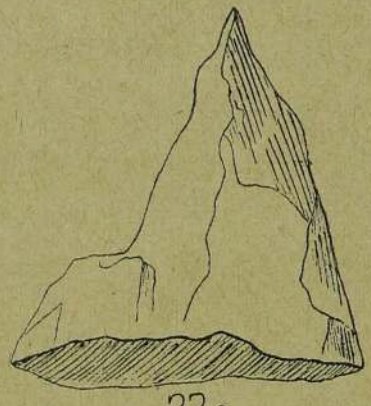
Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
20o	Scr.—/Cut.—	1	1					2	·027
		3	$5\frac{1}{2}$						
20p	Scp. 1		1					1	·013
			$6\frac{1}{2}$						
21a	Cut. 3	5						5	·067
		$1–1\frac{1}{2}$							
22a	Awl	34			2			36	·429
		$1\frac{1}{2}–4$			$2–2\frac{1}{4}$				
22b	Awl	2						2	·027
	Segment	$2–2\frac{1}{2}$							
22c	Awl/Cut.—	1						1	·013
		2							
23a	Engraver	7	1					8	·106
		$1\frac{3}{4}–3\frac{3}{4}$	$5\frac{1}{4}$						
24a	Flake core				248	14		262	3·487
					$\frac{3}{4}–4\frac{1}{2}$	5–8			
24b	Levallois core				4			4	·053
					2–3				
24c	Blade core				8			8	·106
					$1\frac{1}{4}–3\frac{1}{2}$				
24d	Core trimmer	24	1					25	·333
		$1–4\frac{1}{2}$	$6\frac{1}{2}$						
24e	A rolled flake or blade core, reused as a core				1	1		2	·027
					$2\frac{3}{4}$	6			
24f	Potential core				4			4	·053
					3–4				

Fig. 15

20o

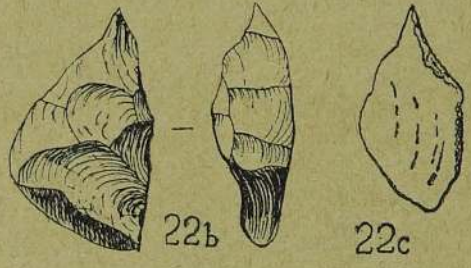


20p



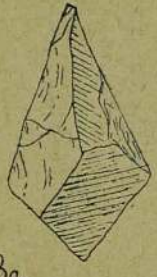
22a

21a



22b 22c

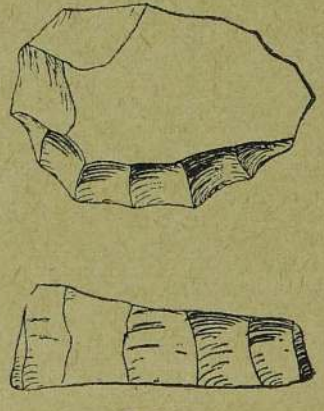
23a



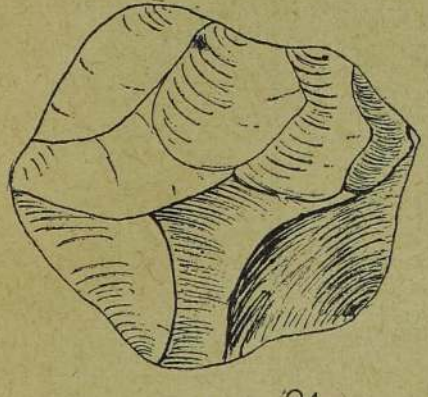
23a

23a

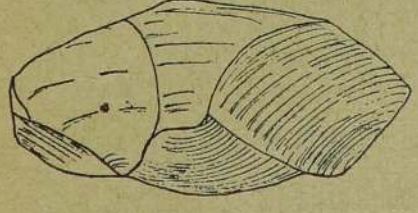
24e

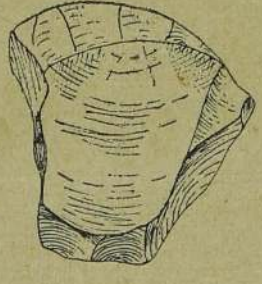


24d



24a



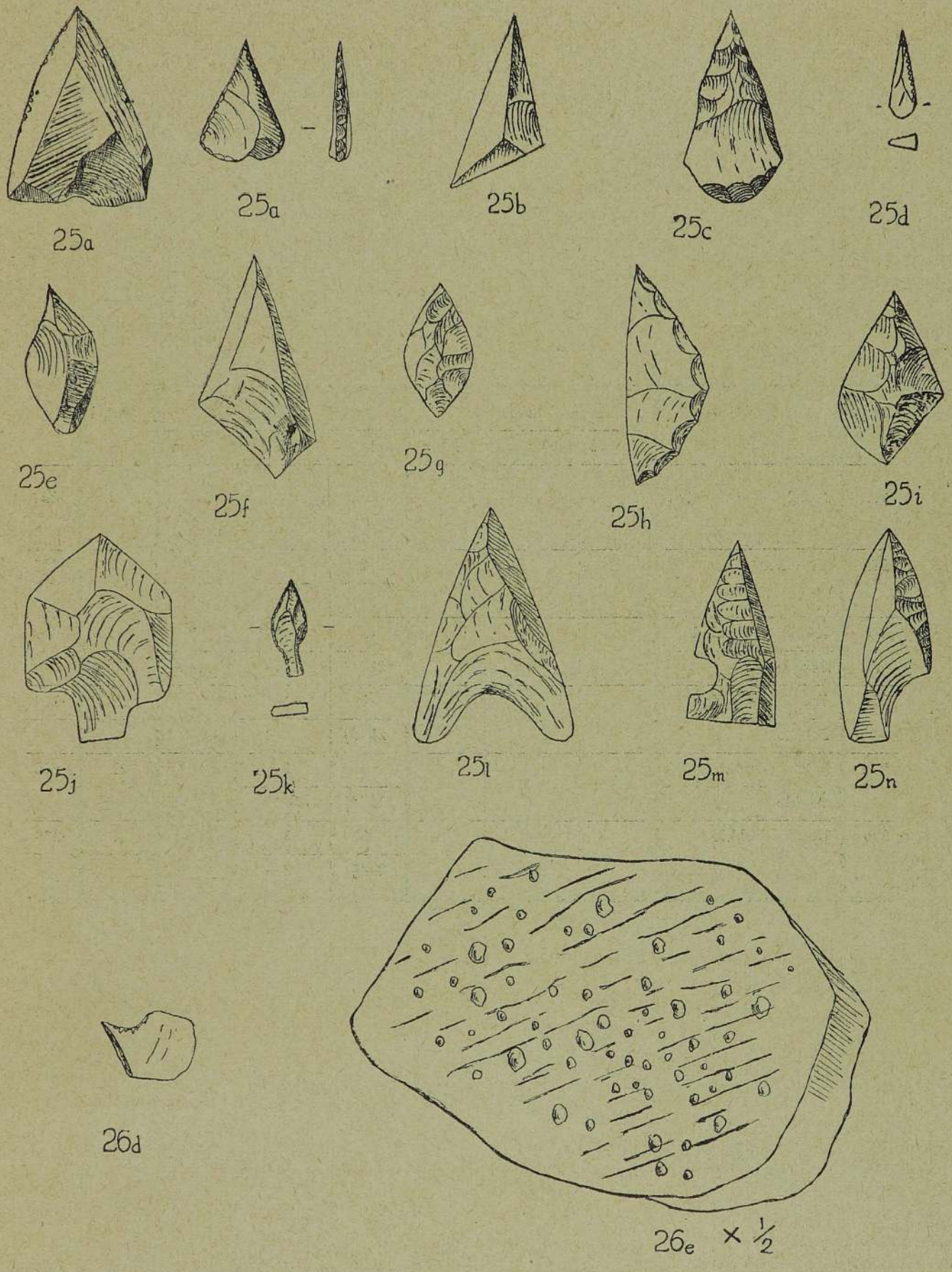


24b

24c

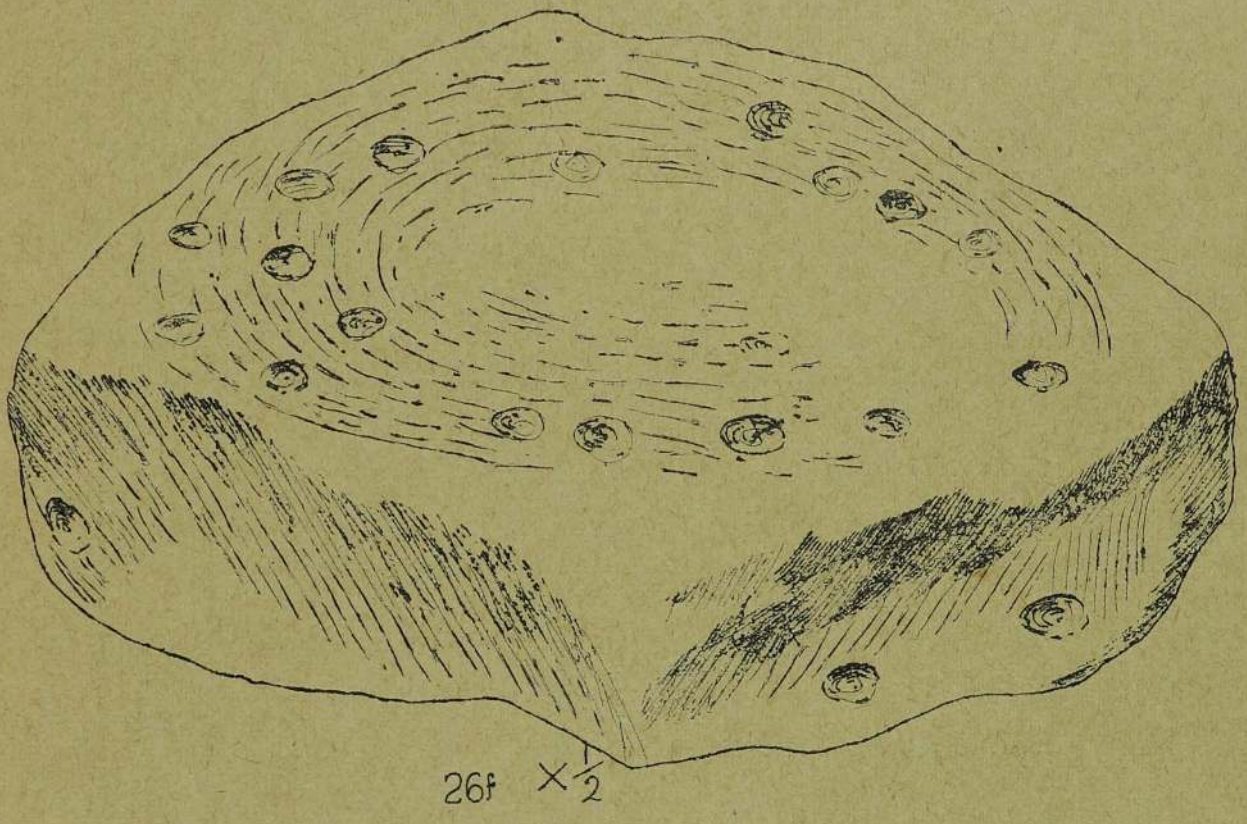
Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
25a	Point	46						46	·612
	Straight base	1–4							
25b	Asymmetrical point	3	1					4	·053
	Straight base	2–3	5¼						
25c	Point	13	1	1	1			16	·213
	Convex base	1½–4½	5½	8½	3¾				
25d	Narrow Point	2						2	·027
	Convex base	1¼							
25e	Point	1						1	·013
		2½							
25f	Point	31	1					34	·453
	Trapezoid	1½–4	6						
25g	Point	1						1	·013
	Leaf	1½							
25h	Point	5	1					6	·080
	Segment	1½–3½	7						
25i	Point	6						6	·080
	Semi-Segment	1½–2½							
25j	Point	1						1	·013
	Incipient tang	3							
25k	Point	2						2	·027
	Tang	3							
25l	Point	2						2	·027
	Hollow base	2–4							
25m	Point	2						2	·027
	Notch	2–3							
25n	Point	3						3	·040
	Shoulder	1½–3½							
26a	Waste	1406	6					1412	18·794
		1–4½	5–6						
26b	Red ochre	2						2	·027
		1½–3							
26c	Blank	16						16	·213
		1½–4½							
26d	Microburin	3						3	·040
		1–1½							
26e	Stone slab with small pits.						1	1	·013
							14		

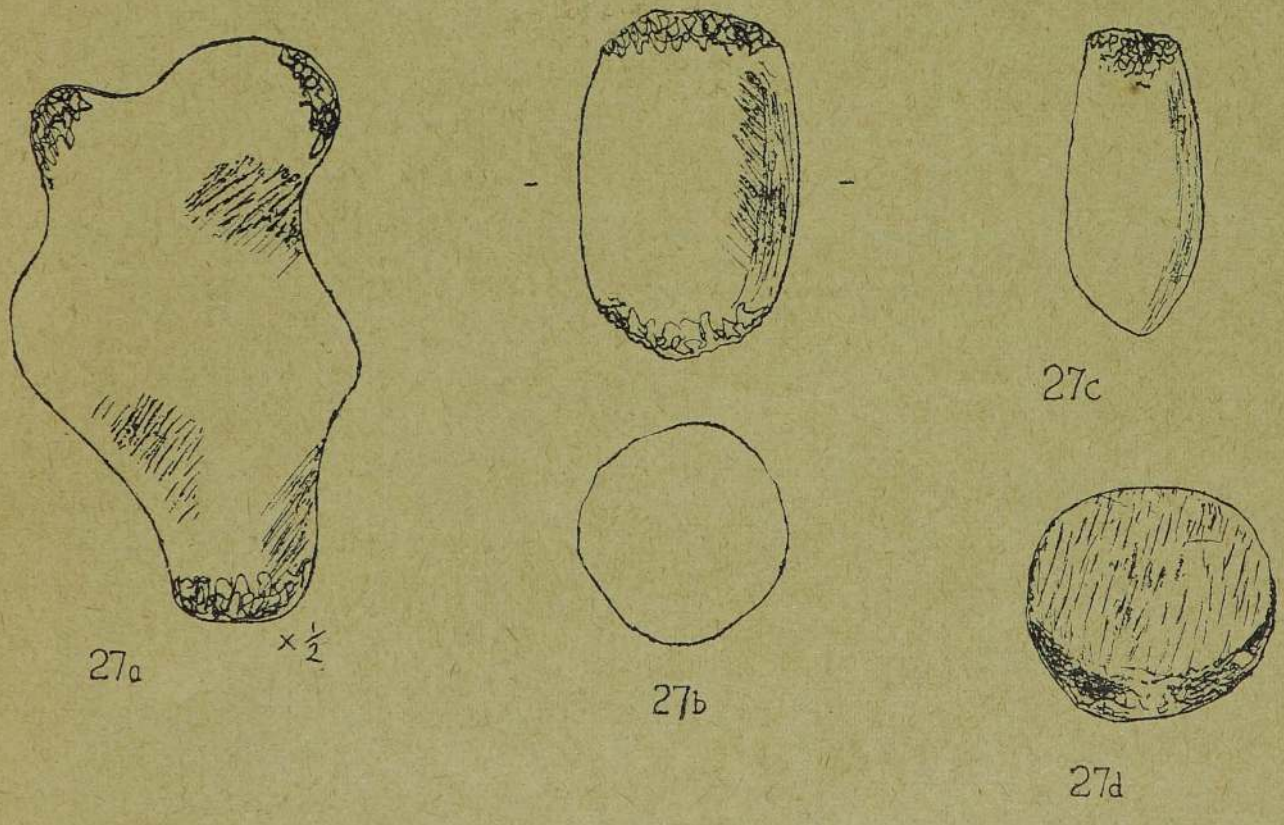
Fig. 16



Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
26f	Anvil-cum-grindstone						2	2	·027
							27–30		
27a	Hammer				2	9	4	15	·200
					3–4½	5¼–7½	8–9		
27b	Hammer 2 ended				42	5	3	50	·666
	Pebble				2½–4½	5–7	8½–9		
27c	Hammer 1 ended				11	1		12	·160
	Pebble				2¼–4½	6			
27d	Hammer p rl.				19	2		21	·208
	Pebble				2¾–4½	5½–8			
27e	Unused Pebble				19	3		21	·208
					2–4½	5–8			

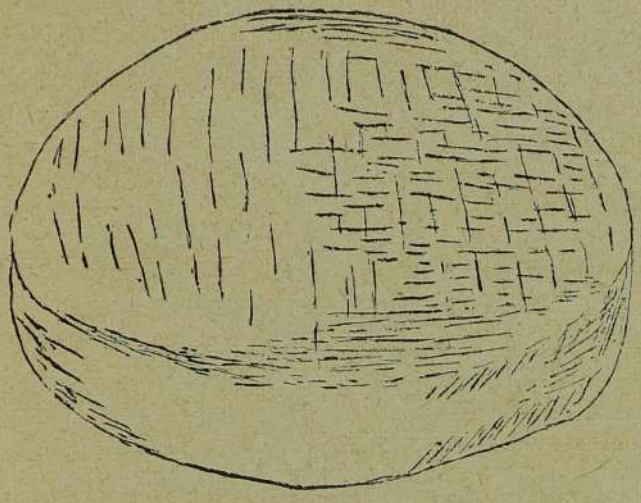
Fig. 17



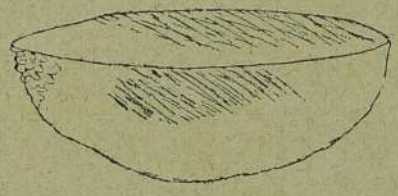


Type	Description	Flakes			Cores			Total	%
		Small	Medium	Large	Small	Medium	Large		
28a	Grinder				4	8	2	14	·186
					$1\frac{3}{4}$–$4\frac{1}{4}$	$4\frac{1}{2}$–$7\frac{1}{2}$	8–$13\frac{1}{2}$		
28b	Grinder			1				1	·013
	Hammer fragment			8					
29a	Hammer/Grinder				1	5	4	10	·133
					3	5–6	$9\frac{1}{2}$–10		
30a	Pitted pebble					1	10	11	·146
	1 pit.					6	8–12		
30b	Pitted pebble						8	8	·106
	2 pits						9–$10\frac{1}{2}$		
30c	Pitted cuboid						2	2	·027
	1 pit						$9\frac{1}{2}$–12		
30d	Grinder			2				2	·027
	Fractured pitted pebble			9					

Fig. 18

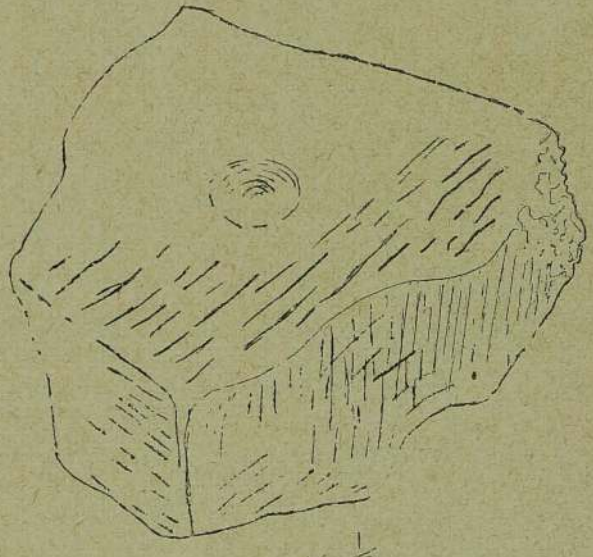


28a × ½

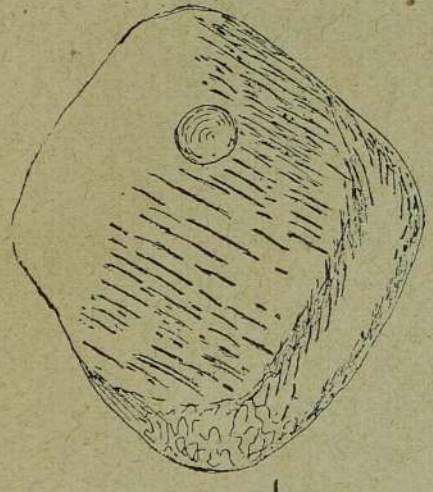


28b × ½

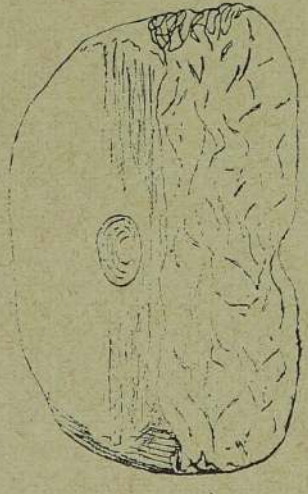
29a × ½



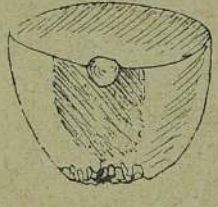
30c × ½



30a × ½

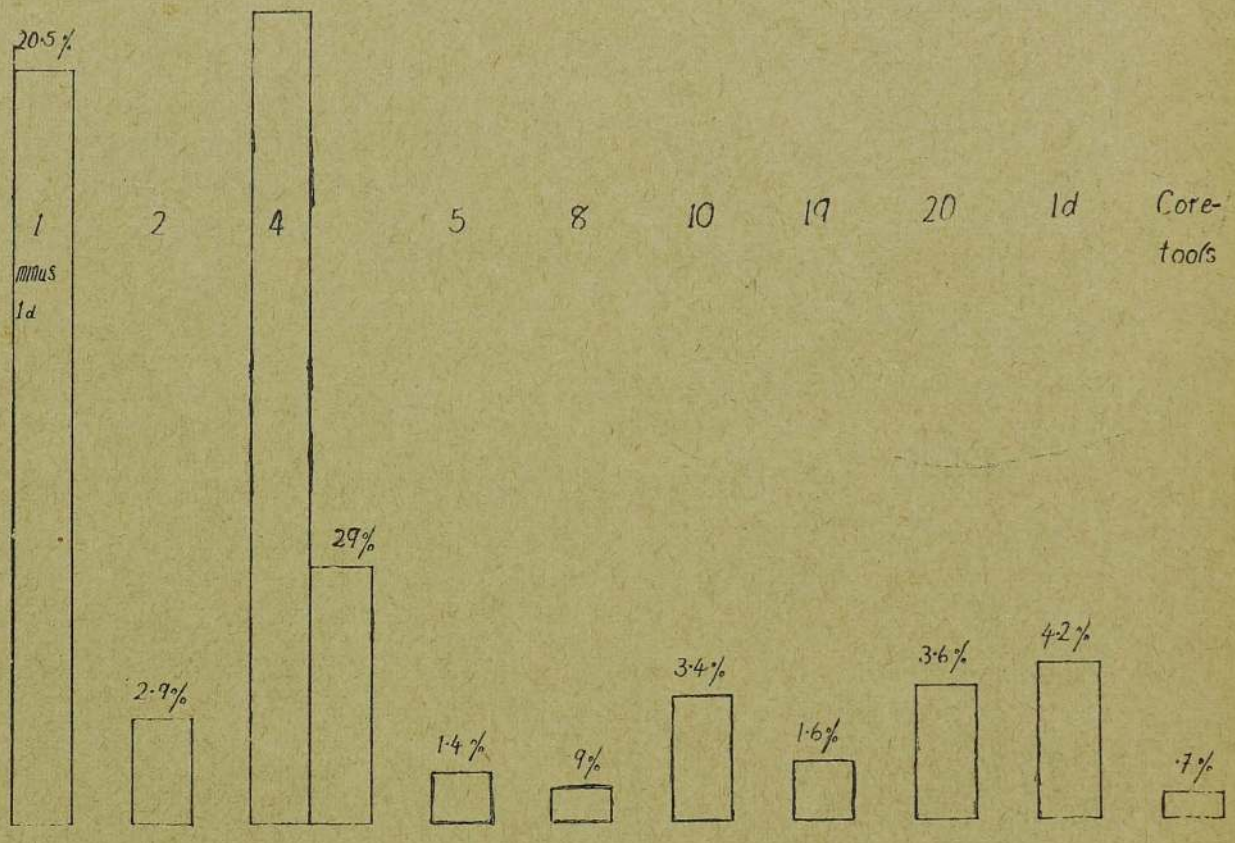


30b × ½

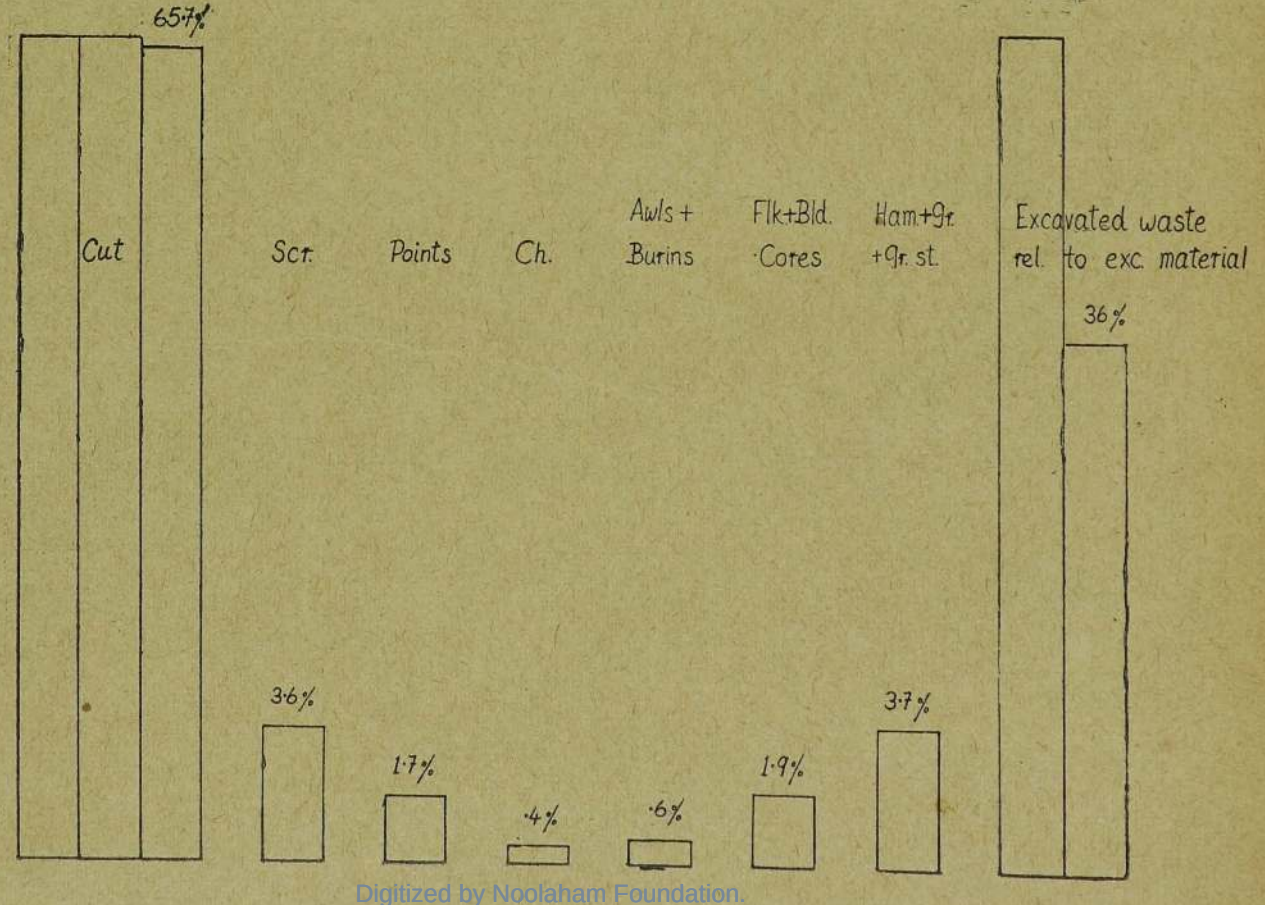


30d × ½

Percentages of SELECTED FORMS relative to total assemblage of 7513



Percentages of APPARENT FUNCTIONAL TYPES relative to total assemblage of 7513



Percentages of trimmed and utilized flake and core-tools :

Form	Total	Trimmed	Utilized
1 (minus 1d)	1692	1 ·4%	16 ·7%
1d	316		11 ·4
2	213	3 ·3	29 ·1
4	2066	1 ·3	12 ·2
5	102	2 ·0	34 ·3
7	40	10 ·0	7 ·5
8	66	13 ·6	48 ·5
9	25	4 ·0	36 ·0
10	255	11 ·4	23 ·9
11	100	8 ·0	21 ·0
12	24	4 ·2	29 ·2
14	29	3 ·4	37 ·9
15	75	5 ·3	24 ·0
19	120	29 ·2	23 ·3
20	274	10 ·2	25 ·9
25	126	6 ·3	
1-21, 25	5556	3 ·5%	15 ·1%

Form 19 dominates the specialized trimmed forms; random occurrences are : 1a, 2b, 4q, 5a, 10a, 20e, 25a, 25d and 25k, of which 1a, 2b and 10a may be considered backed. 1d, 3, 18 and 21 are not represented by trimmed specimens.

COMMENTS

(1) *Blades* were produced, (type 24c), although upon an insignificant scale. In certain countries, blades are known from the Acheulean onwards (de Sonneville-Bordes, D. 1966 :130), and their presence or absence in the Late Stone Age means little. Within the latter context, production is determined by the suitability of the raw material and the need for blades in a particular environment. The Crested-Guiding-Ridge technique was apparently not employed at Bellan bandi palassa.

(2) The majority of flake *cores*, (type 24), belong to an undistinctive group. Generally, any suitable striking platform was used for flaking and special core preparation, as indicated by the presence of Levallois cores, was rare. The shape of the exhausted core was determined by that of the original core. Flat and spheroidal pebbles produce discoidal and polyhedral cores respectively, thus obviating the need for distinguishing between what appear to be three core types, viz. discoids, polyhedrals and nondescripts.

(3) Many of the *choppers*, as on form 10, could easily be mistaken for Olduvan or Sohan pebble tools if found out of context (Deraniyagala, P.E.P.1958b:246). The choppers found in the Ratnapura industry (Deraniyagala, S.1970) are no different from the ones in the Balangodan. Since many of the Ratnapura gravels have been redeposited, and since their stratigraphy has not been worked out, the status of the Ratnapura industry is still uncertain. Nothing akin to an Acheulean hand-axe or cleaver was found at Bellan bandi palassa, with the possible exception of the pick (type 8h).

Cooper mentions choppers in association with an industry similar to the Balangodan on Kangaroo Island (Deraniyagala, P.E.P. 1963:98).

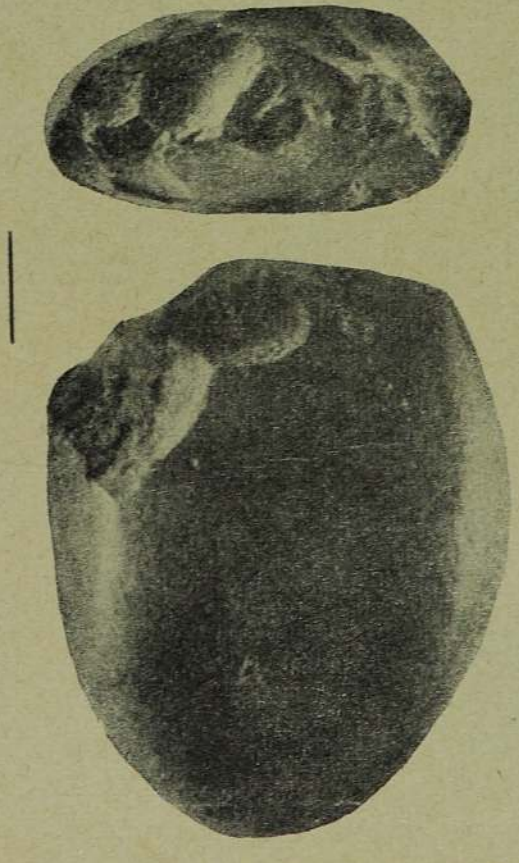
(4) An examination of the technique applied in manufacturing the large elephant bone hand-axe, described in Deraniyagala, P.E.P. 1960 : 98, was revealing with regard to the function of *scrapers*. The periosteal surface appears to have been chiselled or adzed into shape with a hammer and scraper.

(5) Several *points* display signs of having been used as cutters. The Vadda aborigines of Ceylon, who are the hybrid descendants of Balangoda man, generally employed metal arrow-heads to do all their cutting with (Seligmann, C.G. &B.Z.1911:101).

(6) That *engravers* were probably used is indicated by the presence of bones from which slivers had been excised (Deraniyagala, P E.P. 1963:100), and of pieces of antler with notches cut in them (Deraniyagala, P.E.P. 1958b:241/1960:100). It is probable that the groove and splinter technique was used. The raw material is such that undoubted burin facets are not observable.

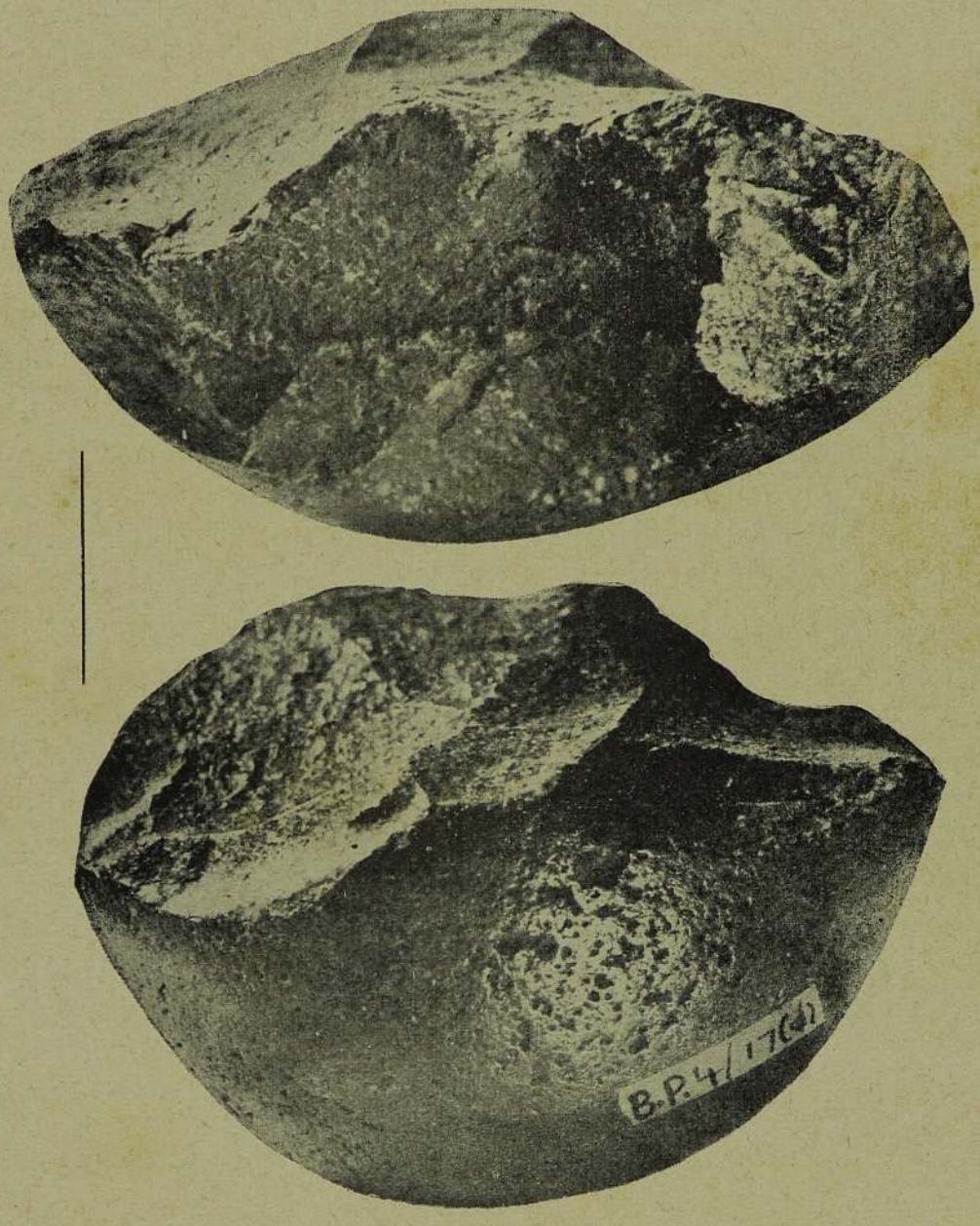
(*a*)

(*b*)



Pebble choppers (×I). (*Courtesy, Director, National Museums*).

(*a*)



(*b*)

Pebble choppers (×1). (*Courtesy, Director, National Museums*).

(7) Although a few objects have been termed *microburins* their existence is open to debate.

(8) In view of the occurrence of forms such as triangles and trapezoids the industry has been termed *geometric* (Deraniyagala, P. E. P. 1960:96).

(9) The range of *hammer* sizes is considerable, some being very small (Deraniyagala, P.E.P. 1958b:245).

(10) That the *pitted cuboids* and *pebbles* were used as hammers is indicated by the presence of batter marks upon them. Although the function of the pits is unknown the following points are worth noting:

(*a*) The pits appear to have been drilled with a solid core, possibly with sand as an abrasive (Deraniyagala, P. E. P. 1958b:245).

(*b*) The surfaces in which the pits occur generally display signs of flattening by abrasion, suggesting a grinding function.

(*c*) Many of the fragments possess fracture planes passing through one or more of the pits. One specimen bears lines of incipient fracture radiating from a pit. These data suggest a hafting function for the pits.

In addition to the correlations mentioned in Deraniyagala, S. 1970, pitted hammers have been found within the following contexts:

(*a*) Neolithic of Assam, East India (Sharma, T.C.: pers. comm.).

(*b*) Bhir Mound, Taxila (post 6th century B.C.) and Sirkap, Taxila (c. 1st century A.D.) in north-west India (Deraniyagala, P. E. P.: pers. comm.). No stratigraphical evidence is available.

(*c*) Pitted spheroidal clay lumps, closely resembling pitted pebbles, have been found in the Harappan of West Pakistan (G. Dales:pers. comm) Similar ones are reported from the Harappan of Kalibangan in north-west India (c. 2000 B.C.). The latter were found in association with ovens (Ghosh. A. 1967:Pl.XXa). The resemblance of these objects to pitted pebbles is probably superficial and their functions different. However, if the clay balls have been baked the functions could have been identical.

(*d*) Couri Complex, Haiti, dated c. 0-700 A.D. (Rouse, I. 1966:Fig. 15-8).

(*e*) Cayo Redondo Complex, Cuba, dated c. 0-1500 A.D. (Rouse, I. 1966 : Fig. 15-9).

The pits in the artefacts from Haiti and Cuba are wider than in the Ceylonese ones with the exception of a single specimen from Nika Vava in the North-Central-Province.

Recent explorations conducted by me resulted in a confirmation of the view held by Dr. P. E. P. Deraniyagala that pitted pebbles do not occur in the Uva Province, east of the Valave river. Bellan bandi palassa is the easternmost site from which these objects have been reported.

(11) *Anvil-cum-grindstones* are peculiar to Ceylon. That these stones were ever used as anvils is a probability without evidence. However, the above term, which was applied by Dr. P. E. P. Deraniyagala, is here retained in order to facilitate reference to literature.

Nothing is known of the function of the pits. They may occur upon both the flat surfaces and also, at times, along the peripheral edge. The slabs often display ovoid hollows produced by grinding on one, or both, flat surfaces. Red ochre is known to have been ground upon anvil-cum-grindstones (Deraniyagala,P.E.P.1958b:245). One specimen from Bellan bandi palassa retains what appear to be traces of organic matter which had been ground upon it.

DATING

A C14 assay on a sample from the lower level at Bellan bandi palassa, which was probably the location of the undisturbed deposit, gave a date of 114 B.C. ± 200 years. This falls well within Ceylon's historic iron age (Deraniyagala, S. 1970). It is significant that the Balangoda Culture was superseded by iron using cultures and not by a developed neolithic or bronze age.

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(2) H. S. Gunaratne, Curator in Geology at the National Museums, assisted in locating and handling the collections and registers. I should like to thank him for his considerable help.

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THE EVOLUTION OF THE TECHNIQUE OF SINHALESE WALL PAINTING AND COMPARISON WITH INDIAN PAINTING METHODS

R. H. De Silva

CEYLON is unique among Asian countries in having a chronicle, the *Mahāvaṃsa* (Geiger, 1908) which embodies the history of the Sinhalese race from its legendary origin in the 6th century B.C. to the advent of the British in the closing stages of the eighteenth century. Though the *Mahāvaṃsa* is largely an historical record of the rulers of Ceylon compiled by the Buddhist church, much information on the social conditions of the country at different periods of its history after the founding of the Sinhalese race can be gleaned from its pages. It is apparent that a developed art of painting (probably introduced by the earliest settlers in the island) was practised in Ceylon from very early historical times.

The earliest reference to painting is to the representation of a palace of the 2nd century B.C. drawn with cinnabar on cloth (Geiger, 1912a). The first reference to wall painting is the description of *jātaka* (stories of the previous births of the Buddha) in the relic chamber of the Mahathupa (Great Tope, Ruvanväli dagoba) built by Duṭṭhagāmaṇi (161-137 B.C.) in Anuradhapura, the first capital of Ceylon, and all but completed before his death (Geiger, 1912b).

By wall painting is meant painting on a plaster or similar ground which has been laid on a suitable support such as rock, a brick wall, or a wooden surface serving as the wall of a building. Many wall paintings on rock, in cave, shrine and relic chamber have come down to us through the centuries, and it is a part of the function of the Archaeological Department to conserve these pictorial relics of a past civilization.

The results of the laboratory investigation of representative specimens of Sinhalese wall painting dating from the earliest historical period (Anuradhapura period) to the 18th century (Kandy period) will be assembled to give a picture of the technique of ancient Sinhalese wall painting and its changes through a period of about one thousand five hundred years till the dawn of modern times heralded by the arrival of the British in Ceylon.

The results of the examination of ground, binding medium and pigment will be utilized to consider the techniques of early Sinhalese wall painting, and the changes that have taken place in the painting materials and methods till the Kandy period. It is found that the general technique of Sinhalese painting has always been some kind of tempera. No evidence is available to support the view, previously expressed that fresco painting (with particular reference to Sigiri) was practised in Ceylon. Dhanapala (1944; 1957) brought forward points of argument purporting to show that the Sigiri paintings were carried out in the *buon fresco* technique. It is

necessary to consider the evidence adduced by this writer, since his conclusion appears to have been accepted. This evidence is enumerated below.

1. It is stated that (*a*) blue as well as green were omitted from the Sigiri palette, (*b*) this alleged omission would be very difficult to account for if the technique employed were *tempera*, but is easily explained if the possibility of the technique being fresco is allowed, (*c*) only natural earths could be used in fresco painting, but blue and green have to be obtained from sources other than natural earths; hence their alleged absence in the Sigiri paintings, (*d*) the presence of green at Sigiri has been proved to be a later addition.

2. The presence of an alteration in the position of a hand in one of the panels (Fig. 8, Pocket B) is attributed to the employment of a *fresco* technique. It is stated that ' True to the genuine fresco technique the colours of the Sigiriya paintings are so thin that the altered hand in figure No. 8 of Pocket B is yet visible in spite of the frantic efforts of the artist to hide it. The artist changed his mind but before he had time to erase the original hand the plaster dried.'

3. It is stated that the plaster comes off occasionally but the pigments do not peel off except where the greens and blues occur.

4. An observation by Havell (1908) is quoted by Dhanapala, and he asks ' Which would be more reasonable to suppose : that the Sigiriya artists used an unknown process of tempera technique or that they followed the known process of true fresco and thus made the pictures capable of withstanding the ravages of time or weather ? '

The validity of each of these arguments adduced in support of the use of a *fresco* technique in Sigiri may now be examined.

1. It is true that blue pigment has not been used in the paintings remaining on the Sigiri Rock, but this colour was reported by Deraniyagala (1948-49) as occurring in a painting in one of the caves below the Rock; the blue pigment *lapis lazuli* was found by the writer in the nearby paintings at Piduragala. The sparing use in ancient Ceylon of the blue pigment (*lapis lazuli*) which is an imported colour is easily explained on account of its rarity. Dhanapala is the first writer to record that green was not used at Sigiri. One is not aware who has proved that the green pigment was not originally present in the Sigiri paintings. Bell (1897) described these paintings in detail after access to the Pockets was gained since their rediscovery : the colours used were described as yellow, red, green and traces of black. Dhanapala is incorrect in stating that blue and green have to be obtained from sources other than natural earths: The blue pigment *lapis lazuli*, and the green earth *terre verte*, are naturally occurring materials as their names suggest.

2. Regarding the presence of alteration in the position of a hand, examination of the painting does not disclose any evidence of scraping, overpainting of background overall colour, or any other attempt to erase the yellow

line drawing of the original hand. The artist certainly changed his mind and painted the contours and coloured another hand, but Dhanapala's statement that the plaster dried before he had time to erase the original hand is unsupported by evidence. When it is appreciated that the paintings would not have been viewed from close quarters (the Pockets were not originally accessible for the purpose of viewing the paintings) the presence of the previous line drawing of the hand is easily explained : it was not necessary to remove it as it could not have been seen from any distance. If the plaster dried (as Dhanapala suggests) before the artist had time to erase this hand, it is difficult to understand how he found the time to finish the contours of the hand in the altered position and to paint the colours in a *fresco* technique.

3. Regarding loss of pigment, there is no evidence that the paintings in the Pockets ever contained a blue pigment, and Dhanapala is incorrect in stating that the Sigiri pigments do not peel off. De Silva (1952) reported that the loss of pigments was one of the causes of deterioration of the Sigiri paintings.

4. The secret of the Sigiri painters was lost with the passage of time. However, Dhanapala presumes that the process of *fresco* painting was known in ancient Ceylon. For this contention there is no evidence whatever.

Thus it is seen that each of the arguments used by Dhanapala in support of a *fresco* technique at Sigiri does not withstand critical examination.

Anuradhapura Period (3rd century B.C. to 11th century A.D.)

The earliest paintings in the island belonging to historical times fall in this period, and the materials and technique employed will first be described. Paintings that are now extant are to be found on the most durable support, rock, which served as the walls of shrines and buildings. The surface of the support was artificially roughened to give key to the adherence of the first layer of ground. This technique is best illustrated by the support at Sigiri. The ground that is laid on the rough surface of the support has, usually, an appreciable thickness, but there are cases where the ground consists of a very thin coating laid on supports that have not been provided with a key (Pleasure Gardens, Vessagiri, Gonagolla, Mihintale).

In the beginning, the inert material used in the ground consisted of a dark (brown red) ferruginous clay with admixture of sand, vegetable fibres (straw), and paddy husks; even fragments of leaves are also known to have been used in Sigiri. In addition to these organic materials which would have served to consolidate the ground, a binding medium was also used which would dry and impart strength to the whole ground. This binding medium has been shown to be a mixture (properly called an emulsion) of a plant gum and a drying oil (De Silva, 1962) on the ferruginous clay ground was laid a very thin coating or wash of lime as preparation for

the painting. This technique of laying the ground is exemplified by the fragmentary remains of painting on the exposed roof of the main cave at Dambulla, where pre-Christian Brāhmī inscriptions are indited below the drip-ledge of the cave.

At Hindagla, a very thin white coating composed of clay instead of the usual lime is laid on the ferruginous clay ground. Apart from the composition of this wash, the method of laying the whole ground is similar to that found at Dambulla (exposed paintings). The final wash was trowelled to receive the paints.

2. The next stage in the sequence of the techniques of laying the ground was a tendency to use lime (mixed with clay and sand) in thicker grounds and to retain the admixture of vegetable fibres in both the ferruginous clay layer as well as in lime-based grounds. More than one layer of lime-based ground has been used in a painting. The surface of each layer of ground was left irregular to provide a key for the next layer; on the surface of the clay ground there was a concentration of paddy husks to provide further key for the next layer of (lime-based) ground. The application of a wash of lime to receive the paints was retained.

3. The following changes in the technique of laying the ground took place at about the same time:

(*a*) Decline in the use of an initial layer of clay ground.

(*b*) Decline in the admixture of fibres in the lime-based ground.

(*c*) Decrease in the number of layers of ground.

4. The final changes in the technique of laying the ground in the Anuradhapura period were the following:

(*a*) The clay ground was abandoned.

(*b*) The thickness of the lime-based ground was decreased.

(*c*) Occassionally, a very thin coating or wash of lime was used as the ground.

During the Anuradhapura period, the binding medium used in the ground was usually an emulsion of plant gum and a drying oil. On one or two occasions the binding medium in the ground consisted only of a plant gum.

The pigments commonly employed were lime for white, red ochre, yellow ochre (orange shades being obtained by mixing these colours), the green *terre verte*, and carbon for black. Mixtures of red ochre and carbon black produced brownish colours. The rare blue pigment *lapis lazuli* (natural ultramarine) was found in three paintings of this period. This mineral has not been reported in Ceylon and appears to have been obtained from Badakshan in north east Afghanistan (where the only deposit in Asia is known)via India. The paint medium, like the binding

medium in the ground, is usually an emulsion of plant gum and drying oil. In a few paintings, the binding medium was found to consist of a plant gum only.

Polonnaruwa Period (11th to 13th century A.D.)

An arbitrary division is made in considering the technique of painting under this period. This is only an historical period, and the paintings falling in this period are considered separately; it is observed, however, that there is no essential difference in methods and materials of wall painting between the late Anuradhapura period and the Polonnaruva period. Thus, there was a continuity of technique from the late Anuradhapura period and throughout the Polonnaruva period. In addition to rock supports there survive paintings on brick walls as support. Multiple grounds have been abandoned, and the ground consists of (*a*) lime-clay-sand superposed by (*b*) a wash of more or less pure lime the surface of which is sometimes trowelled. The binding medium in the ground consists of a plant gum.

The pigments used are not different from those used in Anuradhapura times, but the blue *lapis lazuli* is absent from the palette. The paint medium in the three paintings of this period that were examined consists of a plant gum and a drying oil in two sites (Dedigama and Tivanka shrine), and plant gum only in the third. The paintings in the relic chamber at Dedigama are unusual in technique and do not find a counterpart anywhere in Ceylon. The ground was of crushed brick (which material has also been used as a plaster in the Baddhasīmāpāsāda or Chapter House in the Alahana Pirivena in Polonnaruva) a few mm. thick, and the superficial coating consists of a white clay. The pigments used were black (containing iron and silica) and red (iron ochre). This is the second instance (Hindagala, exposed paintings, being the first) of a white clay being found before the Kandy period in the final coating laid in preparation for the paints.

Gampola Period (14th century A.D.)

The painting of type A at Gadaladeniya is important as marking the latest painting at present known which employs a ground consisting of lime-clay-sand, and which is not much different from the few examples of such type of ground found at Polonnaruva.* The white coating laid in preparation for the paints is a hydrous magnesite that is found in the Kandy district. The binding medium in the ground consists of an emulsion of a plant gum and a drying oil. The binding medium in the paint layer, however, was found to be only a plant gum. The changes in technique that took place during this period were the following:

(*a*) The introduction of admixture of a few cotton fibres in the ground.

* There are the remains of paintings of two periods in this shrine, the earlier being referred to as Type A

(*b*) The introduction of the use of hydrous magnesite for the thin white coating laid on the ground in preparation for painting.

(*c*) The introduction of the use of cinnabar as a bright red pigment.

Kandy Period (18th century A.D.)

The paintings belonging to this period have distinctive features which enable them to be distinguished from paintings of preceding periods. The characteristic features introduced in the technique of Kandyan painting are the following:

(*a*) The use of a light coloured (grey, buff, off-white) clay with fine grains of sand and admixed cotton fibres for the preparation of the ground.

(*b*) The ground is usually only a few mm. thick.

(*c*) The final coating laid on the ground and trowelled to receive the paints consists of a white clay or is of hydrous magnesite.

(*d*) The pigments used are clay or hydrous magnesite for the white, carbon, red ochre, cinnabar, orpiment (arsenic sulphide) for the yellow.

There is no change in the nature of the binding medium in the ground, which is an emulsion of a plant gum and a drying oil or a plant gum only. The paint medium too is either an emulsion of a plant gum and a drying oil or consists of a plant gum only.

Problems of Dating

The technical findings of this study can be used to supply evidence relating to the dating of some paintings previously attributed on stylistic grounds, and of a few undated paintings. Consideration of the sequence of the techniques of laying the ground showed that the earliest technique of using an initial layer of clay ground continued to be practised until at a certain period, this layer was associated with a lime-based ground of appreciable thickness. The next change in technique was a decline in the use of an initial layer of clay ground.

If it can be shown from datable paintings when this clay ground technique was likely to have been abandoned, it would provide a *terminus ante quem* for the dating of other paintings. Now dated paintings in which the clay ground is associated with a lime-based ground of appreciable thickness are those of Sigiri Rock (end of the 5th century A.D.); the paintings in the neighbouring site of Piduragala also have this type of ground, and it is probable that these paintings belong to the same period as the Sigiri paintings. Deraniyagla (1948-49) found, in a cave below the Sigiri Rock, paintings of female figures depicted in the same style as those in the pockets on the Rock. These paintings are therefore datable to the latter part of the 5th century A.D. The writer has shown earlier in this study that the painting in the cave below the Cistern Rock at Sigiri is almost certainly of the same date as the paintings in the pockets on the Rock. But the ground in both Deraniyagala's cave and the cave under

the Cistern Rock does not contain the initial clay layer. Furthermore, the clay layer of ground was not used at Vessagiri where the paintings were stylistically so similar to the Sigiri paintings that they were ascribed to the same King (Kassapa I), and even to the same artists (Bell, 1897). Thus in the latter part of the 5th century A.D. the practice of laying an initial clay ground was on the decline.

The ground of the paintings belonging to the late Anuradhapura period discovered on the walls of a relic chamber in a *dāgäba* at Mihintale consists of a lime-based plaster of appreciable thickness. These paintings were dated by Paranavitana (1951c) to the 6th century A.D., and (though not available for scientific examination) were inspected by the writer. The wall paintings in the palace of Vijayabahu (1058-1114 A.D.) in Anuradhapura are also executed on a lime-based ground of appreciable thickness, and are dated to the very early Polonnaruva period. Thus, it may be safely concluded that the use of a clay layer in the ground was abandoned (at the latest) in the paintings of the 8th century A.D.

The application of technical findings to some problems of dating is as follows:

1. Mahiyangaṇa

There is ambiguity regarding the dating of the paintings. In support of the proposition that the paintings are older than the latest in date of the objects found in the relic chamber, Paranavitana (1951) drew attention to a repair in the painted plaster which was made with a different material and was not coloured; he suggested that the damage to the original paintings was repaired at a later date, probably during the period of Vijayabahu I (1058-1114 A.D.). If that were so, stated Paranavitana, the relic chamber itself and the paintings may belong to an earlier unrecorded restoration during the late Anuradhapura period. Thus, the present position is that the paintings could either be dated to the 11th century A.D. (rule of Vijayabahu I), or to the 9th or 10th century A.D. (late Anuradhapura period).

The technical examination of the Mahiyangaṇa paintings reveals the following characteristics:

(*a*) Use of the initial clay ground.

(*b*) Use of lime-based ground of appreciable thickness.

(*c*) Small quantity of fibres in the lime-based ground. Therefore, these paintings may be dated to the Anuradhapura period between about the 6th century and the 8th century A.D. rather than the dates previously ascribed to them.

2. Dimbulagala

(*a*) *Maravidiya caves.* Paranavitana (1928-33) referred to Brāhmī inscriptions in these caves indicating occupation in very early historical times, and states that the monastic establishment seems to have

flourished up to the 13th century A.D. From the presence therein of an inscription of Queen Sundaramahadevi, wife of Vikramabahu (1111-1132 A.D.) recording the embellishment of the cave (probably No. 2) with statues, *dagobas* and *bodhi* trees (Ficus religiosa), Paranavitana concludes that the walls would have been painted at that time. The paintings were therefore ascribed to the first half of the 12th century A.D., and related stylistically to those in the Tivanka shrine at Polonnaruva.

The technical examination of the Maravidiya ground shows great similarity with the early grounds of the Anuradhapura period. A much earlier date than the 12th century A.D. is indicated for the paintings, which were described as fragmentary, faded and looking very old. They may be dated to a period before the 8th century A.D., probably closer to the 5th century A.D.

(*b*) *Pulligoda.* Regarding the date of these paintings, Vincent Smith (loc. cit.) states ' So far as can be judged from a photograph, it must be of early date, possibly of the seventh century. It may, however, be later.' Coomaraswamy (1927) states that the Pulligoda paintings may date from the 7th century A.D. Paranavitana, however, prefers to date the paintings with those in Polonnaruva, that is, the 12th century A.D.

The present study shows that the technique of laying the ground in the Pulligoda paintings is (like the Maravidiya paintings) similar to that found in the middle or earlier Anuradhapura period. A date earlier than the 8th century A.D. may be ascribed in preference to the 12th century A.D. A date closer to the 7th century A.D. as given by Smith and Coomaraswamy is likely to be correct.

3. Gonagolla

A line drawing of the extant paintings dated to about the 8th century A.D. was reproduced by Deraniyagala (1956). Dhanapala, however, recently (1957) suggested a date about the 3rd century A.D. for these paintings. Now if these paintings were carried out as early as the 3rd century A.D. the technique of laying the ground should correspond to that of the early Anuradhapura period. But it is found that the Gonagolla paintings have the following characteristics:

(*a*) Absence of the initial ferruginous clay layer of ground.

(*b*) Use of a thin lime-based ground.

(*c*) Use of a wash of lime as ground in some areas.

Since these are technical characteristics of the paintings of the late Anuradhapura period, Dhanapala's dating (*ca.* 3rd century A.D.) appears to be too early, and the 8th century A.D. is more likely to correct.

4. Undated paintings

The following dates are ascribed by the writer to the undated fragmentary paintings examined in this study:

(*a*) Dambulla (exposed)—prior to 5th century A.D.

(*b*) Piduragala —5th century A.D.

(*c*) Eruwewa —*ca.* 5th century A.D.

Comparison with Indian Painting Technique

The technique of Indian painting has been studied both by a scientific examination of specimens of wall painting (Paramasivan, 1940; references given below) and by a consideration of literary evidence available in the texts on *Silpa*, that is, fine arts (Paramasivan, 1940; Gunasinghe, 1957). It is now appropriate to compare the technique of Sinhalese wall painting with methods of Indian wall painting as elucidated in publications on their scientific examination.

The wall paintings in India that have been scientifically examined are the following:

1. Ajanta, Hyderabad State (2nd century B.C. to 7th century A.D.)—Paramasivan (1939a); Kahn (1949).
2. Sitabhinji, Orissa State (*ca.* 4th century A.D.)—Ramachandran (1951).
3. Badami, Bijapur District (6th to 7th century A.D.)—Paramasivan (1939b).
4. Bagh, Gwalior State (7th century A.D.)—Paramasivan (1939c).
5. Sittannavasal, Pudukottah State (7th century A.D.)—Paramasivan (1939-40).
6. Kanchipuram, Madras Presidency (7th century A.D.)—Paramasivan (1939d).
7. Namandur, South India (7th century A.D.)—Paramasivan (1941).
8. Ellora, Hyderabad State (8th to 12th century A.D.)—Paramasivan (1940).
9. Tanjore, South India (11th to 12th, and 17th century A.D.)—Paramasivan (1937); Sana Ullah (1937).
10. Narttamalai, Pudukottah State (14th to 15th century A.D.)—Paramasivan (1938).
11. Tiruparuttikunram, South India (14th to 15th century A.D.)—Paramasivan (1941).
12. Somapalayam and Lepakshi (15th to 17th century A.D.)—Paramasivan (1939e).

13. Tirumalai, South India (16th to 17th century A.D.)—Paramasivan (1939e).

14. Cochin and Travancore, South India (17th to 18th century A.D.)—Paramasivan (1939e).

Paramasivan claims to have found two distinct techniques of painting in India :

1. Northern technique, as exemplified by Ajanta and Bagh. The ground consists of a layer of ferruginous earth containing a large proportion of clay, sand, plant fibres and paddy (rice) husks. No binding medium was found in the ground. A superficial coating of fine plaster was laid on the ground to receive the paints. The paint medium is reported to be a glue *tempera*.

2. Southern technique, commonly used in South India from the 7th century A.D. to modern times. The principal constituents of the ground are lime and sand for the rough cast, and lime for the final coating. No binding medium was found in the ground or the pigment layer. The technique of painting is concluded to be *fresco secco*. The lower layer of painting in Tanjore (Chola period, 11th to 12th century A.D.) is described to be in the *buon fresco* technique. The black pigment, however, was laid in gum *tempera*. At Badami was found the unusual example of a southern site containing painting in the northern technique, that of glue *tempera*. The ground too was reported to contain glue.

Before comparing the technique of Sinhalese wall painting with that from Indian sites, it is necessary to discuss some of Paramasivan's experimental methods, results and his conclusion that Indian painting is divided into two schools on the basis of a *tempera* technique in the north and a *fresco secco* and *fresco* technique in the southern sites. Other workers have examined a few of the paintings studied by Paramasivan and obtained different results. Khan (1949) examined specimens of painting from Ajanta but failed to detect a binding medium. There are numerous caves containing paintings at Ajanta ascribed to dates ranging from the 2nd century B.C. to the 7th century A.D. (Fabri, 1955). There is no certainty that these two workers examined specimens of painting belonging to the same period. Sana Ullah (1937) examined specimens of painting from the Chola (11th to 12th century A.D.) and the Nayak (17th century A.D.) periods at the Brihadeswara Temple, Tanjore. Binding medium was found in the ground in both periods, and that from the Nayak ground was identified as a proteinaceous medium, stated to be probably glue. The binding medium gave no reaction for carbohydrates in either case. It was not stated whether the paint layer was examined for binding medium. The writer, while attached to the laboratory of Dr. B. B. Lal, Archaeological Chemist in India, examined under direction in 1950, the paintings in Tanjore and Kanchipuram (Kailasanatha Temple). Samples of red paint from the Chola layer and black paint from the Nayak layer in Tanjore

were examined, and the results indicated that the binding medium was probably a plant gum. In addition, the yellow paint from the Kailasanatha Temple was found to contain the same type of binding medium.

Lal (1953) reported (without details of examination) that the paintings at Ajanta, Bagh, Ellora, Sitabhinji, Badami, Sittannavasal, Kanchipuram, Chola and Nayak layers in Tanjore, Lepakshi, and Somapalayam were in *tempera*, and that the use of a water soluble medium was confirmed in all these paintings. He concludes ' There is therefore, no doubt that the technique, as revealed by the study of murals dating from the second century B.C. to fifteenth-sixteenth century A.D., was all along tempera, and genuine *fresco* technique (*buon fresco*), which involves the use of pigments ground in water only without the incorporation of any binding medium on fresh lime plaster, was not used by ancient artists.' Lal (in Ramachandran, 1951) stated that an unidentified *tempera*, probably gum or glue, was used at Sitabhinji.

These different results obtained by other workers emphasise the need for a scrutiny of Paramasivan's methods of scientific examination of the binding medium. Paramasivan followed the procedure used by Heaton (1910) for the examination of the wall paintings of Knossos, and stated that there is much similarity between the technique of painting in the Chola layer in Tanjore and that of the wall paintings in Crete. Duell and Gettens (1942) examined specimens of these Cretan wall paintings, reviewed the tests used by Heaton, and provided cogent argument to show that Heaton's conclusion (that the Aegean Paintings are frescoes) is not valid. By this token it would appear that Paramasivan's results need assessment. The conclusion that the Chola paintings are frescoes rests on the following tests:

1. The pigments adhere firmly to the ground. They are unaffected by brushing with a wet sponge. Fragments of the painted ground withstand prolonged boiling in water without injury to the surface of the painting.

2. Extraction of samples of painting with ether, chloroform and carbon disulphide failed to remove any binding medium. Therefore, it is concluded that no binding medium was used.

3. On treatment of samples of the paint layer with dilute hydrochloric acid, there was effervescence and solution of the lime (now carbonated) leaving the pigment in a powdery condition. It is concluded that only the carbonate of lime binds the pigment particles; that if the paintings were conducted in *tempera*, the painted surface would have remained as a flake without disintegrating.

4. In some specimens, a close examination of the surface of the ground under magnification showed brush marks. The conclusion is that the surface of the wet ground had been dragged up by the paint brush in laying the pigments.

These very observations were made by Heaton in his study of Aegean wall painting, and his conclusion of a fresco technique was objected to in detail by Duell and Gettens (loc. cit.) Thus, Paramasivan's conclusion of a *fresco* technique in the Chola paintings, and a *fresco secco* technique in the other South Indian sites, also appears to be untenable. The reason for designating the technique at these latter sites (apart from the previously mentioned tests) is ' Since the pigments have not interfused in the plaster ground and spread beneath the stucco surface, the technique employed is one of lime medium ' (Paramasivan, 1939d).

There is a further source of error in Paramasivan's experimentation for the binding medium as noted above. In test 1 the painted surface may withstand prolonged boiling in water due to the presence of a coherent layer of silicate or silica (Duell and Gettens, 1942). Paramasivan (1939d), however, noted that the painted surface withstood prolonged soaking in cold, and boiling water, and immediately concluded ' Thus there was no water soluble binding medium in the paint.' Such a conclusion is unwarranted in the absence of a report that the aqueous extract was tested for a binding medium, with negative results.

Paramasivan invariably found that the black paint in Indian wall painting contained a binding medium of plant gum. He also reported positive identification of glue as the binding medium in the ground at Badami, and in the paint layer at Ajanta, Bagh and Badami. Drying oil was reported as the paint medium at Narttamalai. Paramasivan's identification of plant gum, glue and drying oil as the binding medium rests on the following tests:

1. Plant gum. The Molisch tests for carbohydrates was conducted on the paint film as well as on the ground.

2. Glue: The staining test with iodeosin or acid green was conducted on the paint film and on the ground. The presence of glue in the paint film was also identified in one experiment by the detection of an aqueous medium ' with a characteristic glue crackle ' (Paramasivan, 1939c).

3. Drying oil. The staining test with methyl violet was conducted on the paint film and on the ground. The validity of these tests is considered below, in brief. They are discussed in detail elsewhere (De Silva, 1963).

   i. Molisch test. This test is not conclusive for the detection of a plant gum as the binding medium.

   ii. Application of the staining tests on the paint film and the ground for the detection of both glue and drying oils in wall painting may lead to erroneous conclusions.

   iii. The identification of an aqueous binding medium by the nature of a crackle is not a reliable test.

These methods used by Paramasivan for the examination of the binding medium are not conclusive, and his findings of a northern technique of glue *tempera* and a southern technique of *fresco* and *fresco secco*, therefore, cannot be accepted. However, from the results obtained by Sana Ullah (loc. cit.) indicating the probable presence of glue, and the experiments of the writer showing the probable presence of plant gum, it may be concluded that the technique of Indian wall painting includes some categories of *tempera*, glue *tempera* being one and gum *tempera* another.

Methods of Indian and Sinhalese wall painting will be briefly compared below, and this will necessarily be restricted to the techniques pertaining to the ground and the pigments.

2nd century B.C. to 7th century A.D.

The ground of the earliest Indian paintings (Ajanta, 2nd Century B.C. to 7th century A.D.; Bagh, 7th century A.D.) consists of a layer of ferruginous clay mixed with sand, vegetable fibres and paddy husks, over which is laid a superficial coating of lime in preparation for the paints. Two layers of clay ground are found both in the Indian paintings in Bagh and in the Sinhalese paintings in Dambulla (exposed paintings).

The technique of laying the ground in the oldest Indian paintings is similar to the earliest technique in Sinhalese painting.

6th to 7th century A.D.

The ground (at Badami) consists of clay with admixed vegetable fibres. The clay is stated to be fine grained and devoid of coarse material. No final coating was laid to receive the paints. This technique finds a close parallel in the Sinhalese paintings at Hindagala (exposed paintings, type B) in which no superficial coat is laid on the clay ground in preparation for the paints. Thus, this technique in Indian painting bears affinity to the technique No. 1 of Sinhalese methods of laying the first layer of ground.

7th century A.D.

Indian Painting (in Bagh) was also conducted on lime-based grounds of appreciable thickness (3.4 to 6.5 mm.) reinforced with vegetable fibres. This technique corresponds to the technique No.2 in Sinhalese methods of preparing the ground.

8th to 12th century A.D.

Paintings of this period are found in India (Ellora) in which the ground consists of the early type of ferruginous clay superposed by 1, 2, or 3 layers of lime-based ground. This technique of using a multi-layered lime-based ground corresponds to the technique No. 2 in Sinhalese painting methods. However, the Sinhalese painting in which this technique is found belongs to the end of the 5th century A.D. (Sigiri).

7th to 18th century A.D.

During this long period, Indian paintings (with the exception of Ellora, referred to above) generally contain lime-based grounds having the following characteristics : only one layer of ground is applied, the thickness of the ground is a few mm., occasionally a thin coating of lime is used as the ground (7th, 8th century A.D., Sittannavasal and Kanchipuram). The use of an initial clay ground appears to have been abandoned at the start of this period. All these characteristics are common with the technique No. 4 in the methods of laying Sinhalese grounds. It was shown earlier that this technique was continued in Ceylon from the latter part of the Anuradhapura period (*ca.* 8th century A.D.) to at least the Gampola period (14th century A.D.).

A striking dissimilarity between Indian grounds and Sinhalese grounds of the 18th century A.D. is the use in Ceylon of thin clay grounds of a light colour, with admixture of cotton fibres (and a binding medium), which finds no counterpart in India.

Pigments

The common earth pigments, yellow earth (yellow ochre), red earth (red ochre) and green earth (*terre verte*) are found in both Indian and Sinhalese painting. The blue pigment, *lapis lazuli*, was used in the earliest Indian paintings of Ajanta, Bagh, Badami, and in the Chola paintings in Tanjore. This pigment was also shown to be present in three paintings belonging to the middle Anuradhapura period. Gypsum was used as a white pigment in India (Ajanta), but has not been found in Sinhalese paintings. The pigments cinnabar, orpiment, kaolin, and hydrous magnesite were used in Kandyan (18th century A.D.) painting, but have not been reported in Indian painting.

To sum up, Indian and Sinhalese wall painting, dating from the earliest times till about the 14th century A.D., are similar as regards the technique of laying the ground, and the pigments employed. No paintings in India have been reported which employ similar materials to the Sinhalese paintings of the Kandy period (18th century A.D.). The technique of laying the paint film in Indian and Sinhalese painting cannot justly be compared in the present state of knowledge of Indian painting; nor is it known for certain what binding medium (if any) was mixed in Indian grounds. One factor in common is the use of a *tempera* technique in both countries. It is still not known whether Indian painting was conducted by mixing a drying oil in the binding medium. These observations regarding the binding medium in Indian painting refer only to the lack of reliable information from scientific investigation of specimens of painting.

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SANSKRIT AND PALI INSCRIPTIONS OF CEYLON

MALINI DIAS

A

Introduction

A HUNDRED years of archaeological activity in Ceylon has resulted in the discovery of a large number of inscriptions. The Inscriptions Register maintained by the Archaeological Department from 1921 shows a total of 2756 inscriptions at the time of writing this paper. This is a unique collection because very few countries in the world possess a series of inscriptions dating in unbroken continuity from the earliest historical times to the present day. Considerable work has been done by a number of scholars on the decipherment and interpretation of these inscriptions. A large number has been critically published, noticed and commented upon and the Archaeological Department is intending to edit all the inscriptions so far discovered in a comprehensive corpus running into a number of volumes arranged in chronological order. The majority of these inscriptions are written in the Sinhalese language in its various stages of evolution during a period of two thousand two hundred years. Besides these, inscriptions written in Tamil, Sanskrit, Pali, Chinese, Persian, Arabic, Portuguese, and Dutch have also been found. The aim of the present paper is to assess the historical importance of the Sanskrit and Pali inscriptions which have been published so far in various journals. An analysis in a single article will no doubt be of use, as Sanskrit and Pali are classical languages studied throughout the world. The Sanskrit inscriptions are dealt with first, as they appear to be numerous and historically important. Each group of inscriptions is dealt below under three main headings.

(*a*) Historical—

The interpretation of History especially with regard to religious activity.

(*b*) Linguistic—

Comments on the language with reference to the dates of the inscriptions.

(*c*) Palaeographical—

The study of the script in which the inscription is engraved.

B

Sanskrit Inscriptions

The following Sanskrit inscriptions have been found in Ceylon:

1. Kuccaveli rock inscription—Epigraphia Zeylanica Vol. III, 1933, pp, 158—161

2. Tiriyay rock inscription—Epigraphia Zeylanica Vol. IV 1943, pp. 151—160
   Epigraphia Zeylanica Vol. IV pp 312—319
3. Mihintale rock inscription—Trikāyastava—Epigraphia Zeylanica Vol. IV pp 242—246
4. Indikaṭusāya copper plaques—Epigraphia Zeylanica Vol. IV pp. 238—242
   Epigraphia Zeylanica Vol. III pp 199—212
5. Vijayarama copper plaques—A.S.C. 6th progress report plates XX and XXI
6. Mihintale—Gold sheet from Kaṭusāya A.S.C. AR 1937 p. 11 1938 p. 6
7. Polonnaruva copper plaque—Pabalu Vehera—A.S.C. AR 1937 p. 11
8. Anuradhapura—Slab from Abhayagiriya—Epigraphia Zeylanica Vol. I,1912, pp. 1—9
9. Copper plate from Abhayagiriya Dāgäba—Epigraphia—Zeylanica Vol. I pp. 39—40, Vol. III pp. 169—171
10. Mihintale Rajagirilenakanda inscription C.J.Sc Vol. II p. 47
11. Anuradhapura copper plate—C.J.Sc Vol. II pp. 46—47
12. Clay votive tablets—C.J.Sc Vol. II pp. 47—48
13. Dhāranī stones from Abhayagiriya—A.S.C. AR 1940-45 p. 41
14. Kapārārāma Sanskrit inscription—Epigraphia Zeylanica Vol. V part I,1955 p. 162
15. Fragmentary Sanskrit inscription from Trincomalee—Epigraphia Zeylanica Vol. V part I p. 170
16. Anaulundava slab inscription from Polonnaruva—Epigraphia Zeylanica Vol. II p. 235
17. Tiriyay Sanskrit inscription of the reign of Aggabodhi VI—Epigraphia Zeylanica —Vol. V p. 174

C

List of Pali inscriptions

Following Pali inscriptions have been found in Ceylon.

18. Potgul Vehera inscription—Epigraphia Zeylanica Vol II p. 238
19. Polonnaruva : Lankatilaka guard stone Epigraphia Zeylanica Vol. III p. 49
20. The Abhayagiriya copper plate inscription—Epigraphia Zeylanica Vol. III p. 169, Vol. I pp. 39-40.

D

Sanskrit Inscriptions

(*a*) Historical—

The importance of the Sanskrit inscriptions lies in the fact that there is unmistakable evidence that Sanskrit was used by Mahayanist monks who flourished in Ceylon from the time of the rise of Mahayanism in India till about the end of the Anuradhapura period. Inscription No I in the list given above, records the wish of the author, to become a Buddha by

the merit gained by the representation of the stupas. Bodhisatva Avalokitesvara, well known in the Mahayana texts is mentioned in the inscription No. 2. The same inscription mentions Manjuvāk, another Mahayanist Bodhisatva in stanza No 6. The three verses of the inscription No. 3 describe the exhortation of Trikāya, known as the Trikāyastava in the Mahayana texts. The Bodhisatva ideal, mainly a Mahayana concept is thus extolled in these inscriptions.

Inscription No. 4 consists of copper plaques containing extracts from Sanskrit Mahayana texts which have been identified as the Kāsyapa Parivarta and Panca-viṃsati-sāhsricā-pragnāpāramitā. These plaques which were found inside a stupa of the Mahayanists prove the fact that in the eighth or ninth century the texts Pragnāpāramitā, and Kāsyapa-parivarta were of great value to the Mahayanists. Invocations to Tārā, Avalokiteśvara and Ākasagarbha are found in the Vijayarama copper plaques. They bear evidence to the fact that in the ninth century the concept of Mahayana Bodhisatva was known in Ceylon. Inscription No. 8 is a record containing rules regarding the administration of a monastery. In inscription No. 2 the mention of Trapussaka and Vallika (Tapassu and Bhalluka in Pali), as founders of the Girikaṇḍika Cetiya, is of importance because these names are identical with the two merchants who offered food to the Buddha soon after his enlightenment. The purpose of inscribing the Kapārārāma inscription is to record the donation of two hundred ṭaṇka coins by a priest named Sanghānandin to provide drinkables to the members of a monastery called Kapārārāma. The references about the Kapāra-mula or Pirivena in the inscriptions and the chronicles, indicate that it was one of the main establishments of the Abhayagiri Vihara and that it had an important part in the religious life of the island from about the seventh to the eleventh century.

(*b*) Linguistic—

Some of the authors of these inscriptions show a considerable proficiency in the Sanskrit language. These records are written in both prose and verse and grammatical errors are rare, although long compounds, occur, as found in the Sanskrit prose literature. A metre seldom found in the Sanskrit literature has been used to write the inscription No. 2, which belongs to the 7th or 8th C. The Grantha portion of the Kapārārāma Inscription containing two stanzas in Sragdharā and śloka metres, bear evidence to the author's ability of composing verses in faultless Sanskrit.

(*c*) Palaeographical—

All except one or two records are written in the Nāgari script and some of them resemble the early Grantha alphabet of South India. In inscription No. 2 of the list, the cerebral ḷ is often used in the words such as' suḷalita, and 'singhalendra' and 'gha' in place of 'ha' is used in the latter word. In these records there are examples of conjoint consonants which are not found in the Sinhalese inscriptions of the early centuries. The script of the inscription No. 4 belonging to the eighth or ninth century,

is Sinhalese, and the language is Sanskrit although the Sanskrit inscriptions of this period were written down in the Nāgari script. It is noteworthy because this is one of the few instances where the current Sinhalese letters were used for writing Sanskrit.

Pali Inscriptions E

(*a*) Historical—

Although Pali is the ecclesiastical language of Ceylon, inscriptions written in Pali are surprisingly rare.

Due to some reason, Pali has not been used very frequently in the lithic inscriptions. It may have been used in manuscripts which are not extant today. Pali canonical works, commentaries and other literature must have been written down and copied and recopied after long intervals. A definite reference to the Buddhist Convocation held by Parakramabahu I in his fourth regnal year is indicated in the inscription No. 18 of the list given above and the expression " jināṇattim visodhayi " bears evidence to it. The description confirms the statement in the Mahavamsa and in this record Polonnaruva is called Mulapura which is in agreement with Culavamsa. The Pali verse from Vaṭṭaka Jātaka inscribed on a copper plate is probably a charm against fire. Historical facts concerning the Pali inscriptions are ably summarized by Dr. Paranavitana in an article written in Sinhalese on the " Polonnaruva: Lankatilaka inscription in the Geiger Commemoration Volume. This is an improvement on the edition of the same inscription by Dr. Wickramasingha. The text is given below :

1. Yaṃ Lamkātila-
2. -kaṃ Parakka-
3. -ma Bhujo kāre-
4. -si Lamkissa-
5. -rokante Mū-
6. -lapuremarā
7. vatisame phī-
8. -te pulattha-
9. -vhaye taṃ su-
10. -ro Vijayādi-
11. bāhuvasudhā
12. nātho mahīma-
13. -ṇḍanaṃ jiṇṇaṃ
14. vassatam
15. tadeva bhava-
16. nam-kārāpayī
17. sādhukam.

(*b*) Linguistic—

All inscriptions given above are metrically composed. Inscription No. 19 is in the Sārdūla Vikkrīdita metre. Inscription No. 18 contains three gathās, and each gāthā consists of two lines of sixteen syllables.

Inscription No. 20 has the following stanza, which is identical with the verse from Vaṭṭaka jataka.

Santi pakkhā apathanā
Santi pādā avancanā
Mātā pitā ca nikkhanti
Jātaveda paṭikkama.

(*c*) Palaeographical—

Inscription No. 20 is palaeographically important because the stanza referred to above is written in the Nāgari script. The script of the other two Pali inscriptions is the same as that of the Sinhalese inscriptions of the Polonnaruva period. The inscription No. 20 indicates that the Abhayagiri monks used the Nāgari script to write the Pali language.

Just as there is no agreement among scholars on the original home of the Pali language, the question of the type of script in which the Pali language was written down originally, is not yet settled.

Thus various scripts have evidently been used to write the Pali language in the past, and it is true even today, for Pali texts are written and printed in Roman, Sinhalese, Nāgari, Burmese and Siamese (Thai) characters.

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Jataka I

KIVULEGAMA VIHARA AT PALLAN-OYA

W. B. Marcus Fernando

ABOUT the middle of the year 1957 the Gal-oya Development Board authorities informed the Archaeological Commissioner that the ancient site of the Kivulegama Vihara (Tirukkovil Sheet) would go under water by the end of that year with the construction of the Pallan-oya reservoir. The work on the bund of this reservoir was in full swing even at the time and the Department decided to carry out a rescue dig at the site without loss of time.

The present writer who was then the Department's Superintendent of Works at Anuradhapura was put in charge of the excavation at the site.

A party of 9 men, 4 from Anuradhapura and 5 from Dimbulagala were taken for the work. We proceeded by the Departmental lorry and Land Rover starting from Anuradhapura on 4th November, 1957. The party broke journey at Polonnaruwa for the night and arrived at Pallan-oya in the afternoon of the next day in a heavy shower of rain.

We set to work at the excavation the very next day although it took us four days to find the necessary materials and construct a hut for the men.

The only site suitable for our camp was on the farther side of the bund under construction and our path to the excavation site lay through a patch of land rendered very muddy by the rains and by the heavy earth-moving equipment.

The area of the ancient remains of Kivulegama Vihara at Pallan-oya now submerged was roughly 100 × 100 ft. The sequel contains that part of the writer's report dated 18th December, 1957, which relates to this site, almost as it was written at the time.

This group of ruins situated to the south of the new bund at Pallan-oya had been girt, by a *prākāra* (boundary parapet) consisting of a double line of small boulders placed close to each other and filled in with earth. Only a part of the *prākāra*, measuring 70 ft. running east-west was intact. Part of the *prākāra* had been obviously disturbed by tractors, and the rest of it probably had been missing from some time earlier.

A stone pillar, standing by itself, much of which was buried in new earth, was found 35 ft. from the south-east corner of a pillared structure—the closest point from the pillar to any unit of the complex. It may have been beside the *prākāra* on that side, and was, at the time of excavation, the eastern-most point of the group of ruins.

Pillared Building and Statue

The first ruin investigated was the pillared image-house referred to (plates 19 & 20) Eight pillars of the building were *in situ*, and the legless torso of a Buddha statue was found leaning against one of the pillars.

On the surface, beside this statue, was the fragment of a lotus pedestal (A in sketch, plate 23). Another piece of this lotus pedestal (B in sketch) was found more than 50 ft. away, once more, on the surface. The statue as well as the fragments of the lotus pedestal are of crystalline lime stone.

The statue (plate 21) which is badly weathered is minus its head, and that part of the legs projecting out of the robe is severed. Its height in the present state is 4 ft. 10 in. and it measures 1 ft. 9 in. from shoulder to shoulder. At the neck, it has a hole, obviously for fixing the head to the torso, with a metal rod. The right arm is severed at arm-pit level and a hole in same, bears evidence that the portion lost was originally fixed to it. The left arm, bent at elbow, with fore-arm up raised, too, is lost from midway of fore-arm, at which point also there is a hole. Owing to the deterioration of the stone, the folds of the robe are not clearly noticed except at the bottom hem from where the robe is gathered up to be thrown over the left arm. The portion of stone representing the dropping robe on the left side of the left arm is broken along the front edge.

Kept on this torso was found a piece of stone which may be from the head of the statue, but of which, the present form is only a sort of oblong rotundity, which does not approximate to the shape of a head. On this piece of stone there are two holes—one shallow and the other piercing through.

This statue is now at the Amparai Archaeological Museum.

The pillared image-house faced due north and was a square of 23 ft. measured externally. The thickness of its walls averaged 2 ft. 4 in. The north wall was pierced at its middle by a door. A flight of three steps rising from a plain moonstone led to this door (plate 22). This moonstone was more the major segment of a circle than a semi-circle and its circumference was not regular.

No guard-stones or traces of them were found. Neither was there any indication of a stone balustrade. Mention must be made of two moulded bricks, one of which, almost whole, was of the shape shown in sketch, and the other, a fragment, the moulding of which agreed with that of the first one. These could well have been at the volute of a balustrade. A brick, bevelled on 3 of its sides, measuring $7\frac{1}{2}'' \times 7\frac{1}{2}'' \times 2\frac{1}{2}''$ which was picked up at the site, also indicated a balustrade.

The lengths, risers and treads of the steps measured as follows:—

	Length	*Riser*	*Tread*
1st step from bottom	4′ ·0″	6″	10″ to 11″
2nd ,, ,, ,,	3′ 11″	6″	9″
3rd ,, ,, ,,	3′ 7″	3″ to 4″	1′ to $2\frac{1}{2}''$

Immediately above the steps was a landing 4 ft. 4 in. long and 1 ft. broad (plate 22). South of this was the threshold stone evenly chiselled where it was meant to be exposed, and left rough finished at

either end. The full length of this stone was 5 ft. 10 in. and the breadth in the exposed portion ranged from 1 ft. ½ in. to 1 ft. 1 in. On the threshold stone were two rectangular sockets for the door jambs 2 ft. 7¼ in. removed from each other. The socket on the west end was 3 in. by 5½ in. and that on the south end 3¼ in. to 3½ in. by 6 in. The search for stones answering the requirements of jambs fitted to this stone proved futile probably because these had been of wood. A stone slab 2 ft. 6 in. broad and 4 ft. 10 in. long lay immediately behind (i.e. south of) the threshold stone. At the time of excavation this stone was 1½" below the level of the threshold at the west end and 4½ in. at the east end.

On the northern edge of this last mentioned stone slab were two cuts which, when the slab was placed in contact with the threshold stone made two sockets, one circular and the other rectangular. The circular socket, diameter 3 in. was on the eastern side and the other socket 2 in. by 2¼ in. on the western side of the entrance. An iron ferrule, partly wasted, diameter 2 in., was found in position in the circular socket. This ferrule would have been fixed to the wooden projection at one end of the door-pane on which the latter pivotted. Very probably there was a similar projection from the door at its top, held in position by an iron fitting fixed to the door jamb. The door thus was single sashed. The fact that the broad slab south of the thresholdstone referred to above, had sunk more at the eastern end was a result of the door pivot having been on that end, since the greater weight of the collapsing building would have been felt there.

There were no signs of the door having grated on the stone slab on which it turned.

The flight of steps rose from a much lower level than that from which the walls commenced. In the floor of the building as well as immediately below the brickwork, was a layer of coarse-grained earth from the decomposition of a layer of pegmatite. In the centre of the building, below ground level (under a slab of stone which will be referred to later) was found pegmatite as bed-rock (much disintegrated by the time of excavation) with an outcrop of the same substance projecting from beneath the brickwork at the south western corner of the building. This would explain why the brickwork started at a higher plane than the moonstone and that too without any apparent foundation. The building would originally have been reared on a slightly rising area of pegmatite which had later resolved in most places into a coarse-grained earth.

The bricks used in the building were of various sizes. And it is noteworthy that some of the bricks lying about this building were trapezium shaped with the longer parallel side slightly convex. The large quantity of flat tiles found lying about the ruin, and the position in which these were found indicate that the building was a tiled one. The trapezium shaped bricks have probably, come from a stupa or a domical roof elsewhere or at least were originally meant for such use.

Dimensions of bricks measured were as follows:—

Trapezium Shaped bricks

Long // lel side	Short // lel side	Perp: distance between // lel sides	Thickness
1′ 11″	11″	8½″	2″
9¾″	9″	8″	2¼″
1′ 1¾″	11″	8″	2¼″
10½″	9¼″	7¾″	2½″

Ordinary Bricks

Length	Breadth	Thickness	Length	Breadth	Thickness
8″	4¼″	2½″	1′ 1½″	8″	2″
11½″	7¾″	2¾″	1′ 4″	7½″	2½″
1′ 1¾″	6½″	2¾″	9″	6½″	3″
9½″	8½″	2¾″	8½″	7¼″	2½″
1′ 6¾″	7″	2″	6½″	6¼″	2″
7½″	8″	2¼″	11″	8½″	4¼″
9″	8″	2¼″	1′ 3½″	7¾″	3″

Owing to the fact that trapezium shaped bricks have four measurements, as would be seen above, it was found difficult to obtain more of these bricks for measurement.

Part of the moulding on the wall was preserved and was as in sketch, in its section. On the south wall was an extra layer of bricks at the bottom, which, however, did not alter the pattern of the moulding although it added to the thickness of the plinth at the bottom. Several moulded bricks were picked up at this site. Reference has already been made to some of these.

The brickwork on the north wall at the doorway ended in a line with the west extremity of the socket of the west door jamb. The corresponding end of the wall on the other side of the doorway could not be determined, but assuming that the end of the wall on that side also was in a line with the east extremity of the socket of the east door jamb, the opening on the wall would have been 3 ft. 7 in.

The building has had 16 pillars in four rows of four each (Vide sketch in which the pillars are numbered for easy reference) of which half the number was *in situ*. Of the rest, the stumps were found in position excepting in the case of pillar No. 15. To find how deep the pillars were buried trial pits were made at two pillars. Pillar No. 10 was found buried 2 ft. 7 in. and the pillar No. 1, 2 ft., below ground level.

The arrangement of the pillars aforesaid can also be interpreted as ten pillars immediately inside the walls and four others encircled by these. The gap between the outer line of pillars and the inner four would have been made use of, for *pradakṣiṇā* (circumambulation). The inner pillars were rectangular in section while the others were more or less square in section, (except pillar No. 5, which was also rectangular in section). This last mentioned pillar had the least breadth of all the pillars of this building, and its breadth diminished from bottom to top.

There were no mortices or tenons at the top of the pillars. As has been already stated, a large quantity of broken flat tiles was found at floor level and also in the debris outside the building. The tiles from the site were all of one size. Viz.:

Length	*Longer breadth*	*Shorter breadth*	*Thickness*
11″	$5\frac{1}{4}$″	5″	$\frac{3}{4}$″ to $\frac{1}{4}$″

A good number of iron nails, most of them 2 in. long, was found in the debris both inside and outside the building. Particular mention has to be made of two iron nails one 6 in. long and bent at right angles at 4 in. from the head and the second $3\frac{1}{2}$ in. long with two extraneous pieces of iron adhering to it, one immediately below its head and the other at 2 in. of its length measured from the head. The first nail mentioned would have been driven into a piece of wood 4 in. thick and bent at the lower end. The other nail would have been driven into a piece of wood 2 in. thick which had an iron band at either side of its thickness. The tiles and the nails are evidence of a wooden roof covered with tiles. Within the square formed by the four inner pillars was a stone slab (plate 23) of irregular dimensions, at floor level, roughly measuring 4 ft. 6 in. by 5 ft. and $5\frac{1}{2}$ in. to 6 in. in thickness. On this stone slab, covered by the debris was the fragment of the lotus pedestal-marked ' C ' in sketch. The three pieces A, B and C were found to fit each other completing the lotus pedestal as in sketch (plate 23).

The circumference at the top of this lotus pedestal is 7 ft. 5 in. It has a rectangular projection out of the circle which being in fragment C was found directed towards the south. This should have been its original position so that the statue fixed on the lotus pedestal faced the north. The position of fragment C indicated that the statue originally stood slightly in front of a line joining the pillars Nos. 10 and 11. This obviously

was the best position for the statue, since it gave sufficient room for the devotee to perform his rites in front of the statue as soon as he entered the building, and also provided the *pradakṣiṇā patha* referred to above.

The pedestal has a socket going through its height for accommodating the tenon of the legs. This socket is trapezoidal and has rounded corners. The distance between its parallel sides is 1 ft. 2 in. The longer parallel side is 1 ft. 2 in., the shorter one and 10 in. at the top of the pedestal. This socket diminishes in size, in its section, regularly, from top to bottom. The tenon of the legs was recovered from inside the building at ground level, at 10 ft. 6 in. from outer face of north wall of the pillared building and 8 ft. from outer face of the east wall.

The tenon of the feet and the severed portion of the feet are of one stone. It was recovered with the feet on top and fingers pointing eastwards.

The feet had dowel holes, so that the sculptor had made this part apart from the rest of the statue and dowelled the two together. The dowel hole on the left leg is intact, while that on the right leg leaves only a vestige since the back of the leg of the statue from the dowel hole has disappeared.

As in the case of the mortice in the lotus pedestal the tenon of the feet is a trapezium whose long parallel side is 10 in. and each of the equal sides 1 ft. 2 in. The feet cover the whole length of the trapezium. The gap between the feet at back is 3 in. and in front $4\frac{1}{2}$ in.

The tenon of the feet fits into the socket of the lotus pedestal but loosely (plate 24).

The roof of the building seem to have crashed, and the impact of the crash seems to have thrown the statue towards the south western corner slightly north of pillar No. 10, and the resultant thrust, imparted through the tenon of the legs would have been felt most at point marked ' a ' and in a lesser degree at ' b' in sketch. One can imagine how the ends of the fragments A and B and the tenon of the legs were upraised at ' a' and how years after the debris settled, the hands of some pious devotee retrieved from the debris the tenon of the legs and the two fragments A and B, the only ones then visible, even though partly, above the surface. There was a layer of earth about $\frac{1}{2}''$ thick, between fragment C and the stone slab, when these were exposed. This layer of earth could have got in there after the lotus pedestal broke into three.

After photographs were taken of the slab of stone and fragment C of the pedestal *in situ*, the stone slab was removed in order to find whether there was a *yantaragala* (receptacle for base deposits) as occur in most similar cases, but it was found that the builders had not put in one here. Where, as in most cases, the *yantaragala* should have been, was the bed rock of decaying pegmatite. But slightly to the east of pillar No. 11, at ground level was found a stone roughly 2 ft. square and 8 in. thick, with rounded ends. In the middle of this stone was an irregular hole 1 ft.

3 in. square of depth about 3 in. This was lying face downwards. If this was prepared in order to serve the purpose of a *yantaragala*, it was obviously never put in its place, since there was no room between the stone slab in the centre of the building and the layer of pegmatite referred to earlier, to accommodate this stone. Its capacity was too small for it to have been used as a container for water for sprinkling on flowers. In the *sanctum* were discovered 20 fragments of a large brimmed clay vessel which could well have been the receptacle used for this purpose.

The disposition of brick bats, tiles and iron nails in the debris, indicated that this building had not been fully cleared since it fell in ruin.

The finds from this building, apart from those referred to above, were the stem of a clay lamp, the fragment of a brick (curvilinear on one side and with a sunken border on the same side) and a circular terracotta disc diameter $1\frac{3}{4}$ in. found at the surface level.

Approach to the Pillared Building

Opposite the pillared site discussed above, about 85 ft. to the east, were 4 pillars *in situ*, at the base of which no brickwork was found. Of these, the two southern ones were in a line parallel to the front side of the pillared building. These two pillars may be taken as the eastern and western limits of a group of pillars, marking the old approach to the pillared building. The two southern pillars here were 12 ft. apart. Seven and half feet north of the line of these two pillars, were two others almost touching each other. These two pillars were in close proximity to the remaining portion of the old *prākāra* referred to earlier. A line running north-south through the middle of the pillared structure did not bisect this area of the old approach although such a line did go through same. The north-south bisector of this area was a little to the east of a similar bisector of the pillared building.

Circular Structure

What had so far been seen and identified in recent times as a stupa at the south-western corner of the ruined site, turned out to be a collection of bricks laid in recent times around and above the remains of some structure. When this outer covering of unbuilt bricks and the debris were removed, the remains of a circular structure were uncovered (plate 24). The height from ground level, of these remains at highest was 1 ft. 9 in. The brickwork of this structure was 90 ft. away from the south-western corner of the pillared building—the closest point. This structure had in it at ground level a V.O.C. coin dated 1735. Two other V.O.C. coins were found in the debris heaped on it.

In the debris, at almost the very top, probably in the later accretion was found the headless fragment of a *gaṇa*, in burnt clay, in squatting posture, with hands placed on knees. In this figure the abdominal obesity, usually found in figures of *gaṇas*, has been well brought out. The back of the plaque of this figurine and its bottom are flattened. This fact,

taken together with the posture of the figure, leads one to think that it is from a frieze. It is difficult to assign this figure to any particular structure here, since this is the only figure of its type found.

In the debris has also been picked up two fragmentary bricks, circular on one side and with a sunken border on the same side. One of these contains an incised letter, which being at the broken end of the brick may be the final letter of a line. See eye-copy in sketch. It would be noticed that an unincised brick of the same type was picked at the pillared site.

The other find from this site is the fragment from the base of a terra-cotta lamp.

The circular structure referred to rose from an octagonal base built of two tiers of brick which were thicker than those found above. The arisses of the octagon were rounded off. The two sides of the octagon which were complete enough for taking measurements were 7 ft. 7 in. and 8 ft. long respectively. Above this the structure was circular and the circumference of the circular portion measured 57 ft. at the bottom. This portion of the structure had a moulding whose cross section was as is shown in sketch.

This structure had been cut into, obviously by treasure hunters from the southern side, the breadth of the breach being 3 to 3½ ft. This trench had not pierced through to the opposite side of the structure.

The outer face of the circular structure had some full bricks, though of various sizes. Immediately behind were brickbats and tiles used in the construction. The total thickness of the brickwork was not more than 1 ft. 6 in. The centre of the structure was found filled with earth. The structure was excavated to a depth of about 3½ ft. below ground level for investigation and no evidence could be obtained as to whether it had any base deposits originally. The existence at ground level of the V.O.C. coins, referred to above, indicated that the despoilation was done after 1735.

The structure was in the centre of a terrace slightly raised above ground level. Two stone pillars 35 ft. apart, standing on a line running north-south 5 ft. 6 in. east of the brickwork of the structure, were on either side of it. At right angles to this line and 33 ft. from the south-eastern pillar, was another stone pillar at the south-western corner of the terrace. These three pillars would have marked the corners of the terrace, along with a pillar at the north-western corner, now missing.

About 2 ft. to the east of the brickwork of the circular structure, and 1 ft. from each other were two pillar stumps on which was placed a flower altar slab measuring 2 ft. 7 in. by 5 ft. and having a thickness of 7 in.

To the east of the line joining the two eastern corner pillars of the terrace of the circular structure was the flight of steps leading to the latter. The plain moonstone of the flight of steps was roughly a semi-circle of radius about 1 ft. 9 in. Its perimeter was chiselled free-hand. Above the moonstone was a step whose rough dimensions are, length 4 ft. 5 in. tread 1 ft. and riser 6 in. What can be taken as the fragments of two other steps lay near by.

On either side of the step above the moonstone, and 6 ft. 5 in. apart from each other were two pillar stumps. These were 4 to 4½ ft. away from the line joining the two eastern corner pillars of the terrace.

Our surmise that this structure was not very old is based on the fact that it has been built at a time when the builder was hard put to it to find materials. Yet the stone pillars of the terrace, the moonstone, the stone steps and the stone flower altar slab are evidence of a very old structure. The apparent incompatibility of these two sets of evidence, perhaps, could be explained if an old structure at this site was completely demolished and another one put up at the same site at a later date. This theory also affords an explanation as to how the trapezium shaped bricks came to the site of the pillared building.

A series of events in the following chronological order has been assumed:—

1. Collapse of the original pillared building.
2. Despoilation of the original circular structure.
3. Feeble attempt to reconstruct pillared building.
4. Construction, or at least, commencement of circular structure on octagonal base.
5. Despoilation of the second circular structure. (Probably after 1735).
6. Arranging of bricks over second circular structure.

Site of the Dancer Plaques

Fifty feet to the south-west of the pillared structure, and roughly between the stupa and the pillared structure was *in situ* a pillar standing 6 ft. 5 in. above surface level before excavation.

A trench cut close to this pillar and other pillar stumps near by revealed a brick construction. Three ond half ft. to the south of the pillar mentioned above and 5 ft. 2 in. to its north, respectively were two pillar stumps. The western boundary of the structure here was marked by these pillars. On the north this structure proceeded to about 4 ft. beyond the northern pillar stump referred to.

The excavation revealed that the first construction here was a roughly rectangular one, of which one side was bounded by the whole pillar and the stump to its north. The brick construction between these two pillars

on that side was reared on a stone foundation in two pieces, one small and the other large. The side parallel to this was 5ft. to the east and 5ft. 9in. long.

To the north and south of this rectangle had been added two structures also rectangular in shape, with their western sides in line with the western side of the middle rectangle, and with their eastern sides more or less in one line and bounded on either side with a pillar stump, but about 1 ft. 6 in. behind the eastern side of the earlier rectangle. The southern accretion which showed its outer face clearly had a plinth of one tier of brick and a facia of two tiers above it. It was made of bricks of different sizes. The construction, only one brick in thickness, had been filled in with brickbats and rubble. The south accretion projected to 3 ft. 6 in. while, to judge from the remnant of the north accretion its length was more than 3 ft. 9 in. In both these, brickbats and tiles were used in the construction.

The examination of the south accretion revealed the moulding of the southern face of the inner rectangle. Here as well as at the eastern edge of the inner rectangle and on that part of the northern face which stood out of the northern accretion the same moulding occurs and consists of a plinth, ovolo and facia in that order from bottom.

From this site were picked up five terracotta plaques, maximum size $6\frac{1}{2}$ in. by 6 in. containing a figure of a dancer in relief. Two fragments from two different plaques of the same type and two moulds of the same plaques were also found here. This was a type of find not met with any where else. The modelling of the figure in these plaques is crude* (plate 25).

It intrigues one as to how these plaques came here. The brickwork here had obviously been undertaken at a time when there was a dearth of bricks although the best potter's clay is available in the bed of Pallan-oya just a stone's throw away. Why does a man who has no bricks for the structure waste his resources for the making of terracotta plaques for decoration? How is it that only five plaques and two fragments are found while two of the moulds are recovered? Were the plaques being turned out at the site itself that the moulds should be found here? Were the moulds also used as part of the ornamentation? We do not presume to find solutions for all these problems but it seems probable that these are discarded plaques from the factory which supplied another shrine and have been brought here by some pious devotee. Very probably these were never used on any building here although brought here.

Immediately to the east of the eastern edge of the inner rectangle was a stone which roughly was $\frac{1}{4}$ of a circle and had a radius of about 1 ft. 7 inches.

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* These plaques are now at the Archaeological Museum, Amparai.

Stone Seat (Asana)

East of the line joining the pillared structure and the old approach, and 62 ft. from the moonstone of the pillared structure—the closest point, was an *āsana* (stone seat) 8 ft. 6 in. by 3 ft. 10 in. with a sunken border of $1\frac{1}{2}$ in. going right round. Its underside was roughly bevelled and the corners had broken. Its thickness was about 5 in.

Another Unit

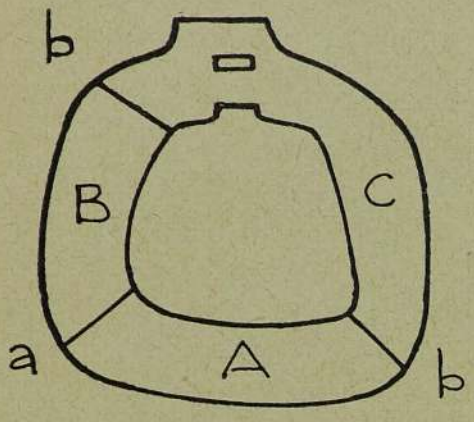
About 27 ft. to the north-east of the pillared structure and to the east of a line joining the flower altar and the pillared structure, there was a complete pillar standing erect. Four other pillars were near by. There was also a flat piece of stone of irregular dimensions 4 ft. 5 in. at longest and 3 ft. 6 in. at broadest and about 6 in. in thickness. Trenches cut here did not reveal any brickwork.

Other matters relating to Kivulegama Vihara—Pallan-oya

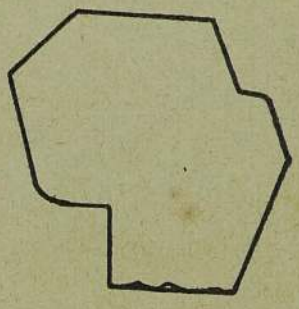
Before we conclude this description we may mention that we were told that some brickwork was found in the bed of the Pallan-oya stream hard by. This we were unable to examine since the stream was always in spate during our stay.

The borings conducted for the construction of the dam had brought up recently a few hot water springs but according to the local tradition there has been a hot water spring connected with the shrine at Pallan-oya before the Board started its activities. Miraculous healing powers had been attributed to the waters of that spring. If this is to be given credence, then we know why devotees flocked to the spot during the Dutch occupation, and also why devotees not having the wherewithal to reconstruct the ruined fane had yet brought materials there, according to their humble means.

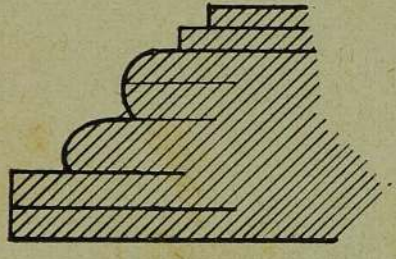
We left Pallan-oya after conducting the excavations on 29th November, 1957. The rainfall at Pallan-oya for the first 28 days of the month was 24 in.—a record for any month since 1951. The site was not submerged at the end of the year as originally expected. The work was done in very bad weather owing to the urgency then felt, but the men would have been spared much of the hardship undergone if the work was done in dry weather. That so much work could be done in the space of 23 very rainy days was due to the fact that all the men went to it with a will.



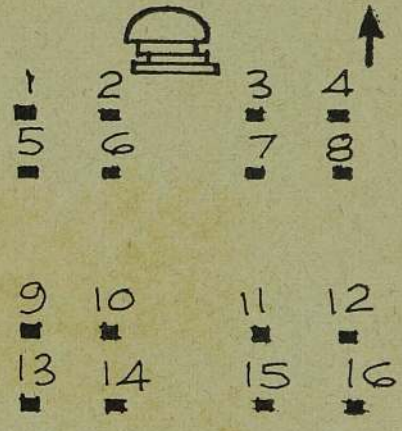
FRAGMENTS OF LOTUS PEDESTAL KEPT TOGETHER.



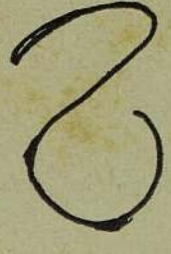
MOULDED BRICK REFERRED TO



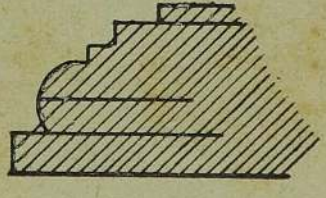
MOULDING OF PILLARED BUILDING.



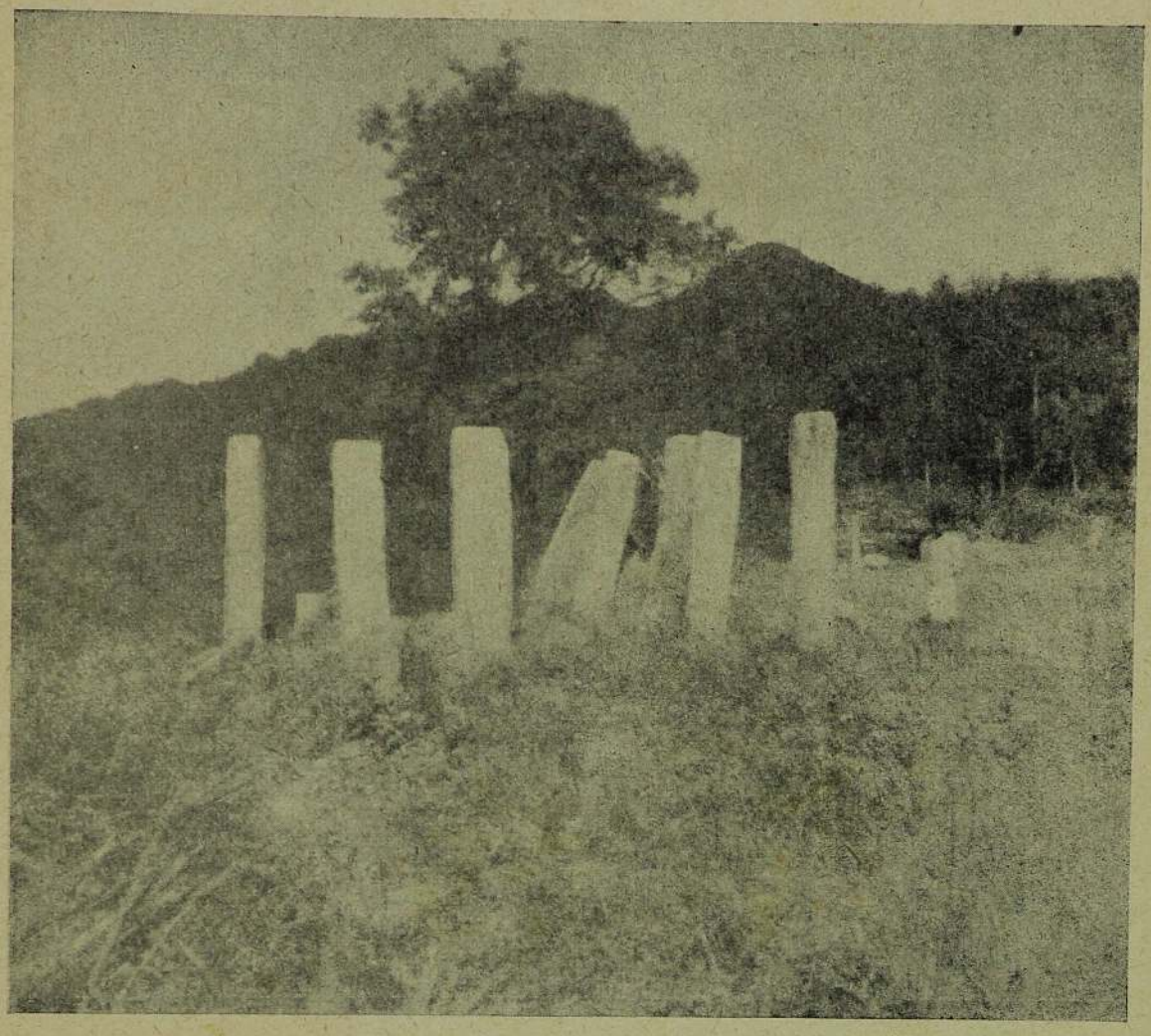
PLAN OF PILLARED BUILDING.



INSCRIBED LETTER ON BRICK FROM CIRCULAR STRUCTURE.



MOULDING OF CIRCULAR STRUCTURE ABOVE OCTAGONAL BASE

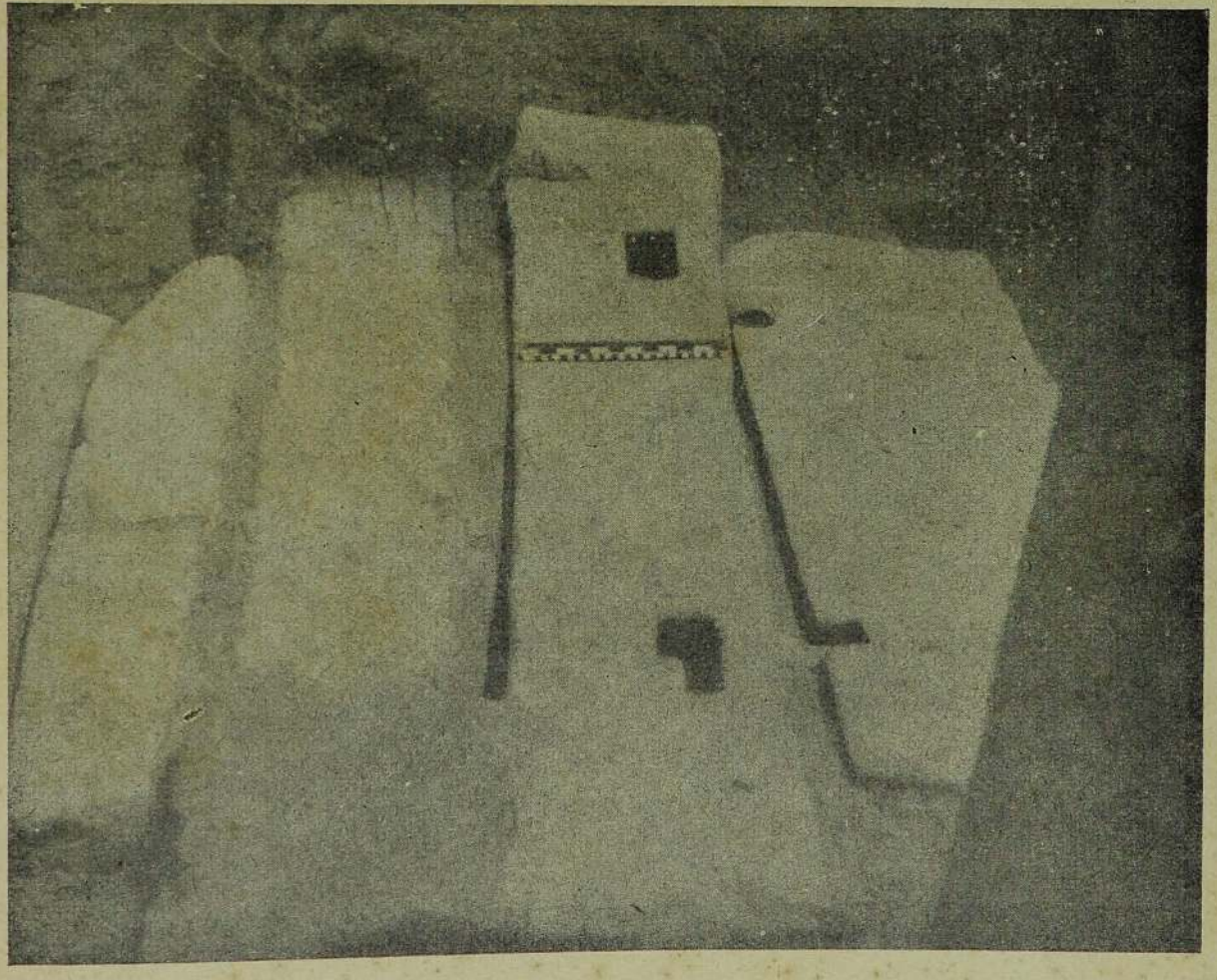


Pillared image-house—before excavation.

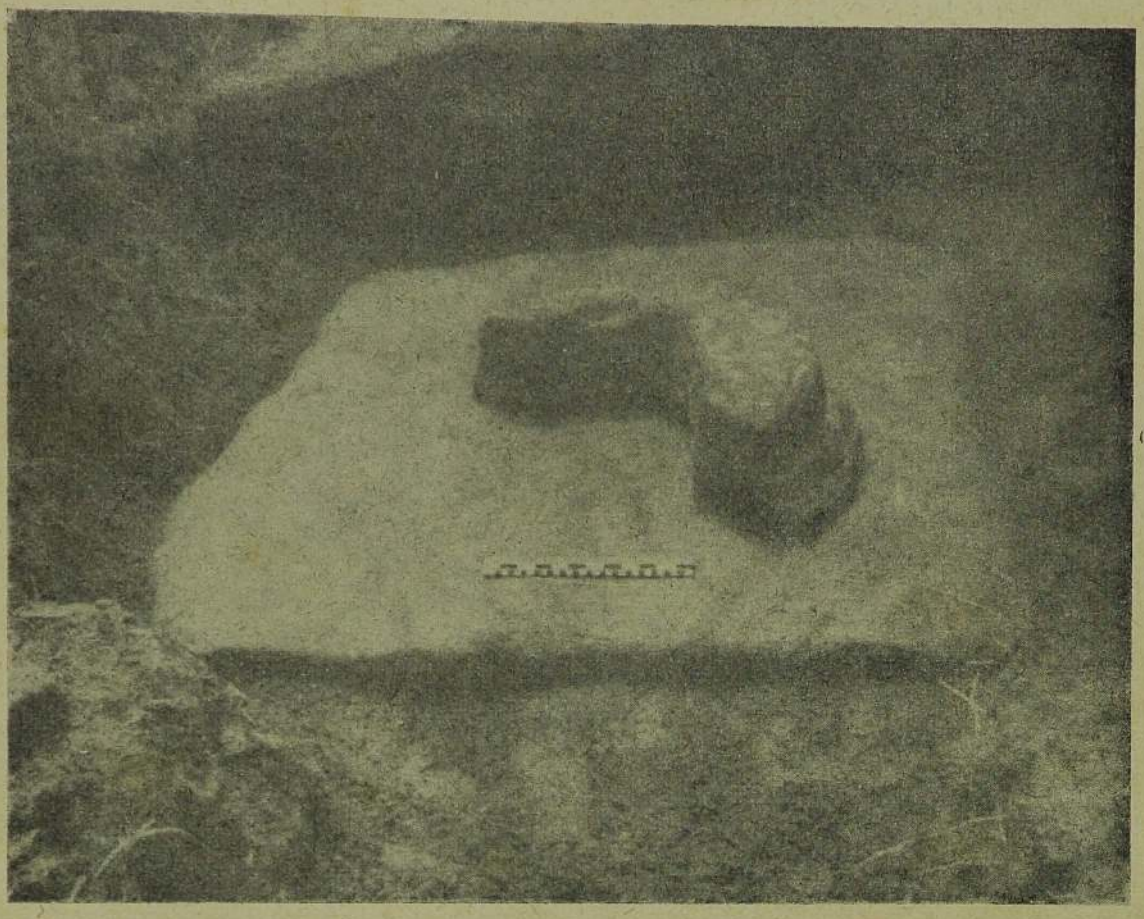
Pillared image-house—after excavation.

Buddha Statue from image-house.

Flight of steps of image-house.

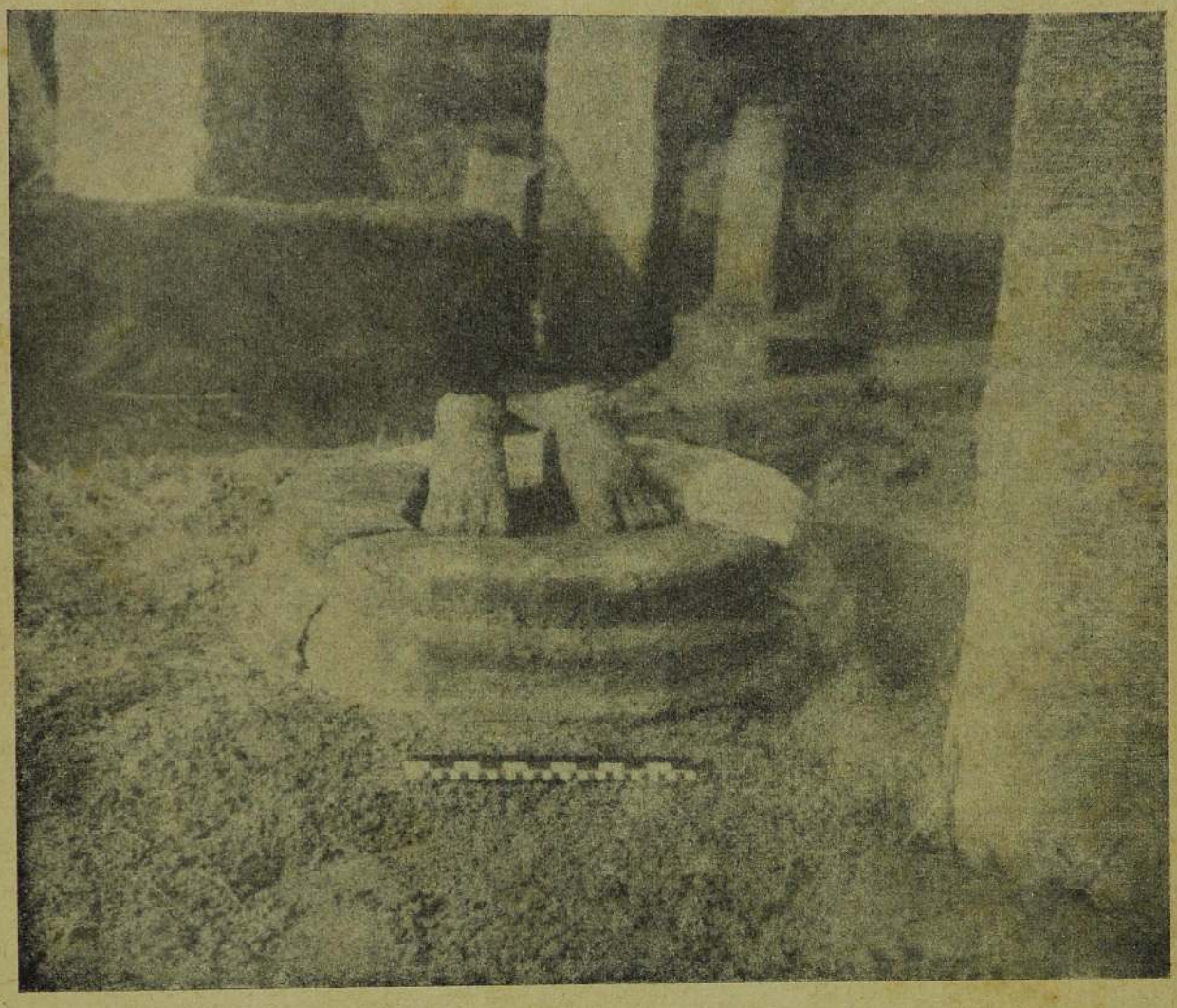


Threshold of image-house.



Fragment of Lotus pedestal found in situ.

Fragments of Lotus pedestal kept together.



Tennon of the feet of the statue in lotus pedestal.

Circular Structure—after excavation.

Moulds for dancer plaques.

Dancer Plaques.

ARCHITECTURE IN WOOD

L. K. KARUNARATNE

" It must not be supposed that **Mediaeval Sinhalese Architecture** *can compare either in extent or magnificence with that of Southern India or with that of earlier times in Ceylon, to which the well-known remains at Anuradhapura and Polonnaruwa testify. But it will be found that the typical Kandyan wooden architecture has a distinct character of its own, and that it responds directly to the needs of a small agricultural people, not luxurious, and rather prosperous than wealthy. In spite of the great remains at Anuradhapura it should be fully realised that the truly national and indigenous architecture has always been one of wooden buildings". (Coomaraswamy A. Med. Sinh. Art.)*

The simple tradition of building houses of mud and timber has existed throughout the centuries. A very fine school of timber construction has existed in the island during the mediaeval period. Many examples of buildings of this period are to be found in various parts of the Island in a fairly good state of preservation to enable us to conjecture and understand old forms of timber construction.

Ambalama

The Sinhalese word *ambalama* literally means a resting place and refers to a simple shelter normally built alongside a main road or in the vicinity of a temple. One such structure is the *ambalama* at Panāvitiya, (a village in the district of Kurunegala) which has been fully restored by the department of archaeology. This is an account of its discovery, study and restoration.

Location

The mediaeval capital of Ceylon was Kandy situated in the central hills of the Island. From here an old roadway connected the ancient city of Anuradhapura which was a popular place of pilgrimage. This road ran through the towns of Kurunegala and Dambadeniya passing the prosperous village of Panāvitiya, where this resting place or *ambalama* was found. It lies in the center of a large stretch of cultivated land just outside the village.

Utility

From literary and other references we were able to gather much information of the use of these buildings. Poetic descriptions give details of travellers taking shelter in them and appreciating not only the beauty of the scenery outside but also of the excellent carvings on pillars, beams and brackets. Records show that this building was also used by the government officers for transacting business and by the villagers as the common meeting place where they met to discuss their day to day problems. No doubt the farmers who cultivated the paddy land around this shelter found it most useful to rest and take their mid-day meal brought to them by their wives from the village.

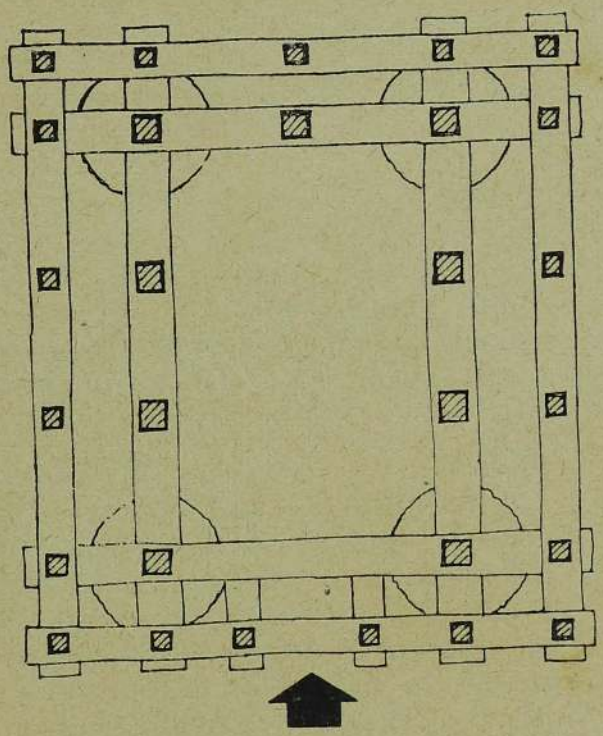
As Found

The villagers had maintained the structure but they have not been able to arrest the decay of the wood due to age and weathering. The structure had once come down totally by a tree falling on it. This damaged the roof and practically all the tiles. A temporary repair made by the village folk with a covering of woven palm leaves gave it but little protection. It was in this state when the department undertook its study for restoration.

Construction

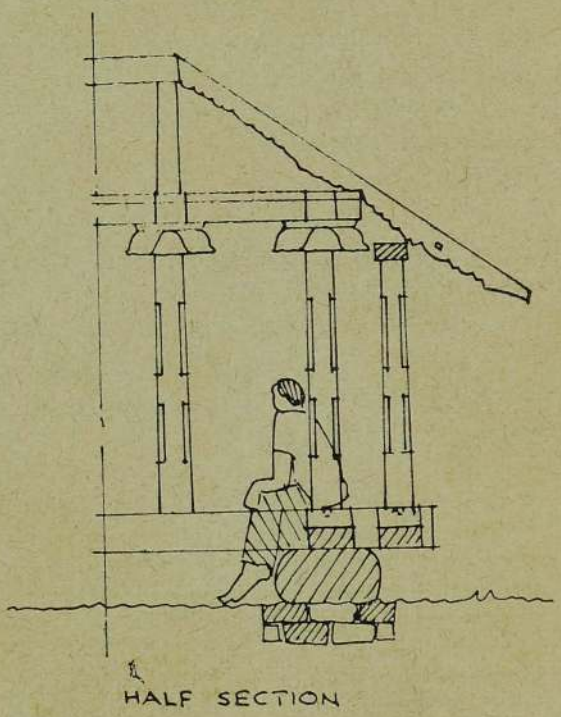
It was a wooden structure built on large beams with pillars, plates, rafters and a tiled roof. All woodwork except for the floor beams was elaborately carved. There was no foundation. The four main floor beams which carried the entire structure rested on four large boulders placed on the ground at the intersection of the beams.

The beams were of large size not sawn but fashioned out of large tree trunks. So were the posts, and rafters. Joinery was simple, the beams being halved where they met at the corners. The pillars had the mortice and tenon joints. The rafters were deep and had the lower side carved whilst the top remained flat to take the timber that carried the flat tiles. An interesting feature was the construction of the roof itself where all rafters round the corners radiated from the ridge fanwise.



PLAN

SCALE 1 2 3 4 5 6 FEET



HALF SECTION

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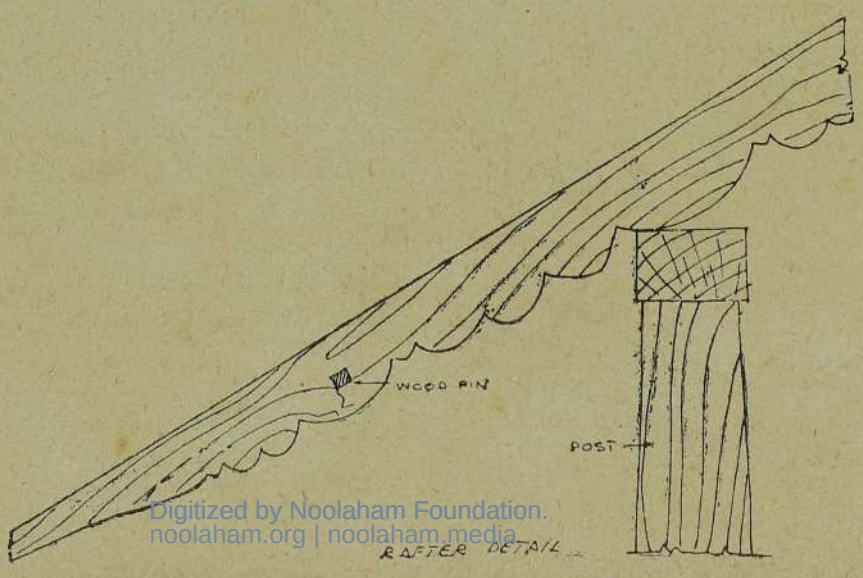


RAFTER DETAIL

Appreciation

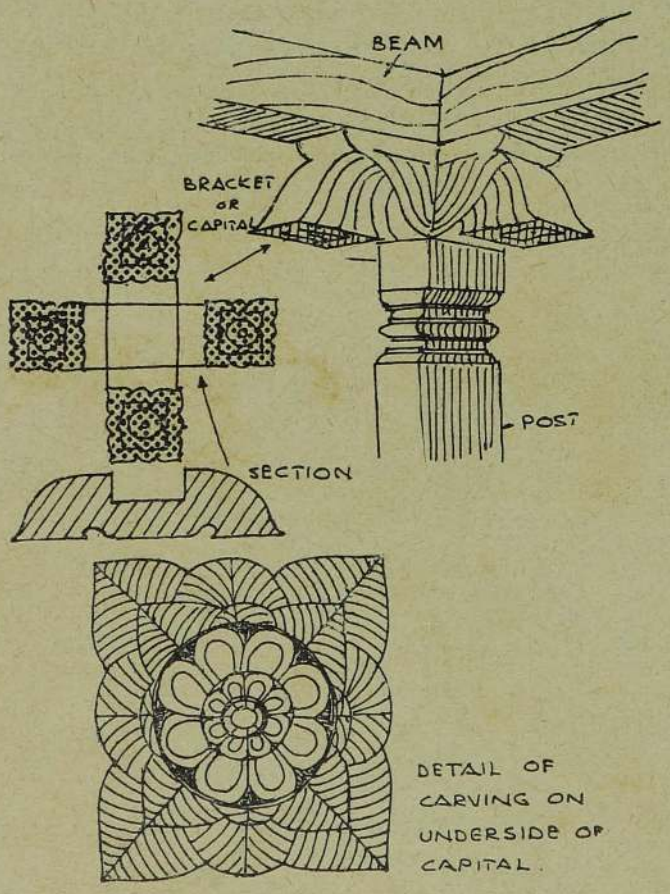
Villagers were until recently self-sufficient communities. As recently as a century ago, the average village had its own craftsmen, the carpenter, the smithy, and the potter. The construction of these structures was in the hands of the village craftsmen who have made them works of art and utility. These structures contain a wealth of traditional designs and motifs which help to conjecture old forms of life in the village.

" Village and country buildings, like all architecture everywhere, are the outward expression of their social background, and the practical everyday needs of their times." says Donald Insall in writing on " The changing village."

This building was indeed a clear expression of the above.

Decoration

The pillars were masterpieces of the wood carvers art. Each pillar consisted of square and octagonal shaft with intermediate square panels and crossing bracket capitals. The panels were carved with scenes from daily life in a village. These included such scenes as a guest being greeted in the home, food being served, a village drummer and dancer, and a procession. There were also the popular decorative motifs of the lotus, the swan, the lion, the snake and geometric patterns.

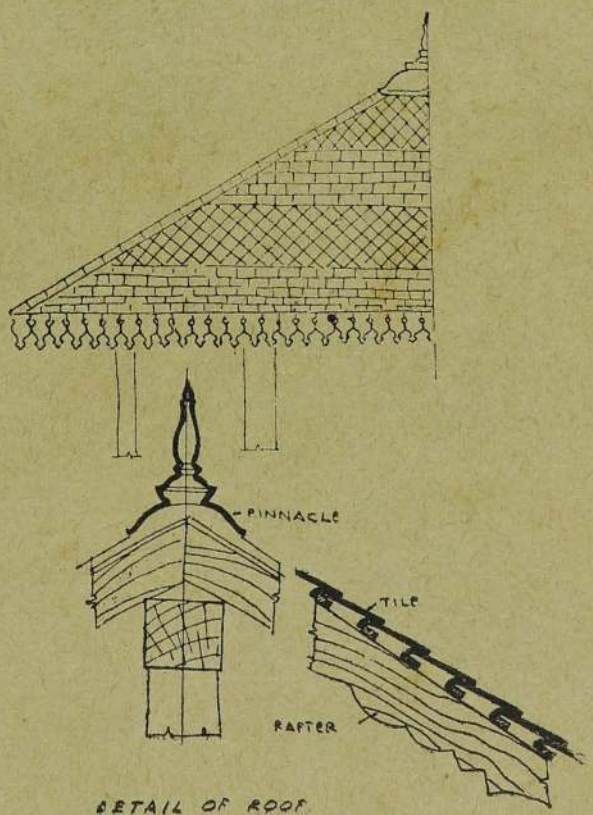


Restoration

It was clear on inspection that every piece of timber had to fit in its original position and no where else. This indeed is the case of every ancient building whether it be of wood or stone. No two units could be interchanged of the pillars, beams or the rafters, all of which had been made individually. The restoration of such a complex structure needs planning and a complete understanding of ancient building design and technique of architecture in wood. In and around the city of Kandy are to be found many examples of wooden buildings which give an idea of timber construction. Careful plans were made of every unit of the building. The different units were numbered in situ before removal. A record was made in a series of photographs showing every aspect of the structure. Notes and sketches were taken of every joint. Samples of old tiles were recovered in an excavation at the site. All the information, in sketches, plans and photographs helped in the preparation of a set of plans for the restoration.

Whilst much of the timber needed cleaning and treatment with a preservative, quite a few of the very elaborately carved beams, rafters, and brackets needed replacement. The best that could be done was to replace the bad timber with new units carved in the original way, but dated to show they have been replaced, and to place the old carved units in the museum. It was possible to get craftsmen with lineal descent who made very good copies of the originals, and left their name too to add to the continuity of a tradition of timber building.

Roof. High pitched roofs with wide eaves overhang are a feature of ancient roof construction. This was necessary to provide protection from the heat of the noonday sun as well as from heavy rain during seasons of rainfall. Three types of tiles were found during the clearing of the site. These were a flat rectangular tile, a flat pointed tile, and a patterned tile used in the eaves. The last was most decorative and provided the pattern to the eaves.

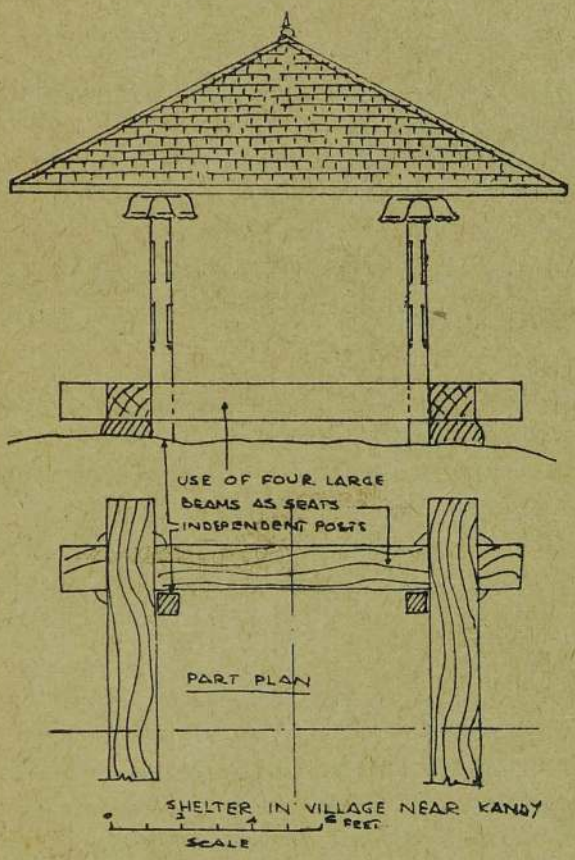


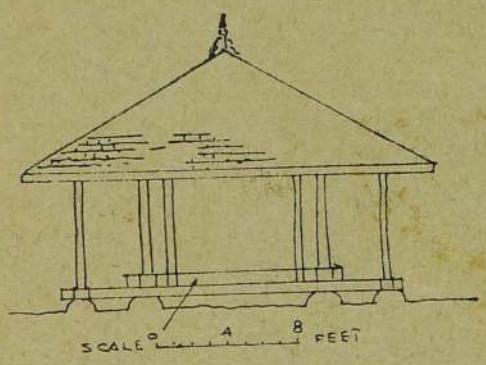
DETAIL OF ROOF

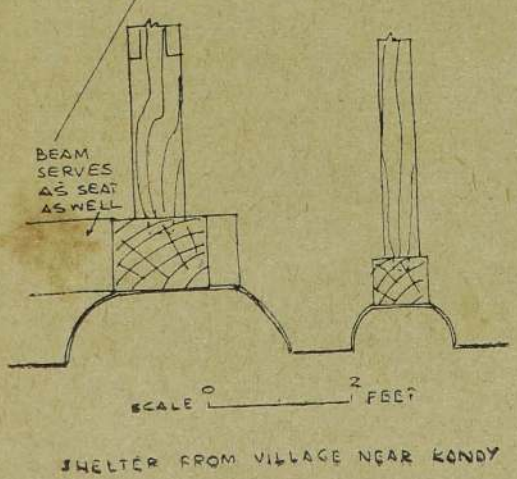
Tiles.—With the two types of flat tiles it is possible to get many different combinations of designs on the roof. Tiling was the job for an expert. Here too the craftsman with training in his ancestral craft had to be hired. New tiles had to be made for practically the entire roof. The village potter not only made the tiles for covering the roof but made also two pinnacles for the top. The completed roof was a copy of similar examples found in the district of Kandy.

With the restoraton work accomplished what might have been "fragments from an ancient *Ambalama* displayed in a museum show case" regained its original form and status in the village as a living monument.

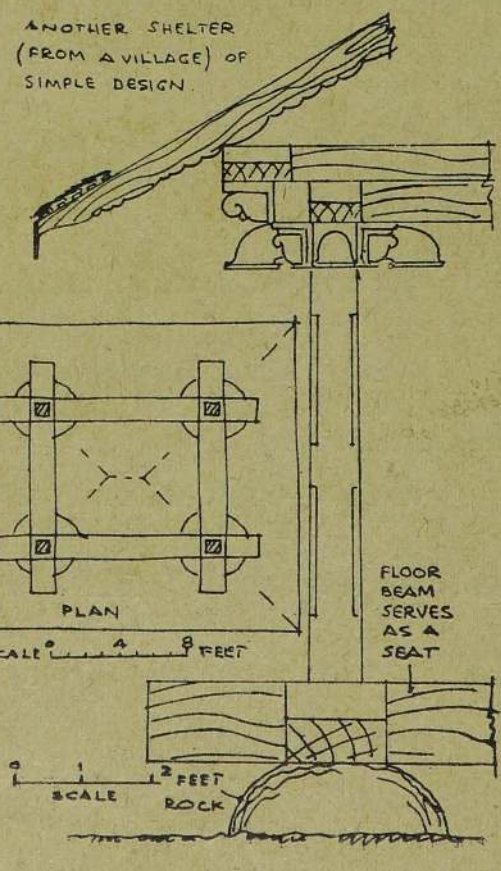
What was originally the meeting place of the village folk where they met to decide matters of importance effecting their daily life, or gathered on an evening for a friendly talk once more serves its purpose.







SHELTER FROM VILLAGE NEAR KONDY



Design and Ornament

The motifs used in the decoration of the various architectural units of the *ambalama* may be classified as follows:—

Animal motifs : The swan, elephant and lion.

Conventional motifs : Floral patterns such as the lotus, creeper patterns and various conventional designs.

Geometrical patterns : The dot, line curve, circle, square, triangle and chequer patterns.

Human figures: Compositions of figures depicting various scenes in a village, such as a dancer and drummer, a procession greeting a guest, etc.

Nelum-mala : The conventional pattern of the lotus flower is quite familiar in all pillars and brackets. The lotus circle, or rosettes, are used to decorate the underside of drooping brackets of pillar capitals as well as to fill spaces of the square intermediate panels. The lotus circle usually divides into four, eight, sixteen, or more petals and rarely into multiples of three or five.

Timber

The Wood used for most of the construction of beams, rafters, columns and brackets has been of a specially selected variety suitable for carving and of a durable nature. No preservative has been used in the original work.

The Forest Department of Ceylon gives the detail of this wood in their handbook.

Gammalu (S) Pterocarpus marsupium Roxb Wood—Sapwood pale yellowish-white, heartwood golden brown with a darker streaks, with a satiny lustre. Broadly interlocked grain. Contains a yellow dye which is readily soluble in water. Strong and hard. Seasons well. Presents no difficulty in sawing, machines well, takes a good and lasting polish. Very durable.

Uses—House building, doors, window frames, rafters, beams and posts, felloes, spokes, bent rim of cart wheels, agricultural implements, drums, *carving*, pit props, railway carriages, furniture and cabinet work.

Weight—50 pounds per cubic foot.

Distribution—Low country, chiefly in the dry intermediate regions up to 3000 feet above mean sea level.

DAKKHIṆA VIHĀRA SLAB INSCRIPTION

SADDHAMANGALA KARUNARATNE

While clearing away the debris at the base of the Dakkhiṇa Thūpa at Anuradhapura in March 1948, the then Archaeological Commissioner, Dr. S. Paranavitana exposed a stone pavement. This pavement extended 7 feet out from the ovolo kerb which ran round the whole circumference of the stupa. A number of stone slabs, (sixteen originally) with Brahmi writing was discovered. Unfortunately they are worn and fragmentary and the inscription as now found is in seventeen disconnected fragments (A.S.C. A.R. for 1948 pp. I 8-10).

TEXT

(*a*)

1. Vaṭatakaha ovaraja Mahanakayaha
puta ca a(meti) Vayahaṇa M [eka]-
-vaṇa ca laya-ga-

2. -ta karaya t[i] ṇi karihi sata ca
ya bumi Paḍakita ca kari [hi sa]
te ca Canaka karihi ca me nava

3. karihi sata ca catara karihi
karavatakaya me kaṇiya (hi
daki) niyavaca (kava) ya - gata (Kivanaka)

4. -canahi mula sari ca pacavaḍitaka
sara ca sari nigata sari aṭa
karihi sata ca catu-

5. asati karihi ca Conaka Carupata-
gamaha (ca Uṭa tera rana paca
pajina sarake paca) .. (sa)

6. -ra nigata sari visiti karihi ca ya
bimahi dakiṇ[i] ca karihi (va)vi ca catara
karihi (daka) .. ..

7. <four symbols> me kariya Dakiṇi viharaha
maparumaka Pita-maharajaha [aka]-

8. [ḍa kaṭa keravita mahavihara j na-
paṭisatiriya]

(*b*)

1. kama karaṇa kaṭu ca tela huta mila
koṭu ca utiriya gaṇaya maha [pakavaṭa] haya
uvana kaṭu ca

2. maparumaka maharaji bijiyapatiya kara
kaḍavaya Devi (ti) sari nava karihi
sata ca eka karihi ca

3. Nilarajiya Citagamaka kaṇiyahi (paripa)
-lakaya Kaḷayaha ca laya-(gata)
.. .. .. karihi su(vi) ca a-

4. -meta Buteyaha puta Tisayaha puta
Tisa Nakilayaha ca laya-(gata) .. ..
.. .. sata ..

5. paṇasa kariha ca me eka karihi
sahasi ca paṇasa karihi ca
keravataka (ya .. kaṇiya .. .. .. ya
vi .. ka)-

6. -ravaya gataka Citagamakehi sari eka
karihi sahasi ca panasa kariha ca
.. .. [Daki] -

7. -ṇi vihirahi T [i] sa mahacetahi
maparumaka Pitamaharajiha akaḍa
kaṭu kara [vi] taka [cetaha jiṇa -pa] -

8. -ṭisatiriya kama karaṇaka koṭu ca
tela huta m[i] la koṭu ca utiriya
gaṇiya me bukavaṭahi uva [naka]

9. [ko]ṭu ca maparumaka maharajaha

(*c*)

1. .. .. [kara ka] ḍavaya Deviti (sari
Karihi) sahasi ca [paṇasa karihi] .. ..
.. ..

2. .. (takaka) .. .. .. (ka) ta kama avi (kiṇi) yahi
Mala Abaya .. .. .. Aselaya .. ..

3. -(vama) ca Sahitayaha puta Katayaha
ca laya-gataka kariya paca-paṇasa
karihi .. .. ..

4. (ha) karivatakaya Mekahi kaṇiya
vicaravaya ga(vakara) Abaya (Vini)viyahi
sari pa .. ..

5. <Symbol> ma kariha Dakiṇi vihirahi
Tisa [maha] cetaha [akaḍa ka] ṭu kariya
jiṇa-paṭisa [tara]-

6. ṇa kaṭu ca tela huta mula koṭu ca
utiriya gaṇiya maha [pa] kavaṭahi
uvana koṭu

7. -(ke) maharaji bojiyapati kara kaḍavaya
.. .. [ka] rihi ca paṇasa karihi
[Diviti] -

8. - haligamaka kaṇiyahi ovarajaha [ca laya
ga] ta kariya ca (tiṇi) kariha sa .. ..

9. me vataka karihi sati ca visiti
karihi .. .. maparumaka
.. ..

(*d*)

1. Pita maharaji akaḍa kaṭu karavita
Dakiṇi viharahi Tisa mahacetahiya
jiṇa-pa [ṭisatiriya]

2. kama karanaka koṭu ca tela huta
m[u] la koṭu ca u[ti] riya gaṇiya
mahapakavaṭahi uvana [ka] kotu ca bo -

3. -jiyapatiya kara kaḍavaya Devitihaligamakahi-
catari karihi sata ca vasa
.. ..< symbol >

4. <four symbols>Vihirabij [i] kahi Kadeṇi
Kanayahi am [e] ti (Hati)bija Nakayaha
[puta] Sagayaha ca la-

5. -ya-gata kara paca karihi sate m(e)
paca karihi sata ka(ra kaḍavaya) maparumaka
puta maharaji [Pita]

6. maharajaha akaḍa koṭu karivitaka Dakiṇi
viharahi Tisa maha [cetaha jiṇa patisatiriya
kama kara]-

7. -ṇa koṭu ca t [e] la huta mula koṭu ca
utiriya gaṇiya maha [paka] vaṭahi [uvanaka]
koṭu ca [boji]-

8. -yapati ka [ra kaḍa] vaya Devitikakaṇi
kaṇiyihi sara ca Taraka .. .. su .. ..
gama pa(cavi)-

9. -sata koṭu .. taḍavita bavini
maparumaka maharaji la .. vata
.. .. .. karihi .. .. ..

(*e*)

1. -ravaya mula sarini me [Dakini
vihirahi kama] karana [ca] bojiyapati
kara kaḍavaya Divitiḍa .. .. .. [cati]-

2. -ri karihi sate .. ..
.. .. kaṇiyahi (Majuvapi-
Hiriṭiya) .. yaha

3. .. ..
.. (sa) hasi ca eka karihi sate ca
.. ..

4. -raha ca ma eka (kariha) .. ..
.. ..jikehi
sara aṭa (karihi) .. .. ..

5. ca saṭi kariha ca<symbols> .. ..
.. .. gamaka ha
.. .. sa .. ..

6. -te<symbols>.. .. .. karavitaka [hi ma]
purumaka [puta maha] raji Pita maharajaha
(akaḍa koṭu) kari-

7. -vita Dakiṇi viharahi [Tisa maha] cetahi
jiṇapaṭisatiriya kama karaṇa kaṭu ca
[Tela] huta [mu] la.

8. koṭu ca utiriya gaṇiya mahapakavaṭa
u [va] na koṭu ca [bo] jiyapati kara
kaḍa [vaya] .. ..

6. ..(k)ibe (ka) jakahi sari [a] ṭa karihi sate ca saṭi karihi ca Barajaka avaraṇahi (saravasi vadahi)

10. bara .. .. Kadaragamakahi sari tiṇi karihi sate ca

(*f*)

1. Majitagamana kiriyahi Gaḍanakaraka tisa eka (vapahaya laya) .. ..

2. amitiya maha-bamaṇaya ma Abaraka Bamayaha .. ..

3. ekuna visiti karihi ca me d(o)-karihi [vavi] ca ekuna visiti kari [mapurumaka]

4. puta maharaji Pita maharajaha a [kaḍa koṭu] karivita Dakiṇi vi [harihi Tisa maha cetahi jiṇa]-

5. -paṭisatiriya kama karaṇaka [ka] ṭu ca tela huta mula koṭu ca (utiriya mahapakavaṭa)

6. -hiya uvana kiṭu ca bojiyapa [ti kara kaḍa] vaya Devitibu .. ..

7. < symbol> Coṇa aviyehi sari paṇasa karihi<symbol>eka (karihi) .. ..

8. <symbol>Ekahalaka Ati vaviya badata Utilayaha .. ..

9. <symbol> me kaṇiyahi paca visitaka ekaha .. ..

(*g*)

1. puta Kaḷaya ..

2. -hi ca mayahi ..

3. bojadakavi kaṇiya

4. vila .. ..

5. .. ..

6. .. .. (va kaṭa)

7. .. .. (puta) ..

8. .. .. ga ..

(*h*)

1. .. .. (gara) ca .. .. vayaha .. ..
2. .. .. hi .. .. sari ca ha .. .. ..
3. .. .. ha ca laya - gata karaya sari ..
4. .. .. ya catu asati karihi ca me
5. .. Pita maharajaha akaḍa koṭu
6. -[sati] riya kama karaṇa koṭu ca tela h[u]-
7. koṭu ca bojiyapati kara kaḍavaya
8. yahi ma va pacavaḍita sara la

(*i*)

illegible

(*j*)

1. .. .. .. [ma] haraja .. ..

(*k*)

1. .. yaha
2. .. [ca] laya-gata ka-
3. .. .. .. majeya u-
4. ya .. .. yaha ca
5. .. .. ekariya cata
6. .. sa kariha ca ha-

(*l*)

1. (bakaṇa) .. .. ..
2. (raka ketaha) .. ..
3. .. .. karihi sata ca aṭa ḷa
4. .. ..ya Dakiṇ[i] viharahi maparu
5. .. .. .. [keravita] ka Tisa mahacetahi jiṇa-
6. .. .. kaṭu ca sesaka utiriya gaṇiya
7. -[rumaka] maharaji bojiyapatiya kara kaḍavi
8. .. .. na kariha pa
.. ..

(*m*)

1. -ra bala .. .. ha ca laya-
   gata .. ..

2. .. .. ga ca .. .. catapa
   .. ..

3. -ha ma [ḷa] Batiya Bukalayaha .. .. ..
   ma .. ..

4. .. .. raha sata baga .. .. ..
   .. ..

5. .. .. viya < symbol> mipa .. ..
   .. ..

6. .. .. [ca] tiṇa (kariha) .. ..
   .. ..

7. .. .. satara ka(riha)
   .. ..

8. .. ..
   (cavala) .. ..

(*n*)

1. ti ca t [i] ṇi karihi ca<symbols>me kariya
   (maparumaka puta maharaji Pita maha) -

2. rajaha akaḍa koṭu karita Tisa mahacetahi
   .. ..

3. ca tela huta mula koṭu utiriya gaṇiya
   mahapakavaṭa [ha uvanaka koṭu] .. ..

4. maparumaka .. buje .. ..
   .. ..

5. karihi ca .. .. magapa kariyahi
   Lanavilaka kaṇiya .. ..
   ..

6. -ha ca laya-gata kariya paṇasa karihi
   ca likiya (ka karita) .. ..
   .. ..

7. .. te vanaka tatiya variya sahasa
   variya balata (kaṇa ca) Nakayaha ... ...

(*o*)

1. -ka Nakayaha ca maji variya sahasivariya
bala .. .. puta Nakayaha
.. ..
2. -ya raṭiyana Kaṇayaha p [u] ta Siviyaha
.. ..
3. -ha paṭavaṇaka .. ..
.. ..
.. ..
4. -ha puta Saya .. ..
.. .. sa .. ..
.. .. ..
5. ca laya-gata kara (catari karihi
sate ca me kaṇiyahi) .. sa .. ..
.. . .
6. .. ..
.. ..
.. .. ..

(*p*)

1. .. me kaṇi [yahi] kaṇiya .. ..
.. ..
2. -ta ca sata satati karihi .. ..
.. .. [mapa]-
3. -rumaka Pita maharajaha [karavitaka
Dakiṇi viharahi Tisa] maha cetahi
jiṇa - paṭisa-
4. -tiriya kama karaṇa [koṭu ca tela huta
mula koṭu ca utiriya] gaṇiya
mahapakavaṭaha
5. uvanaka koṭu ca [maparumaka maharaji]
bojiyapati kara kaḍavaya .. ..
(sara catari) .. ..
6. karihi sate .. ..
Nilarajiya Culạ .. ..
7. kaṇiyahi .. .. .. ya ca (Tisaya) ha puta
ca .. .. .. namakavi .. .. .. niyabu ..

(*q*)

1. -mala-
2. -vica-
3. -tevana-
4. -bojiya-

TRANSLATION

(*a*)

These *karīsas*[1] of land are donated for the maintenance of the Tissa-mahācetiya of the Dakkhiṇa vihāra which had been inviolably established by His Majesty the great King Pita, to wit :—

the three hundred karisas which have been
recorded by the son of the viceroy Mahanaka of
Vaṭataka and the minister
Vayahaṇa Mekavaṇa,
the extent of land at Padakita
amounting to hundred karisas,
the karisas at Canaka,
these 900 karisas
the four karisas of Karavataka
by the side of the southern hill of
this division . . . . . .
the original arable land, the
improved arable land and the
arable land set apart, totalling
to an amount of 800 karisas,
at the Conaka Carupatagama.....
.....
twenty karisas of arable land
allocated.....
four karisas of the land at the
south.....and the tank.....

(*b*)

for the purpose of (ma'ntenance) work, for the
cost of lighting oil lamps, and for the purpose
of utilising the remainder for the refectory,
His Majesty the great king has exempted the levy of
the owner-tax,
901 karisas of the arable land at Deviti,
the land recorded by Kalaya the (controller ?)
in the division of Nilarajiya Citagamaka,
.....
recorded by Tisa Nakilaya son of Tisaya,
son of the minister Buteya.....
fifty karisas,
this one thousand karisas,
and the fifty karisas.....
and one thousand karisas of the arable
land at Citagamaka,
.....

1. *karīsa* is a land measure

these karisas have been donated by His Majesty the great king for the maintenance of the Tissa mahācetiya of the Dakkhiṇa vihāra inviolably established by His Majesty the great king Pita, and for the cost of lighting oil lamps and for utilising the remainder for the refectory.....

(*c*)

.. .. .. having exempted from the tax, one thousand karisas of the arable land at Deviti ....
and the fifty karisas,
.... . . in the division of .. . .
Mala Abaya ..... Aselaya .. .. ..
.....and the fifty-five karisas
recorded by Kataya son of Sahitaya
.....
(having asked ? the division of
.. hakarivataka Meka, the cowherd ? Abaya .. .
the arable land near the tank Vini ....)
these karisas have been donated for
the maintenance of the Tissa mahācetiya
of the Dakkhiṇa vihāra which was
inviolably established, and for the cost of oil lamps. The remainder is to be utilised for the refectory. The
great king exempted .... the owner
tax .. .... these karisas
the fifty karisas in the division of
Divitihaligamaka recorded by the
viceroy .. . .
three hundred ? karisas . . . .
this amount of karisas and twenty
karisas .....
the great king ..

(*d*)

(These Karisas) have been donated for the maintenance of the Tissa mahācetiya of the Dakkhiṇa vihāra which has been inviolably established by the great king Pita ; and for the cost of oil lamps. The remainder is to be utilised for the refectory. Having exempted the owner tax four hundred karisas of the arable land at Devitihalagama,.....
Five hundred karisas recorded by Sagaya son of the minister Hatibija Nakaya of the division of Kadeni at
Vihirabijaka ..
These five hundred karisas have been exempted from the owner-tax and have been donated for the maintenance of the Tissa mahācetiya of the Dakkhiṇa vihāra inviolably estab-

lished by the great king Pita ; and for the cost of oil lamps. The remainder is to be utilised for the refectory.

Having exempted the owner-tax the arable land in the division of Devitikakaṇi

. . . . . .
His Majesty the great king . . . . . .
. . . . . .

(*e*)

From the original arable land donated for the purpose of this work at Dakkhiṇa vihāra, having exempted the owner-tax . .
. . . . Divitiṇa . . . .
four hundred karisas . . . . . .
. . . in the division of Majuvapi Hiritiya
. . . . one hundred karisas
. . . . . . one karisa . . . . . .
. . . . . eight karisas of arable land at . . . . . .
. . . . . and sixty karisas . . . . . .
. . . . . .
. . . . . .
(These karisas have been donated) for the maintenance of the Tissa mahācetiya of the Dakkhiṇa vihāra inviolably established by the great king Pita, son of His Majesty; and for the cost of oil lamps. The remainder is to be utilised for the refectory.
Having exempted from the owner-tax
. . . . . .
Eight hundred karisas of the arable land at . . . kibekajaka, sixty karisas, and at the dam Barajaka . . . . . .
three hundred karisas at Kadaragamaka . .
. . . . . .

(*f*)

Of the karisas at Majitagamana . . . . . .
thirty one tanks recorded at
Gaḍanakara . . . . . .
The minister the great brahmin and
this Abaraka Bamaya . . . . . .
nineteen karisas, and the tanks of two karisas? and the
nineteen karisas have been donated for the
maintenance of the Tissa mahācetiya
of the Dakkhiṇa vihāra inviolably
established by the great king Pita,
son of His Majesty, and for the
cost of oil lamps. The remainder
is to be utilised for the refectory.
Having exempted the owner-tax at

Devitibu .....
fifty karisas of arable land at
Cona aviya .. ..
One karisa .. ..
badata Utilaya at the Ati tank
at Ekahalaka .....
.. twenty-five in this division ...
.....

(*g*)

Too fragmentary to give a
translation

(*h*)

. . . . . .
.....
the arable land recorded ...
. .. the eighty four karisas ..
.....
for the maintenance of the Tissa
mahācetiya at the Dakkhiṇa Vihāra
inviolably established by the
great king Pita; and for (the
cost of) oil lamps . . . . . .
Having exempted the owner-tax ...
the arable land which had been
later improved ? .....

(*i*)

.... the great king .....

(*j*)

Too worn to give a translation

(*k*)

Too fragmentary to give a translation

(*l*)

.....
.....
a hundred karisas and eight ....
.. .. for the maintenance of the
Tissa mahācetiya of the Dakkhiṇa
vihāra (inviolably established by the
great king Pita) . .. . The
remainder to be utilised....
..... the great king having
exempted the owner-tax .....
.....

(*m*)

Too worn to give a connected
translation

(*n*)

three karisas .....
Tissa mahācetiya inviolably
established by the great king Pita,
son of His Majesty .....
. . . . . .
for the cost of oil lamps; the remainder to be utilised for the
refectory .... ..
.....
in the division of Lanavilaka .....
fifty karisas that were recorded and the
recorded .....
the officers Kaṇa and Nakaya for the
third season and the thousandth time.

(*o*)

Nakaya ..... son of .....
in the middle season and for the
thousandth time
Siviya, son of Kaṇaya, the territorial
chiefs .. ..
.....
the four hundred karisas recorded
and in this division .....
.....

(*p*)

in this division .....
.....
the seventy seven karisas .....
for the maintenance of the Tissa mahācetiya of the Dakkhiṇa Vihāra established by His Majesty the great king Pita, for the cost of oil lamps, the remainder to be utilised for the refectory.....
His Majesty the great king having
exempted the owner-tax .....
.....
hundred karisas .....
Nilarajiya Cula .. ..
son of Tisaya .....
.....

(*q*)

Too fragmentary to give a translation

NOTES

The palaeographical and linguistic evidence indicate that the probable date of the inscription should fall within the third century A.D. Pita maharaja often mentioned in these slabs has been identified by Dr. Paranavitana as king Vaṭṭagāmaṇī Abhaya. As he reigned in the first century B.C., these must be posthumous references. The object of the record is to donate extensive lands for the maintenance of the Tissa mahācetiya of the Dakkhiṇa Vihāra. A stereotyped phrase to this effect is repeated many times in the slabs. The rest of the document seems to contain a detailed enumeration of various lands donated to the monastic establishment. There are symbols which probably stand for numerals or a pictogram which denotes a land measure. The numbers of the *karīsas* donated are not systematically clear to come to a definite conclusion as regards the connotation of the symbols. The following explanations are offered for some of the phrases :—

1. laya-gata karaya. This phrase has not been found in other published inscriptions of this period. Possibly it means, " having caused it to be written." likiya (ka karita) in (n) line 6 should also mean the same thing. This shows that the practice of recording land grants by scribes of the king's secretariat was in vogue at the time.

2. ya bumi .... ya seems to have been used as a relative pronoun. For the phrase ' ya gedhama se baye nama ' see Paranavitana, Brahmi Inscriptions in Sinhalese Verse, J.C.B.R.A.S. Vol. XXXVI, Pt. II 1945, p. 58, " Ya bumi ", followed by " me ..." means " whatever fields enumerated .. these .. "

3. pacavaḍitaka: pacchāvaḍḍhitaka-improved later.

4. akaḍa kaṭa keravita: Pali akhaṇḍakatvā kārāpita. Established firmly. The king may have framed firm regulations at the time of establishment.

5. jiṇa-paṭisatiriya The context seems to favour the older interpretation of causing maintenance work or repair, rather than ' spreading of antelope skins ' as given by Paranavitana in E.Z. Vol. V, p. 71.

6. vicaravaya, having examined.

7. utiriya gaṇiya, having taken the remainder.

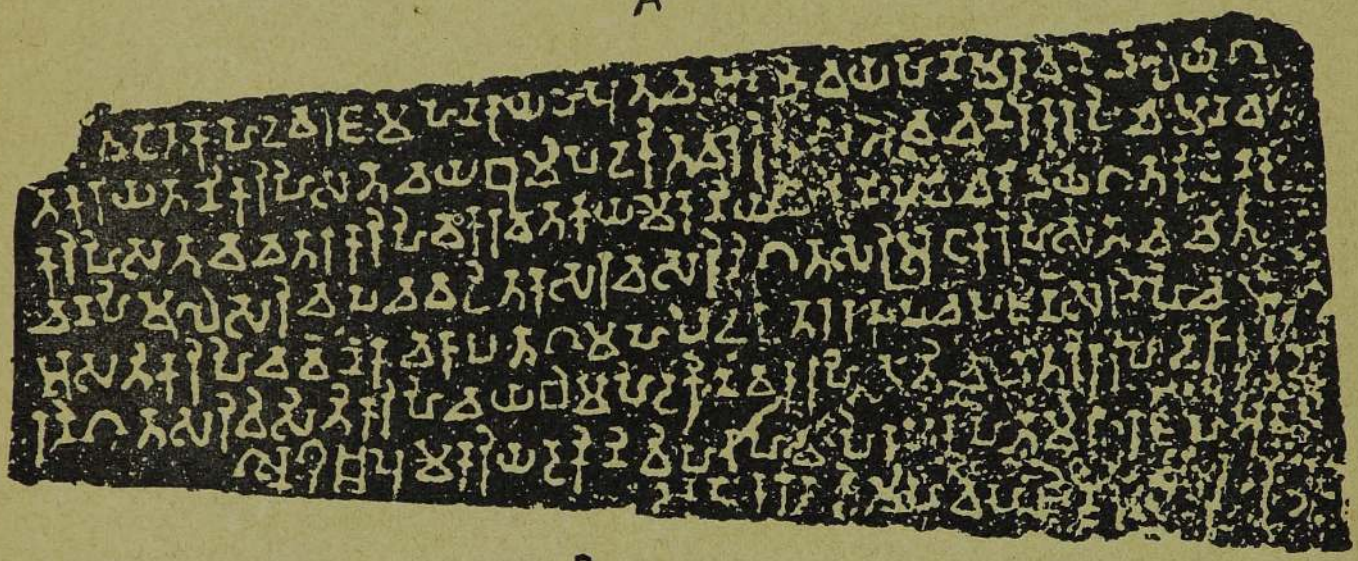
8. avaraṇa: āvarana =dam.

9. kaṭa, kiṭu and koṭu are all derived from krtvā, having done.

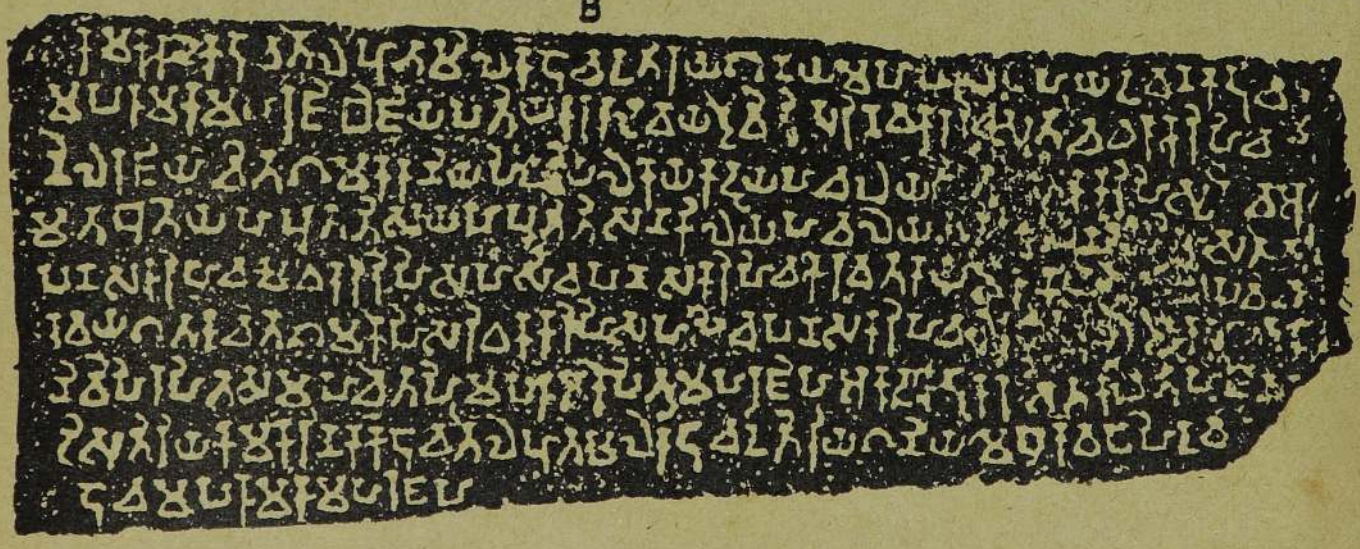
10. sata satati: satta sattati, seventy seven.

DAKKHINA VIHARA INSCRIPTION

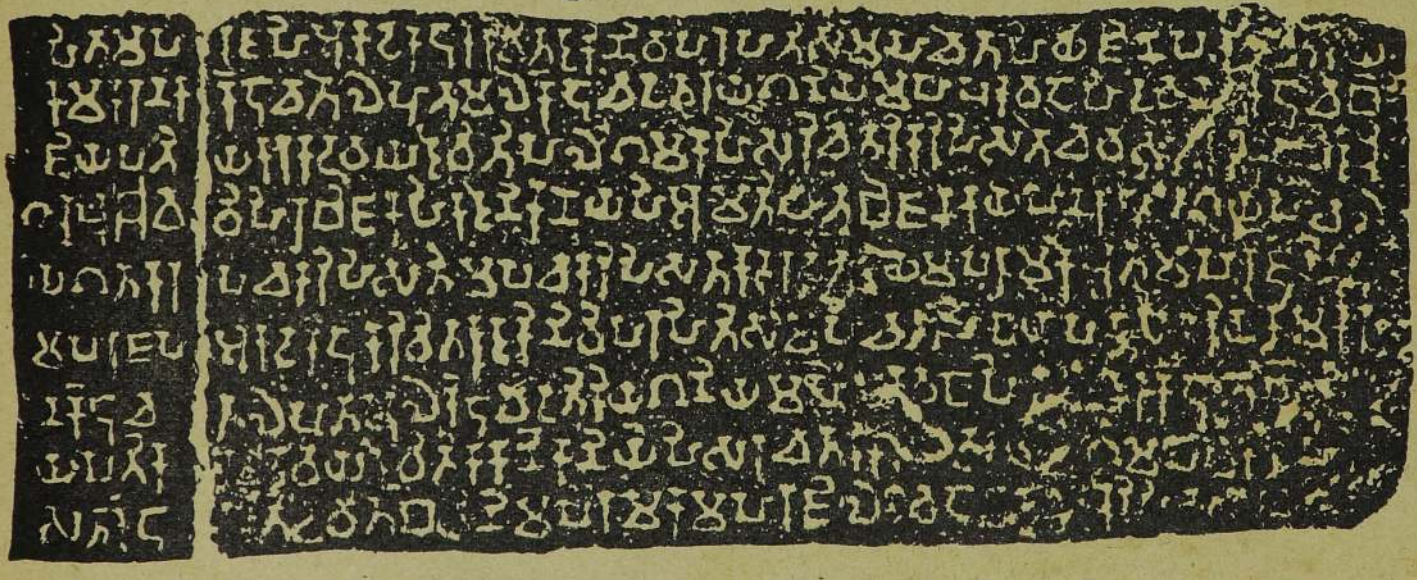
A



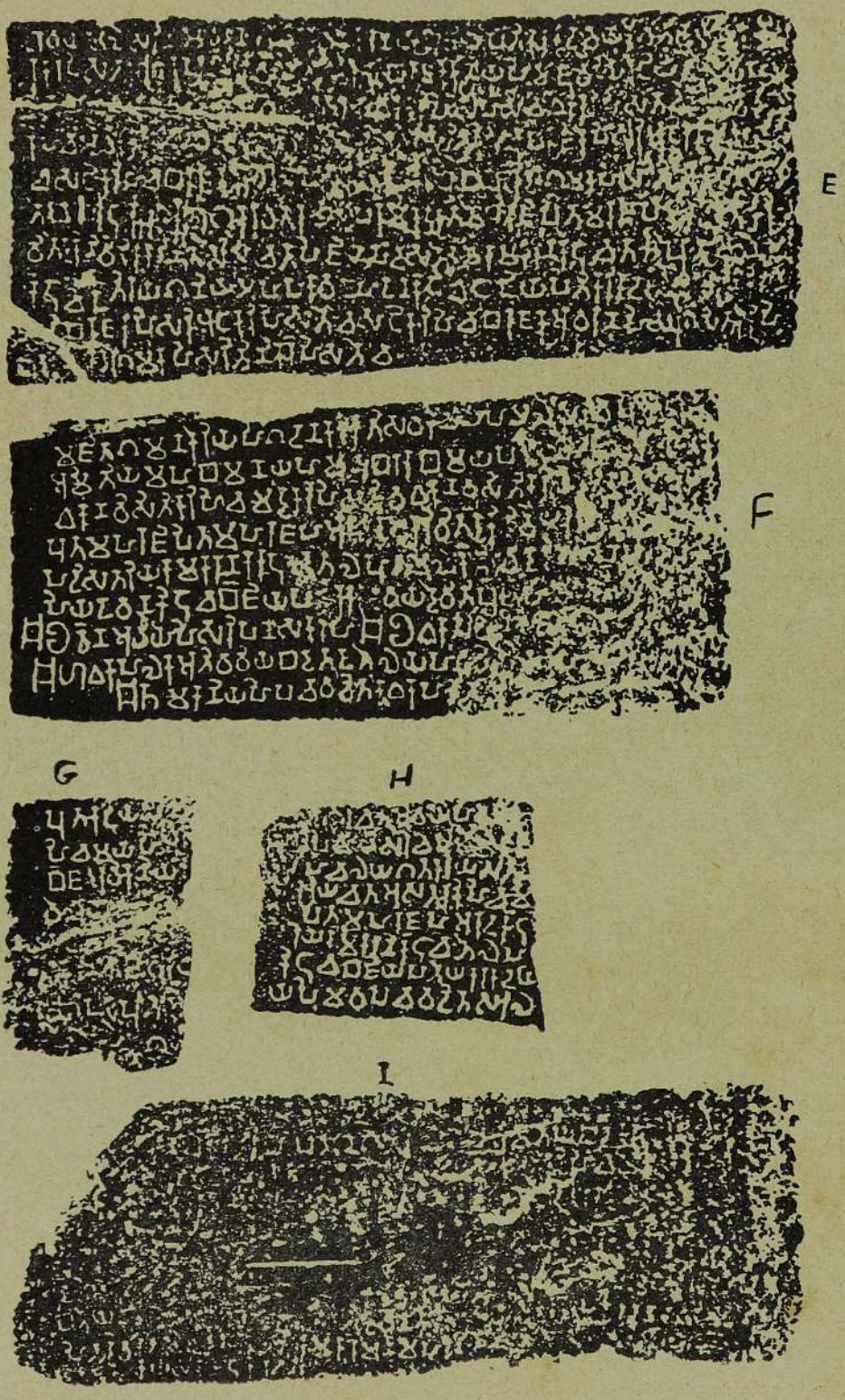
B

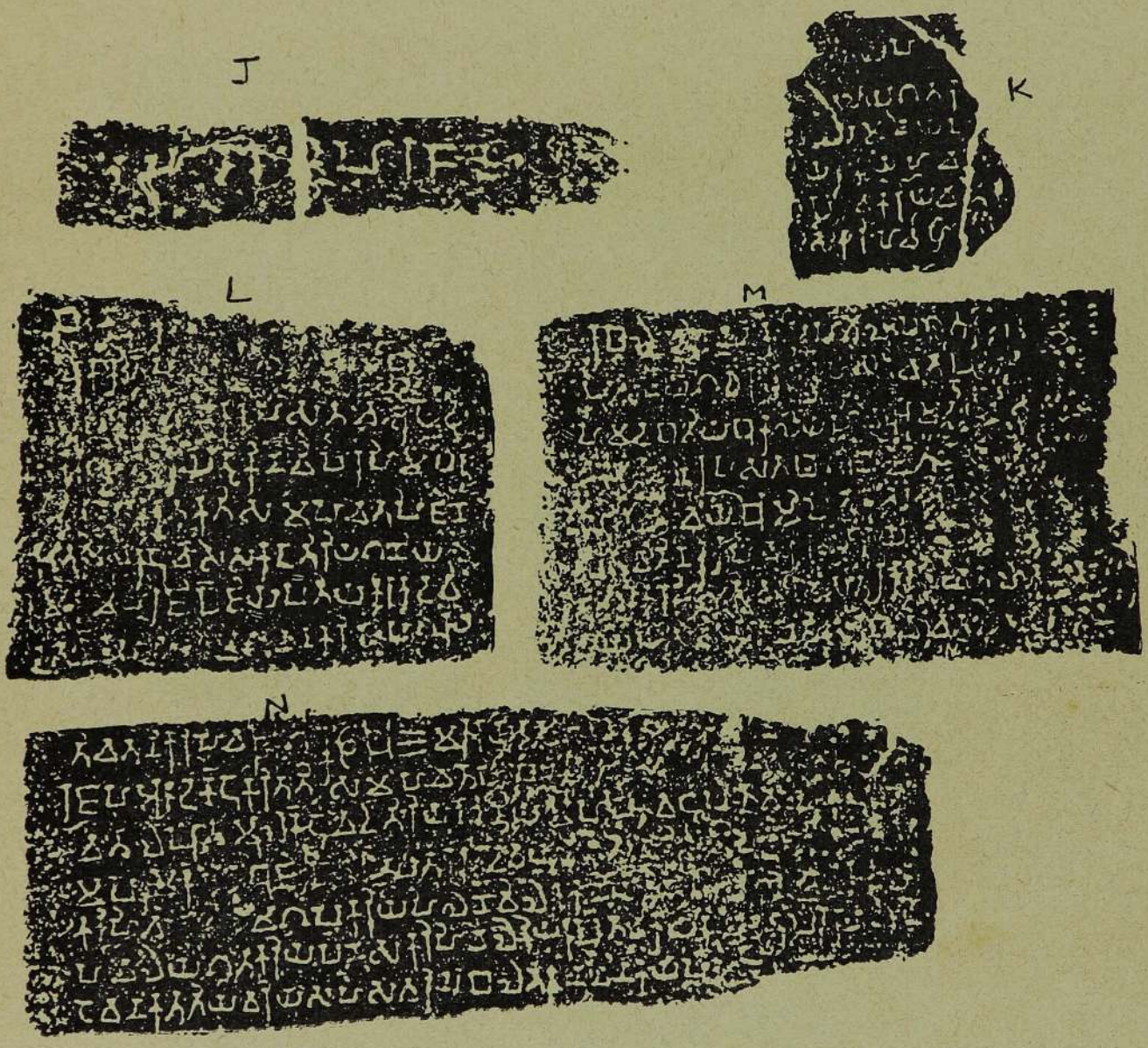


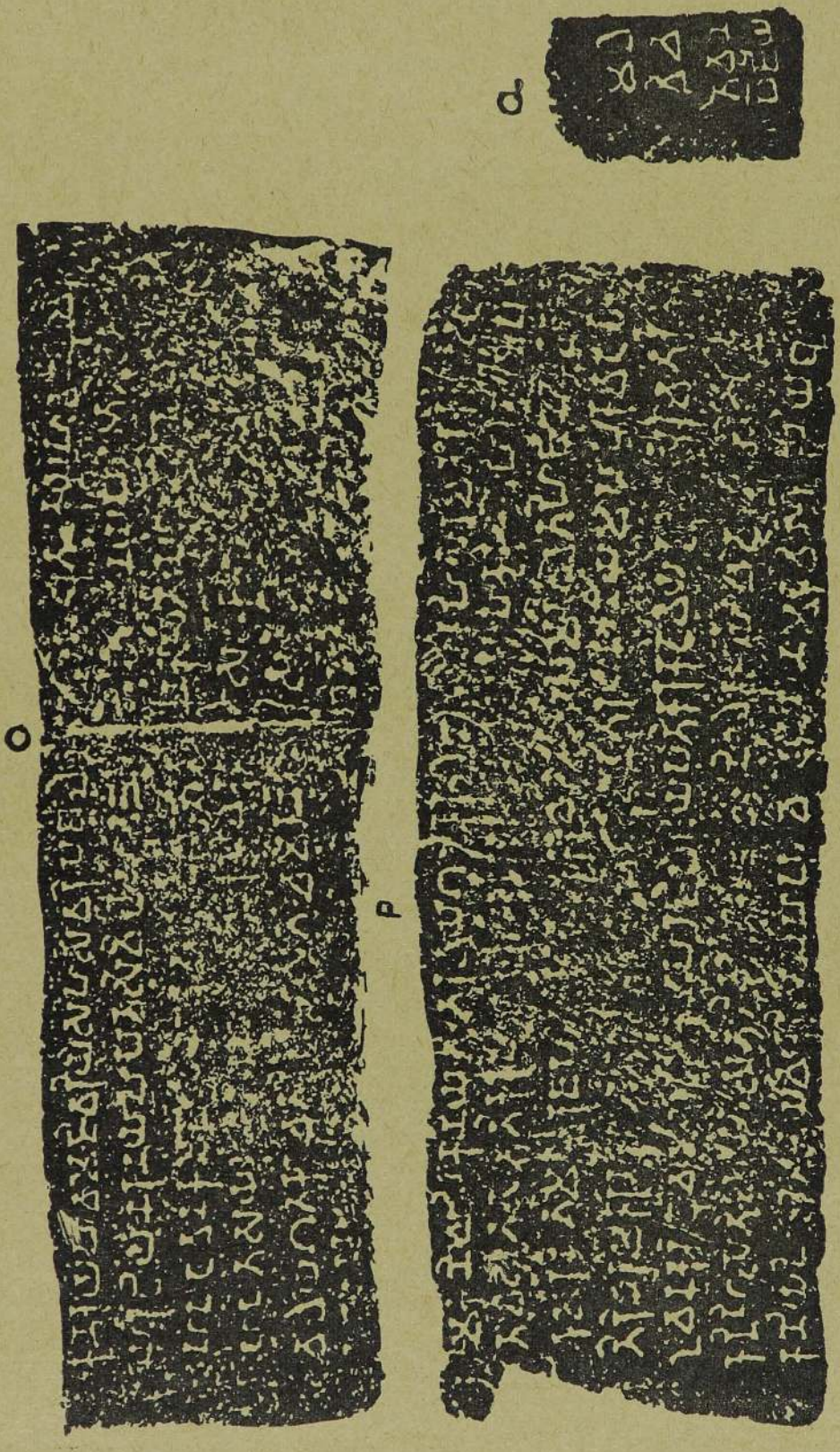
C



D







THE USE OF PHOTOGRAMMETRY IN THE DECIPHERING OF INSCRIPTIONS WITH SPECIAL REFERENCE TO CEYLON

ROLAND SILVA
A. DENIS N. FERNANDO

ARCHAEOLOGISTS and epigraphists in particular, have relied on inscriptions as one of the principal sources of information to study the past. These specialists made use of 'eye-copies'[1], or rubbings made on paper,[2] for their research. Although the latter method was an improvement on the former it was limited to a two dimensional representation. In this paper we suggest a method by which scholars could take advantage of a three dimensional record to read inscriptions.[3]

Professor Paranavitana an eminent epigraphist, has in recent times reported that a number of interlinear inscriptions have been noticed among the ancient records of Ceylon [4]. He, moreover, observes that some of these have three sets of writing scribbled one above the other in different sizes of character and at varying depths [5]. We believe that the latter feature could be exploited to isolate one set of carvings from another. This would also eliminate errors that normally result from a confused palimpsest especially if the letters are of miniature dimensions.

Our study assumes that in engravings, the depth of writing depends on the following factors:

1. The size of the characters.
2. The nature of the scribing instrument.
3. The medium on which the letters are inscribed.
4. The personality of the carver.

In view of the above factors it could be deduced that writings executed on a slab or surface at various periods, whether overlapping or otherwise, would differ even minutely in depth. Thus, if the difference in depth could be accurately measured and recorded it will be possible to read the characters at a specific level and so isolate one layer of writing from the rest. Similarly, every other level of lettering can be separated.

Photogrammetry is used in surveying today for the plotting of contours and other details of the earths surface. This is done by taking three dimensional measurements from photographs. We have used this property to measure and record the minute differences of contour depth in the surface of an inscription. The depressions in the lettering can be broadly compared to the valleys or streams noticed in a plateau. To illustrate this principle we have prepared a palimpsest on plaster-of-paris. Here,

different levels of over-lapping scripts were achieved by using various scribing instruments, namely :

1. A ball-point pen
2. A compass point
3. A brush with indian ink
4. A sharp point of scissors
5. A thick application of oil paint

Two twenty-five cent coins of known thickness (1 ·68 mm.) were placed on the plaster-of-paris as a reference for depth and photographed from two positions with the camera axis perpendicular to the slab [6]. The positions of the camera of focal length 13 ·5 cm. is indicated in fig. 1 which was placed 114 ·4 cm. away from the slab. The distance between the two camera positions was 22 ·9 cm.

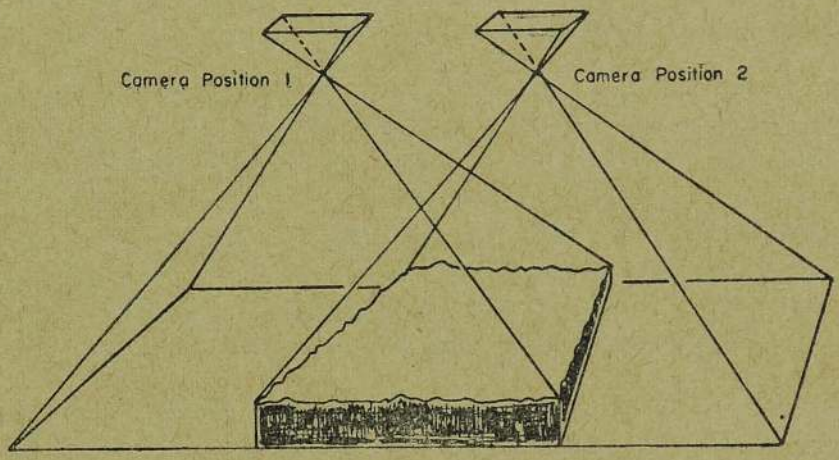


Fig. 1.
Camera Positions

The two photographs that were taken were placed on a photogrammetric plotting instrument in the same way as it is for aerial survey work [7]. The three dimensional model seen on the instrument was levelled to the letters written in indian ink as they were on the same plane as the slab. The model was then scaled and the form and depths of the writing plotted. A stereoscopic pair of photographs of the slab with the inscription and the three dimensional plot are shown in pl. 27 and pl. 28 respectively. The top half of the inscription contains the normal writing at different levels and the section below shows an example of over-lapping writing. An isolated plot at a fixed depth of —1 ·10 mm. is recorded in pl. 29 where all other levels of writing were eliminated. Pl. 28 indicates the Five sets of writing at varying depth as inscribed by the Different styli. Their plotting levels are as follows :—

1.	Ball-Point Pen	— 0 ·50 mm.
2.	Compass Point	— 0 ·70 mm.
3.	Indian Ink	± 0 ·00 mm.
4.	Point of Scissors	— 1 ·10 mm.
5.	Thick oil paint	+ 0 ·90 mm.

The above investigations were extended to decipher a 10th century stone inscription from Mayilagastoṭa which is presently in the Colombo Museum [8]. Pl. 31 is a stereoscopic pair of photographs of this inscription and could be viewed in three dimensions using a pocket stereoscope. The same procedure adapted with the plaster slab was used in preparing the three dimensional plot of the inscription at two different contour depths [9].

1. The upper part of the inscription was plotted at a height interval of 0 ·5 mm. as indicated in plates 31 and 32.

2. A small section of the inscription was plotted at a height interval of 0 ·1 mm. as hown in plates 31 and 33.

The contour plot of pl. 33 was prepared with a Wild A-7 plotting machine. The three dimensional model was then levelled to the surface of the inscription and the contours recorded. As the inscribed surface was irregular the variations of depth in restricted areas were not directly reflected in the plot. This inadequacy was rectified by taking relative measurements of height on a 10 cm. grid at plotting scale as shown in pl. 33. Such adjustments are necessary as the surfaces of inscriptions are generally not perfectly flat. The datum ' A ' for each square was derived on the basis of the average profile for the four sides of the grid. While ' A ' was taken as the average depth for each square only the values below the datum were shaded progressively as (A-0 ·1), (A-0 ·2), (A-0 ·3), etc. The results of the plot seen in pl. 33 indicate the shape and form of the insertions made by the scribe upon the stone slab with scientific accuracy. These details may be compared with plates 30 & 31 which represent an eye-copy, an estampage, and a deep-shadow photograph respectively. Although the early techniques recorded interesting data, these were subjective in part which the new method presents a much more objective way of deciphering inscriptions.

The three dimensional plots indicated in pl. 32 and 33 show that the contour interval plays an important role in the decipherment of the inscription. Larger and deeper carvings like the snake are recorded clearly in pl. 32 being plotted at a height interval of 0 ·5 mm. while the lettering lacks definition. The contours in pl. 33 plotted at a variation of 0 ·1 mm. indicates the horizontal lines and the incised writing of corresponding depth. Similarly, shallower and minute lettering could be highlighted if smaller contour intervals are used. A form that resembles the letter ෆ appears in pl. 33 and was found to have an average depth of 0 ·2 mm. If these incised forms or letters are to be recorded on a contour survey the interval of plotting should be maintained at about 0 ·05 mm. It is also interesting to note that this form which looks like a letter appears in the identical position of the inscription in plates 30B, 31 and 33. This means that we have been able to record an incised form or letter of minute dimensions and depth using three independent means of reading namely, an estampage, a deep-shadow photograph and a three dimensional plot.

Photogrammetry can prove to be more reliable and accurate than any method developed so far in recording and deciphering inscriptions irrespective of the language and the material on which it has been indited. Moreover, as the production cost of the records is reasonable and their storage convenient, photogrammetry could greatly assist and benefit epigraphy of the future.

Acknowledgments

We wish to acknowledge the assistance given by the Archaeological Commissioner Dr. R. H. de Silva, the Assistant Commissioner (Epigraphy) Dr. W. S. Karunaratne, the Surveyor-General Mr. C. T. Gunawardena and the Director of Museums Dr. P. H. D. H. de Silva. We also thank Messrs. K. Jayapalan, S. L. Gallapathi, K. J. de Alwis & S. Thillainadarajah of the Survey Department for preparing the three-dimensional plots. We are grateful to Mr. N. Perera for taking the photographs and Mr. M. H. Sirisoma for preparing the eye copy pl. 30 A who are both members of the Archaeological Survey Department.

Foot notes

(1) 'Eye-copies' are records of inscriptions made directly from observations, a practice followed in the 19th century. See pl. 30 A.

(2) Rubbings made on paper are called 'estampages' and is yet the most popular mode of recording inscriptions for research purposes. See pl. 30 B.

(3) Dr. R. H. de Silva has also developed a technique of making accurate scale copies of inscriptions using a resin mould in recent years. The effect of infra red light on a copy made of selected material has produced promising results [*Godakumbura, C. E.*] *Administration Report of the Archaeological Commissioner for the Financial year* 1965-66. *p. G.* 103.

(4) Paranavitana, S., *Ceylon and Malaysia*, Colombo, 1966, pp. v-vi.

(5) *Ibid*, pp. 29-30.

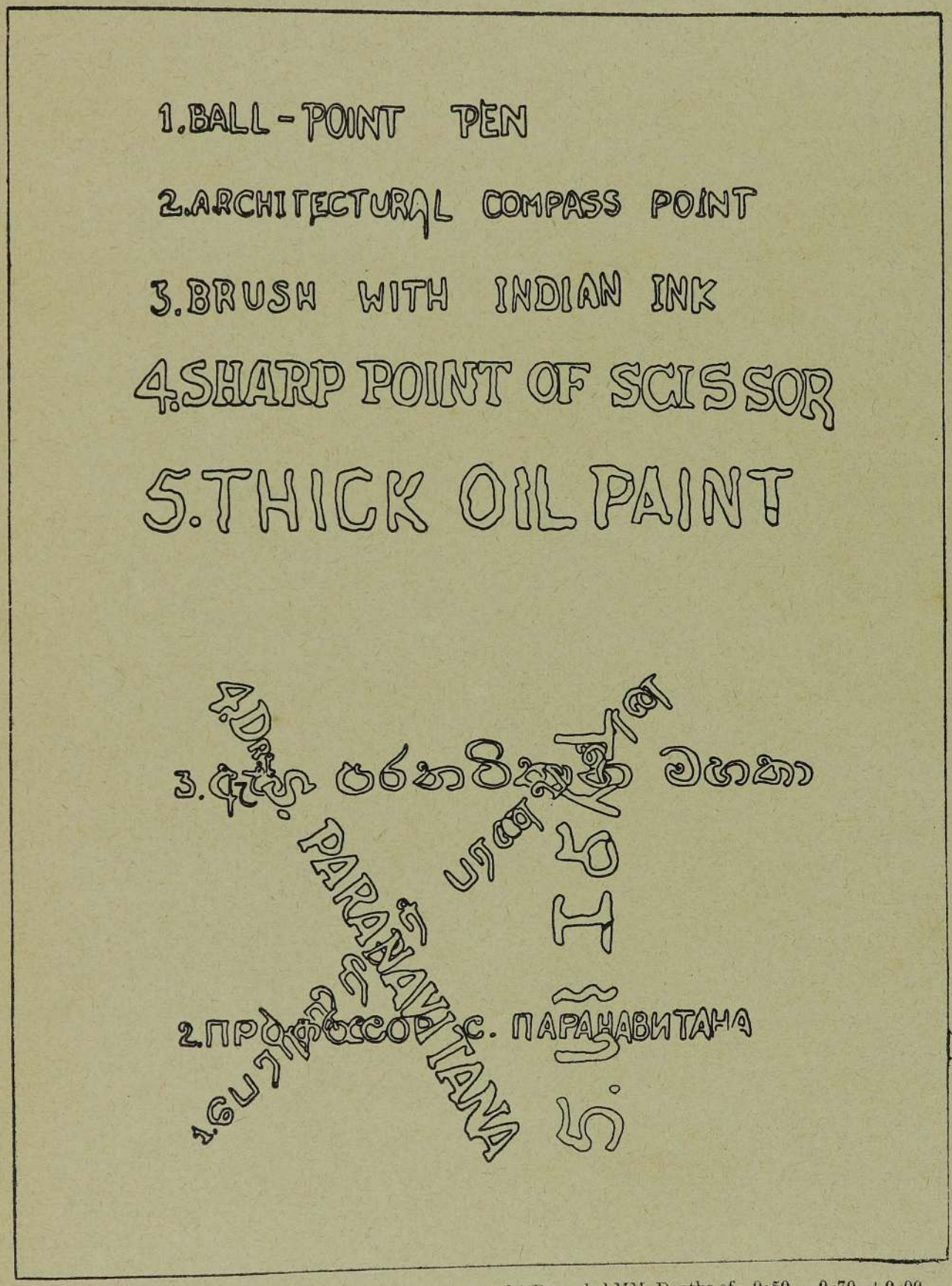
(6) The Camera used was a ' Linhof ' with a lens f/3 ·8.

(7) The photogrammetric plotting instrument used was a ' WILD ' A7 plotter."

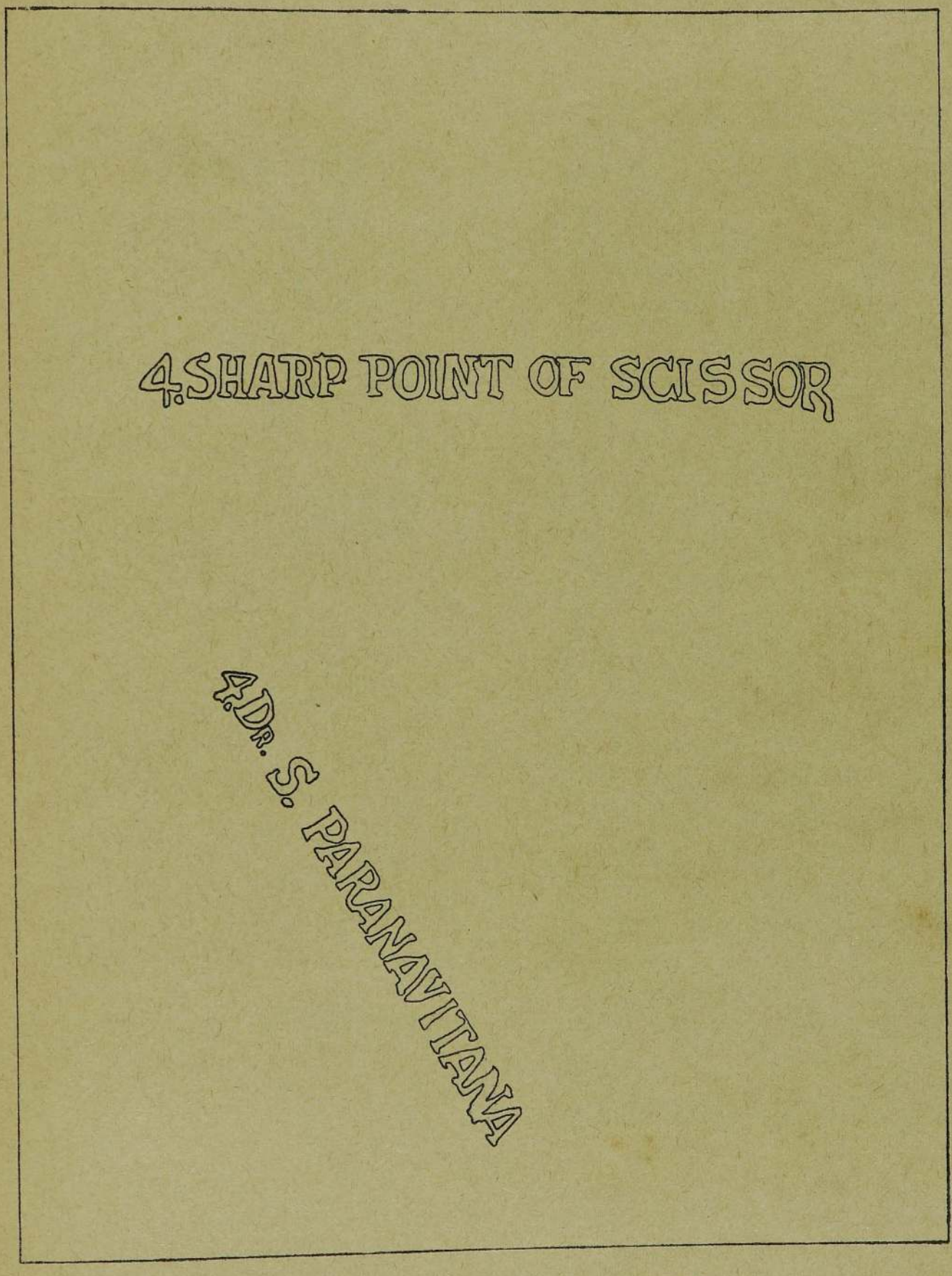
(8) No. 24—57—99—16. The inscription is from Mayilagastota, Magampattu and it records " a grant to a religious establishment at Magama [Tissamaharama] by a prince named Mahinda, a son of Kassapa V [914-928] A.D.] " Paranavitana, *opp. cit., p.* 23.

(9) The camera of focal length 13 ·5 cms. was placed 137 ·3 cms. away from the vertical slab and the distance between the two camera positions was 44 ·1 cms. Two twenty-five cent coins of 3 ·36 mms. thickness have been used to record the height of the model.

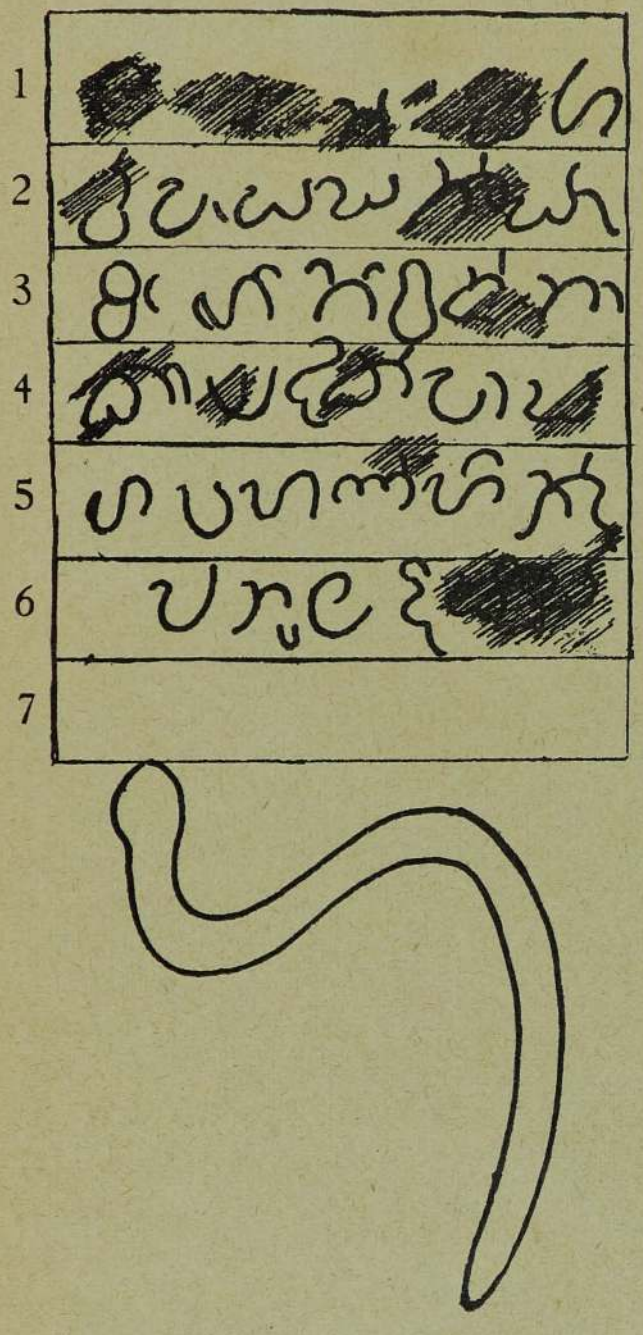
A Stereoscopic pair of photographs of the Palimpsest prepared on plaster-of-paris.



Three-Dimensional Plots of the above scripts 1, 2, 3, 4, and 5 Recorded MM. Depths of—0·50, —0·70, ±0·00, —1·10 and +0·90 Respectively.



A Three-Dimensional Plot at a Fixed Depth of —1·10 MM.

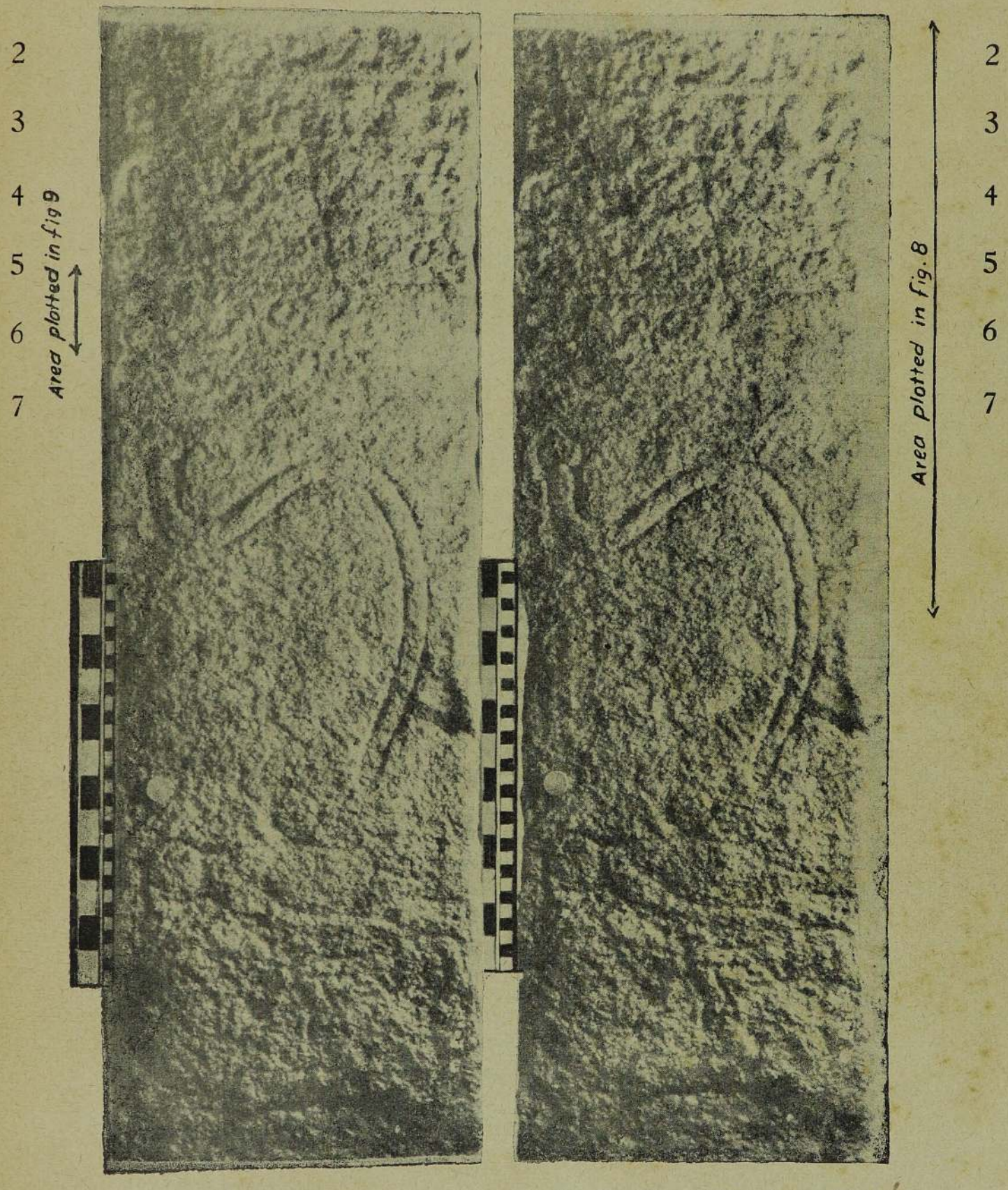


A

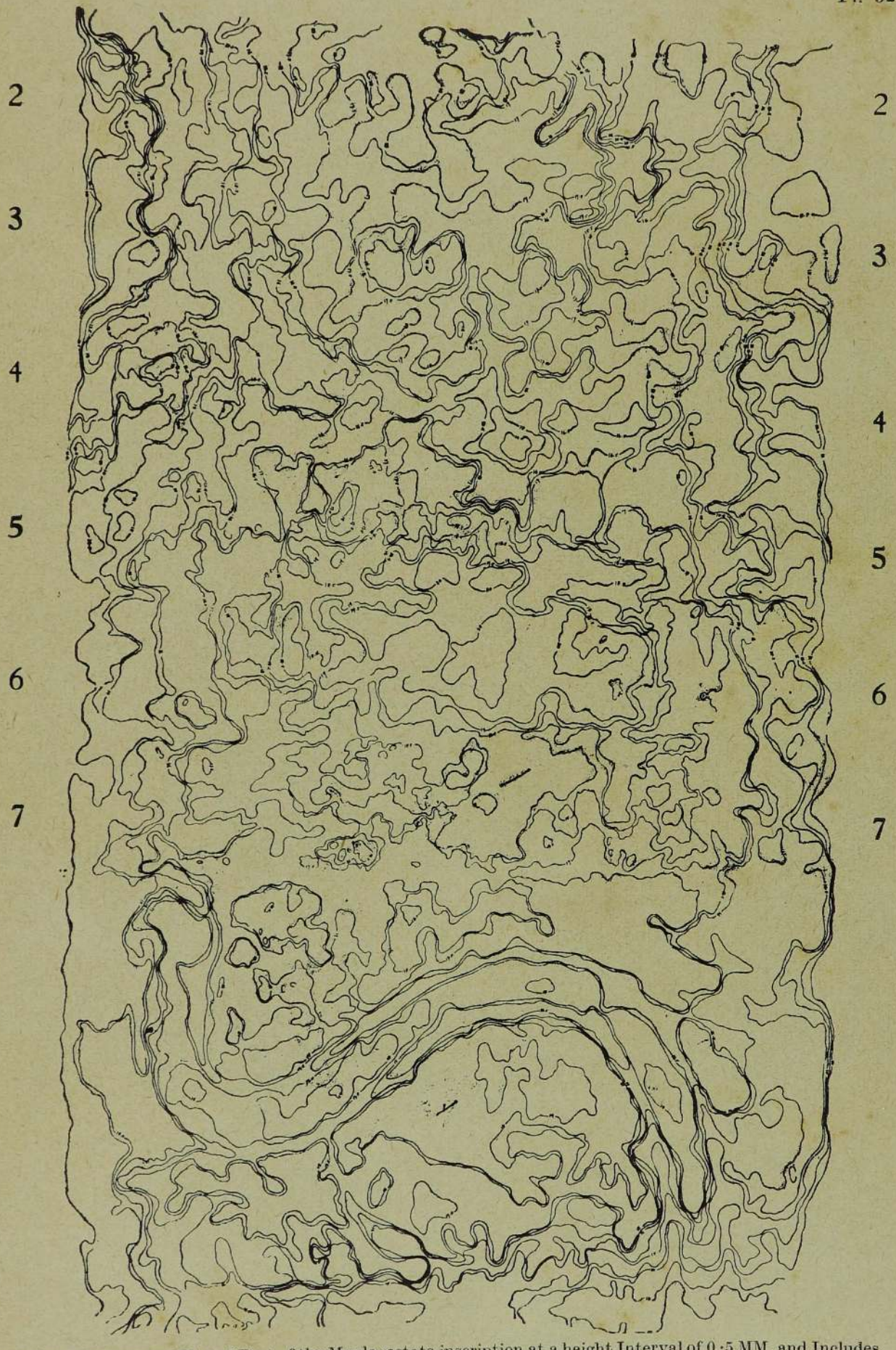
An Eye copy of the Maylagastota Stone inscription and Records lines 1 to 7.

B

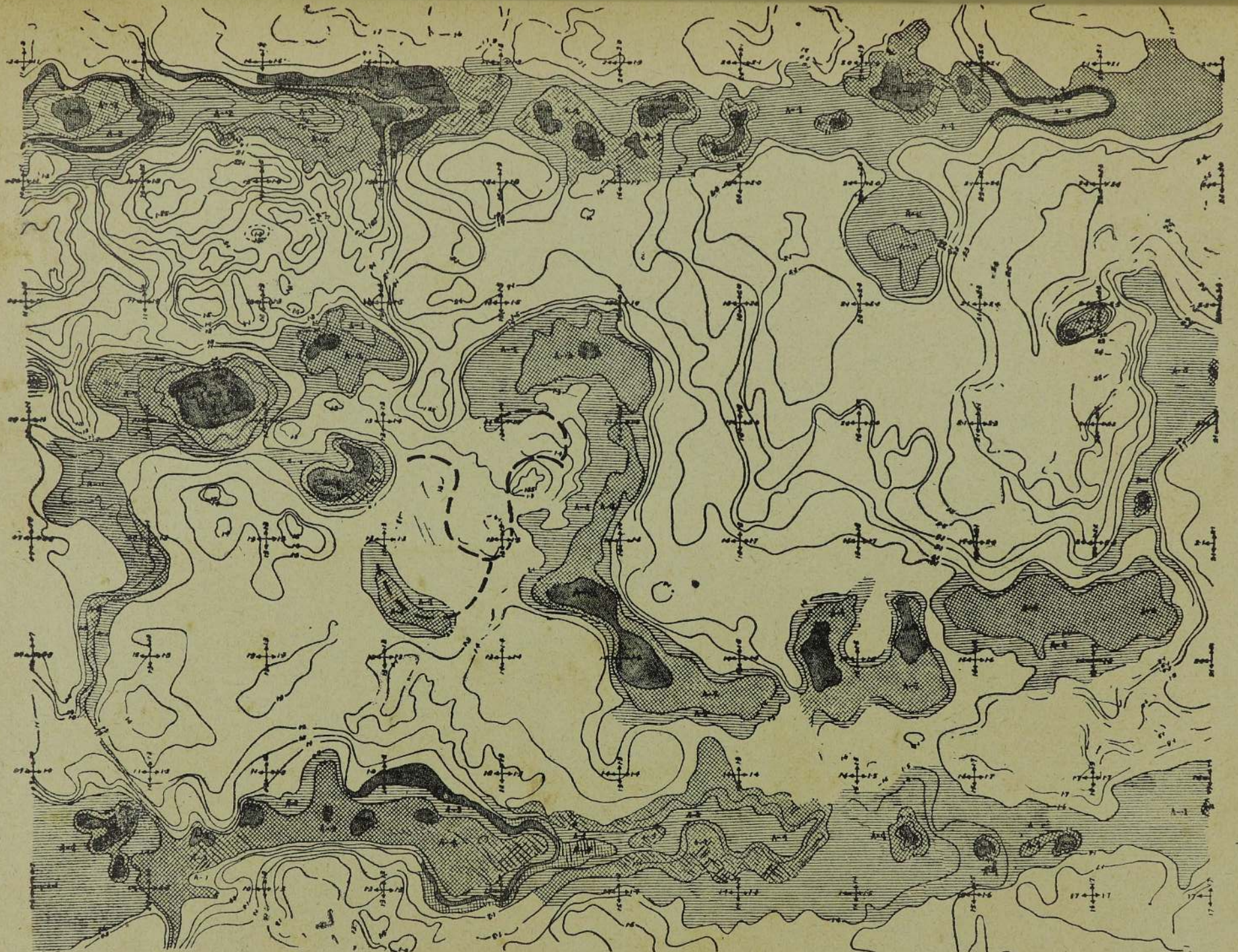
An Estampage of the Maylagastota stone Inscription and Records Lines 1 to 7.



A Stereoscopic Pair of Photographs of the Maylagastoṭa Stone Inscription and Record Lines 1 to 7.



A three-Dimensional Plot of Part of the Maylagastoṭa inscription at a height Interval of 0·5 MM. and Includes Lines 2 to 7.



A Three-Dimensional Plot of Part of the Maylagastoṭa inscription at a height interval of 0·1 MM. and includes the left third of line 6.

A RARE MUDRĀ IN CEYLON IMAGES

M. H. Sirisoma

IN Buddhist and Hindu images of various media one often comes across the *hasta-mudrā* (gesture of the hand) shown in Nos. 1, 2 & 4 of fig. I with the fingers so placed as to denote some special gesture[1]. In this particular *mudrā* the position of the hand is vertical and the index finger and the thumb are half bent while the middle and ring fingers are fully bent to touch the palm. The half bent little finger and the index finger are both bent to the same extent, i.e., slightly less than the others. The degree to which the little and index fingers are bent varies in different figures, from the almost unbent position to the half bent position. The gap between the bent thumb and the forefinger also varies (compare Nos. 1, 2 & 4 in fig. I).

This *mudrā* had been identified by many a scholar of Art and Iconography as the well known *kaṭaka-hasta*.[2] The *kaṭaka-hasta* as described in the traditional *śilpa* books on Indian iconography is intended for the main purpose of receiving and bearing of a flower, a fact which is supported by the Ajanta usage (see No. 3 in fig. I). According to the *Nāṭyaśāstra* of Bharata[3], in the *kaṭaka-hasta*, the forefinger of the *muṣṭi* (fist) hand should be bent and pressed by the thumb while the ring and the little fingers should be bent so as not to touch the palm. It is used to represent sacrifice, oblation, the umbrella, drawing up reins, fans, etc . . . taking up garlands, plucking flowers, etc.[4] The *Abhinaya Darpana* of *Nandikesvara*[5] describing the *kaṭaka-hasta* says that the forefinger and the middle finger are applied to the thumb; the usages being picking flowers, holding a necklace,[6] etc. In a foot-note to the same account Ananda Coomaraswamy throwing further light on the subject says that the tip of the forefinger and the side of the middlefinger are applied to the tip of the thumb; the third finger is bent beside the middlefinger, and the little finger is also bent but to a less degree.[7] C. Sivaramamurti who equates the *Simhakarṇa* (lions-ear) with the *kaṭaka-hasta* thinks that his gesture is meant for the purpose of holding an object like a lotus.[8] The usages of the *kaṭaka-hasta* clearly indicate that the hand should be in a horizontal position having the 'ring' of the thumb and the forefinger parallel to the ground. (See Nos. 6 & 9 in fig. I).

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1. The peculiarity of this *mudrā* was first brought to the notice of the writer by Dr. R. H. de Silva, the Archaeological Commissioner of Ceylon, who further encouraged the writer to pursue on a study of its significance.
2. See below.
3. Translated by M. Ghosh, Calcutta, 1950.
4. *Ibid* Vol. I, pp. 175-176.
5. Translated as *The Mirror of gesture*, A. Coomaraswamy and G. K. Duggirala, Cambridge Harvard University Press, 1917.
6. *Ibid*, pp. 31 and 32.
7. *Ibid*, p. 31, f.n.1. See also *Elements of Hindu Iconography*, Gopinath Rao, Vol. I, p. 15.
8. *South Indian Bronzes*, C. Sivaramamurti, Lalita Kala Academy, India, 1963, p. 20.

A comparison of the above accounts and Nos. 3, 5, 6, and 1, 2, 4 in fig. I would show the close similarity of the two *mudrās*. It is therefore no wonder that some scholars identify both these as *kaṭaka-hasta*. Coomaraswamy was correct when he observed that " this hand (i.e. *kaṭaka-hasta*) is also used in teaching and is known to some iconographers, incorrectly as *vitarka-mudrā* ".[9] Though there is some similarity in these gestures a close look would make their difference clear. An examination of a few selected statues would make this difference between the two *mudrās* obvious.

In an article[10] about the colossal rock-cut sculpture at Väligama in the Southern Province of Ceylon, representing a figure popularly known as ' Kuṣṭarāja ' or the leper king, (Madam) van Lohuizen-de Leeuw, while commenting on the *mudrās* of the hands says in more than one place that the left and right hands display the *kaṭaka-hasta* and *vitarka-mudrā* respectively. To enlighten the reader further, she includes a drawing of the hands of this figure and also photographs of other relevant figures.[11] It is very clear from the drawing that the gesture of the left hand conforms more with the *mudrā* in No. 4 in fig. I than with the *kaṭaka-hasta*.

Nadadeva Wijesekera writing on the same subject leaves the *mudrā* unidentified saying that the arms are in a peculiar pose with the hands in a certain *mudrā*.[12] But, at a later date (Mm.) Lohuizen-de Leeuw calls the *mudrā* of the left hand the *kaṭaka-hasta*.[13] We may note in passing that Wijesekera too has failed to identify the true *kaṭaka-hasta*.[14]

Paranavitana in his discussions of this statue makes no comment on the *mudrās* of the hands.[15] In another instance also he evades the direct identification of this *mudrā* in a different statue simply quoting a work on iconography.[16]

Nandasena Mudiyanse describing the same statue (i.e. Kuṣṭarāja) identifies the *mudrā* of the left hand as *kaṭaka-hasta* and observes its similarity with the gestures of the *bodhisattva* figures of the Buduruvagala Group. [17] (See plates 34 & 35). Here Mudiyanse has attempted to make a comparative study of the *mudrās* and dwelt on its significance. However in his comments on the Buduruvagala Group he identifies the same *mudrā* in diverse ways in various places. [18] An examination of the *mudrās* of the *bodhisattva* statues at Buduruvagala would show that the hands of

9. *Supra* p. 31, f.n. 1. See also *Mahayana Monuments in Ceylon*, Nandasena Mudiyanse, Colombo, 1967. p. 53 and fig. 19 where he had identified the *kaṭaka-hasta* as *vitarka*. For *vitarka-mudrā* See *Mudrā*, E. Dale Saunders, America, 1960, pp. 57 and 66 ff.
10. Paranavitana Felicitation Volume, Colombo, 1965, pp. 253-261.
11. See plates attached to her article.
12. *Early Sinhalese Sculpture*, Nandadeva Wijesekera, Colombo, 1962, p. 252.
13. See above f.n. 10.
14. *Supra* pp. 247, 252.
15. Ceylon Journal of Science, See G, Vol. II, p. 49, 50 and *History of Ceylon, University of Ceylon*, Colombo, 1959, p. 405.
16. *The God of Adam's Peak*, S. Paranavitana, Ascona, 1958, p. 45. See also *Ceylon Journal of Science*, Sec. G. Vol. II, p. 50 for a similar instance.
17. *Mahayana Monuments in Ceylon*, Colombo, 1967, p. 41 [Buduruvagala is a place close to Wellavaya in the Monaragala District, where a group of colossal Mahayana statues is found].
18. *Ibid* pp 38, 50 and 61.

all the figures are in one posture except the one that holds the so-called double- *vajra* which is in *kartāri-mukha* and the *lola-hastas* of the *Śaktis* (see plate 34). But there is no agreement between Paranavitana and Mudiyanse as regards the gestures of the Buduruvagala Group. The former citing Gopinath Rao states clearly that with the exception of the central Buddha, the statues of the group bear the *kaṭaka-hasta*. [19] The latter describing what he calls the representation of Vajrapāṇi at Buduruvagala states that the *mudrā* is open to conjecture, [20] and in the same breath identifies the identical *mudrā* in the other statues of the same group as *kaṭaka-hasta* and *varada*. [21] We believe that the question can be resolved satisfactorily by looking into the dissimilarities than to the similarities in the *mudrās*.

We may begin with the bronze statue of Sundaramurti Swami (see Nos. 7 and 8 in fig. I) from Polonnaruwa which displays two different gestures in the hands.[22] The *mudrā* of the right hand is undoubtedly the *kaṭaka-hasta*, where the ' ring ' formed by the thumb and the forefinger is so held that a flower or some such object inserted remains in place. But, the *mudrā* of the left hand, though having the fingers in almost the same position, is slightly different, in that the ' ring ' is tilted so that a flower, etc., does not fit gracefully into it. The palm more or less faces the ground and in this position the hand could be taken as having a gesture of beckoning some one by the movement of the middle and ring fingers. Vincent A. Smith and Coomaraswamy are silent about the *mudrās* of this statue.[22] In Hindu or Buddhist iconography instances are very rare where both (front) hands of a figure are in the same *mudrā*. Exceptions occur only under very special circumstances. The *mudrā* we are here trying to identify, which is often found in Hindu and Buddhist bronzes, appears certainly to have a special significance.

O. C. Gangoly who discusses *mudrās* in Hindu iconography explains the *kaṭaka* and *varada-hastas* giving drawings of variant forms of the two *mudrās*. [23] From his drawings it is clear that what he calls the *varada mudrā* in diagrams R and T is not the conventional *varada* gesture but the same *mudrā* in the left hand of the Sundaramurti Swami which had been identified by some scholars as *kaṭaka-hasta*. A similar *mudrā* noted in the Somaskanda statue has been identified by H. Krishna Sastri as *abhaya-*[24] *mudrā* perhaps erroneously.

We may now consider the Chandikesvara statue from Tanjore District which holds its right hand in the *kaṭaka-hasta* and the *left hand* in the same *mudrā* as the left hand of the Sundaramurti Swami referred to above. [25]

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19. *Ceylon Journal of Science*, See G, Vol. II, p. 50
20. *Mahayana Monuments in Ceylon*, Colombo, 1967, p. 61.
21. *Ibid.* pp. 38, 50.
22. A History of Fine Art in India and Ceylon, V. A. Smith, Oxford, 1911, pp. 255-256.
    Bronzes of the Colombo Museum, A. Coomaraswamy, Oxford, 1914, p. 16, plate VIII.
23. *South Indian Bronzes*, O. C. Gangoly, Calcutta, 1915, pp. 44 & 45.
24. *South Indian Images of Gods and Goddesses*, H. Krishna Sastri, Madras Govt. Press, 1916, p. 110 adn plate 67.
25. *Bronzes of South India*, P. R. Sirinivasan, Madras, 1963, plate 207.

Sirinivasan who comments in detail on the Chandikesvara referred to identifies the gesture as *āhūya-varada*, a term which is not very common in iconography. The same *mudrā* in other statues such as Viṣṇu, [26] Naṭeśa, [27] Siva, [28] and Chandikesvara [29] are also similarly identified by the scholar without comments on its significance.

The name *āhūya-varada* was not noted in any of the *śilpa* books and books on *pratimālakṣaṇas* available to the present writer. [30] But the *mudrā* in No. 1 of fig. I which we have been trying to identify may be considered a variant form of *varada* as given by Gangoly [31] and it may have been included in the *śilpa* books as *varada* without any distinction. As the nomenclature of *mudrās* is also taken from the traditional usages of the Indian *sthapatis* it can be a generic term known only to them.

Sivaramamurti who discusses its meaning says that it displays the attitude of beckoning a devotee to confer a boon, [32] and his drawings (see Nos. 4 & 6 in fig. I) enumerating the *mudrās* are very convincing and the differences between the *kaṭaka-hasta* and the *āhūya-varada* are clearly indicated in them.

The word *āhūya* is derived from the Sanskrit root √hve—to call or summon with the preposition *ā*. It is the absolutive form with the suffix *ya* and means ' having called ' or ' having summoned.' [33] Hence the meaning of the *mudrā* can be reckoned as ' beckoning a devotee for a boon, blessing or a favour.'

One special characteristic of this *mudrā* is that it is always accompanied with the *abhaya, varada, vitarka* and rarely with *kaṭaka-hasta* in the opposite hand. [34] There is a difficulty in calling it *āhūya-varada* when it is accompanied by *abhaya* or *vitarka*, in which case, strictly speaking, it should be *āhūya-abhaya* or *āhūya-vitarka* respectively. The meaning becomes more obscure when an *āhūya-mudrā* is accompanied by a *kaṭaka-hasta* in the opposite hand.

The Buduruvagala group of sculpture is a lucid example where the *āhūya* meaning of the *mudrā* is clearly expressed. There the central Buddha statue is in the *abhaya-mudrā* in the right hand bestowing ' fearlessness ' and the accompanying *bodhisattvas* who are displaying a

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26. *Ibid.* pp. 37 & 38—fig. 19.
27. *Ibid.* p. 81—fig. 48.
28. *Ibid.* p. 148—fig. 92.
29. *Ibid.* p. 140—fig. 84.
30. *Nāṭyasāstra, Abhinaya Darpana, Mānasāra, Sādhanamālā, Sāriputra, Pratimālaksaṇa,* &c.
31. See above f.n. 23.
32. *South Indian Bronzes*, p. 20.
33. *Monier Williams*, q.v.
34. Compare the *mudrās* of the hands in figures referred to above in foot-notes 25 to 28.

gesture in the hands having the ring and the middle fingers bent to touch the palm are beckoning the devotees for the blessing. The mobility of the two bent fingers which expresses the notion of beckoning or summoning can be understood by the positions of the other fingers which are slightly flexed. Since it would be convenient if iconographers had a clear term by which to call this *mudrā* I would suggest the adoption for it the term *āhvāna-mudrā*[35]. Thus in view of the argument adduced above the *mudrā* in question in the Buduruvagala Group which had been identified by others as *kaṭaka-hasta* [36] can be conveniently defined as *āhvāna-mudrā*.

Similarly, the *mudrā* in the left hand of the Väligama statue which is analogous to that of the Buduruvagala *bodhisattvas* too can be identified as *āhvāna-mudrā* which summons the devotee for a ' discourse ' or an ' argument ' or an ' explanation ' (*vitarka*). (See plate 36).

35. This is the nominal form of *āhūya*.
36. See above.

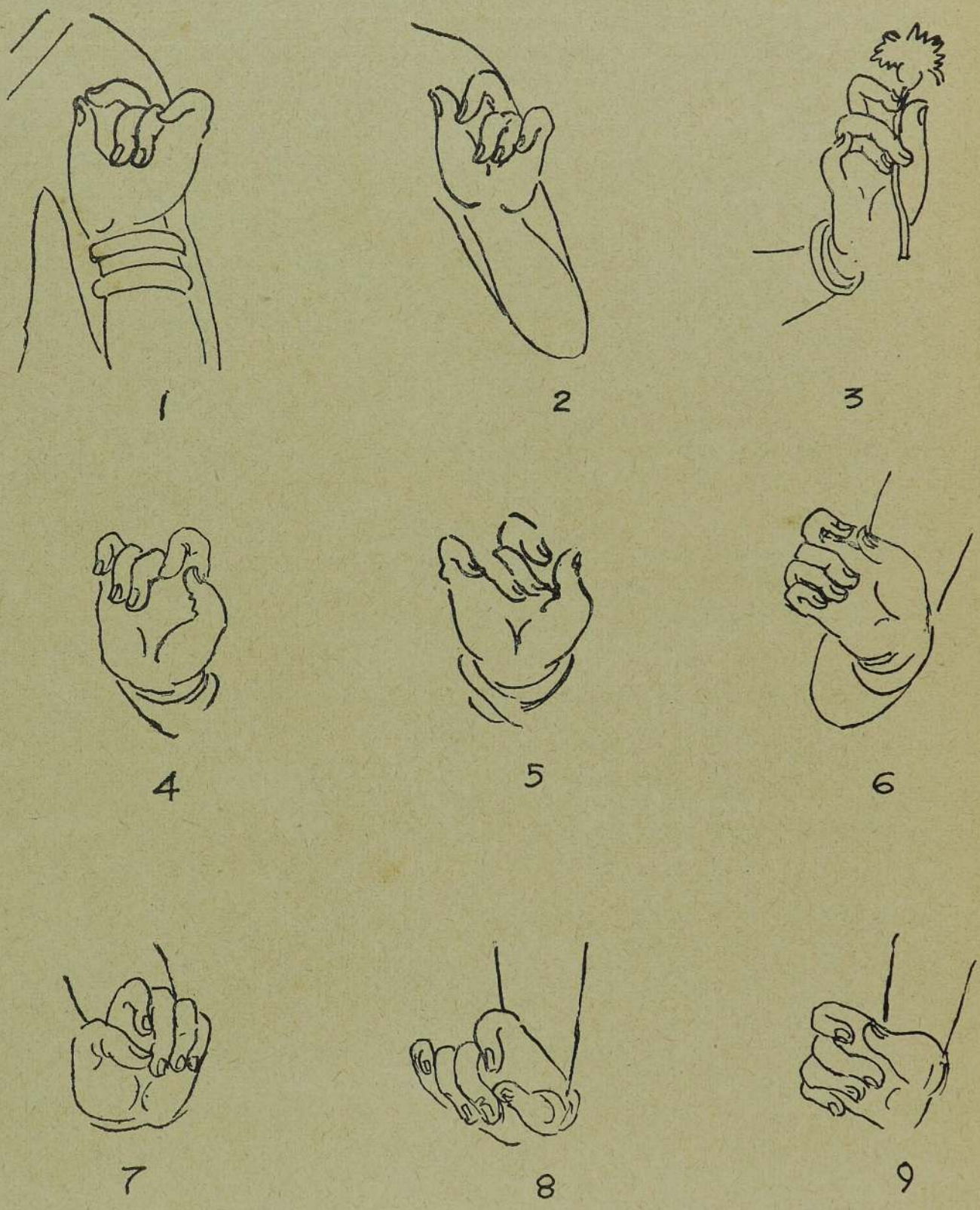
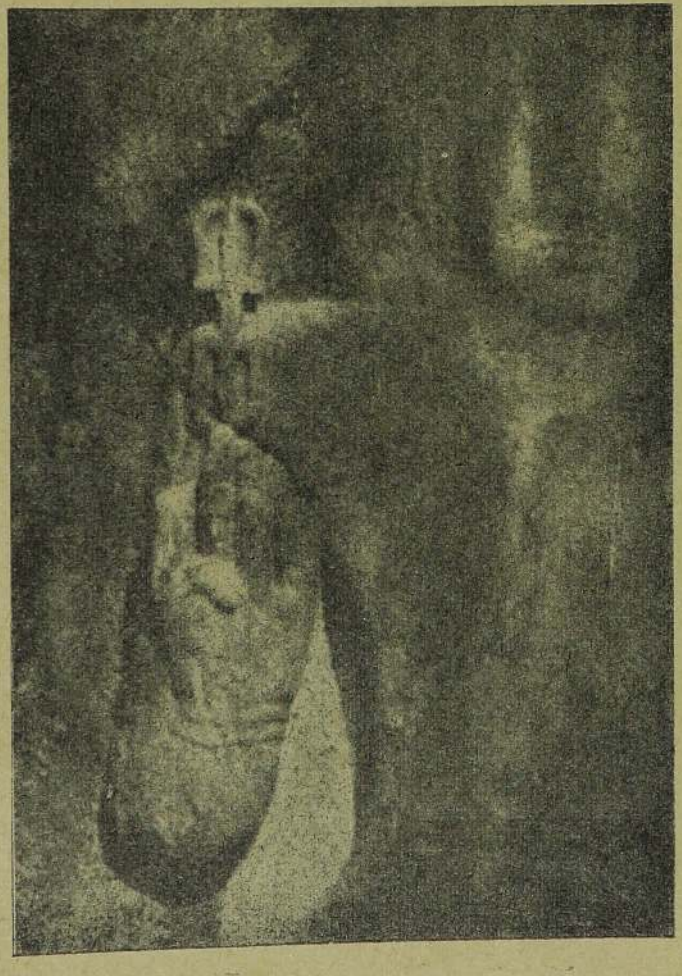


Fig 1



BURIED FINDS AT BUDUGALA

L. A. Adithiya

THE South-Eastern plains of ancient Rohana yet covered in a mantle of jungle and vastly unexplored for archaeological and architectural interests remains today as a fertile terrain for study. To the south of Balangoda lies the hamlet of Uggal-Kaltota four miles from which is the hillside called Budugala, coming within the borders of the Kadawata Meda Korale in the Ratnapura District. It was not long ago that people called this area the Ratnapura Bintenne owing to the wild nature of the country. Exploration of these slopes during a week-end revealed remains of such interest that they merit record. One inch topographical map ref. is $\frac{M}{21}$ 31.

The upper reaches of the Walawe-ganga and the Weli-Oya converge in the plains not far from Budugala. Colonists re-settlement schemes have been in progress in this locality for some years now. Unless pockets of this area are declared archaeological reserves no trace will be left for future generations to even know that anything of value ever existed. New settlers quite ignorant of the artistic and historical value of these remains of ancient settlement will permanently destroy these structures.

Most of the hill-side ruins lie, unknown and invisible but fortunately sheltered by thick-matted forest. H. C. P. Bell had informed Collins that " Sabaragamuwa . . . . has always been regarded as extra-ordinarily bare of ' archaeology.' Nevertheless, the Budugala ruins alone save this reflection. They merit full clearing and tackling systematically by the Archaeological Department." Although this statement was made thirty-four years ago, nothing has been seen, done or written about it since. The department sent a team of officers in 1965 to explore the Walawe basin at the request of the Uda Walawe Development Board but they did not reach Budugala.

Layout:

The layout of these ruins, as far as it was possible to explore, stretch on a East-West axis. Broadly they could be divided into three groups.

1. Lower group—consisting of a twin building, a stepping stone, a lavatory stone and pit, bo-tree on a platform and a ruined dagoba on a natural boulder.

2. A stone stairway, complete with dressed stone balustrade and handrail connecting the two groups.

3. Upper group—consisting of two sets of twin structures, the " Smiling Lion," (as I prefer to call it) a *padoni* or feet cleansing water receptacle, a natural rock slab with the " Galloping Lion " and figurines of a man, woman, fish, trident and swastika in a group composition at the other end.

There are many more ruins on this hillside which deserve systematic exploration by those competent to do it and to record such findings.

Ascending the hillside, through thick undergrowth, the remains of a *prākāra* or demarcating boundary wall of a sacred level or *Maluwa*, is to be observed. Time has dislodged the dressed stones of this wall which now lie, part intact and part engulfed in underbrush, that must be cleared before much more is said about it.

Adjacent to these stones is to be found one of the most intriguing units of artistic interest (Fig 1). It is a carved stone 50 ins. wide. The right side of it, has crumbled through age and disintegrated, particularly on the lower right corner. Fortunately, the decorative elements are intact. The other three sides, around which a 9 ins. band runs, are neatly dressed by chiseling. The inner panel is demarcated by $1\frac{1}{2}$ ins. band of two lines down the two sides. The inner panel measures $32\frac{1}{2}$ ins. by 19 ins. On the central axis, at the base, is a semi-circle—slightly oblong as it measures 17 ins. diametre at the base, but $10\frac{3}{4}$ ins. at the widest limit. It rises about one inch in relief above the chiselled-out background. On the left of the semi-circle is a stylised lotus in two petals, the flexed stalk of which, gracefully roots itself at the base of the stone and it is decorated with three parallel lines. A tendril curves to the left. Four smaller petals float above the greater upper petals. On the upper right hand corner of the stone lies another blossom, 11 ins. long and diagonal to the right angular corner of the inner panel. This one is highly stylised though three shapes indicative of petals, show themselves prominently above it. The stalk of this flower gently curves, harmoniously matching the arc of the semi-circle and ends in a calyx from which another stalk springs to follow the arc downward, ending in a bud.

Collins,[1] who saw this stone earlier, says that he does not think it to be moonstone though it has been taken to be one. It appeared to him to be a lintel of a doorway instead. Collins also reproduces a sketch of it as he saw it. This appears to be a stepping stone of the door mat type, the commonest shape of which we know is the moonstone form, semi-circular, regular and symmetrical. Such stepping stones are not necessarily semi-circular and oblong. Examples with sharp rectangular corners, decorated or plain, have been found since. For instance, a good example which compares with this one favourably is the one found at Magul-maha-vihare off Lahugala.

If this was a lintel over a doorway it would, very likely have had a smoothly dressed rear face, which it did not have. The rough finish suggests it to have been a paving stone and it is presumed to have been laid as a carpet stone. If the semi-circle was found rough cast, it could be conjectured that the sculptor abandoned the stone in a semi-finished state though it was his intention ultimately to carve out the centre of the

1. Collins, C. H.—J.R.A.S. [cb], Vol. XXXII, No. 85. 1932, p. 167.

semi-circle. This surmise collapses as the stone within the semi-circle is polished and worn, perhaps by bare feet or sandles.

Its workmanship is fine, chaste, and in good proportion. As an artistic composition, created for a purpose, it has been executed with a high degree of skill and precision. Owing to its refined characteristics and the advanced techniques used in its execution, it is suggested that it belongs to a later date than some of the other etchings which will be dealt with in this paper. It is perhaps one of the early types of moonstones, judging by its simple character. The highly decorated and elaborate sculptures came into moonstones about the ninth or tenth century A.D.

West of this stones, further up the hillside but moreor less on flat level there stands the ruins of a twin structure. All that remains today is the plinth of the outer perimeter of one building, within which there stands a wall to a height of about 4 ft. 6 ins. and 5 ft. of undressed random stone-in-motar, on three sides with a *vaṭa-māle* or outer ambulatory surrounding it. The entrance seems to face north. Paving stones at the entrance are evident though architraves, lintols and spur stones have disappeared or lie buried beneath. All that remains of the frontal structure are five stone monoliths yet upright and a few others lying prone. In line with this structure are remains of another twin building. About 50 ft. south of the Bo-tree lines of stone lie completely hidden in the tangled undergrowth. The plinth masonry of the northern building, square on plan, measured 43 ft. by 43 ft., the perimeter being defined by a line of semi-dressed stones. The northern end is serviced by a flight of stone slab steps. Only one monolithic upright column now stands at the north-west corner.

To the south, 10 ft. away connected by a link of 6 ft. wide at the four corners of which yet stand four monolithic stone columns, is the other rectangular twin measuring 62 ft. by 45 ft. 5 ins. Perhaps excavation of adjoining areas and within the lines of the foundation might reveal many a hidden detail of construction and component part of the edifice.

Moving northwards from this ruin, there is a huge natural boulder of whaleback formation. On the northern slopes of it flourishes a Bo-tree, the base of which is built up with rough hewn stone, forming a platform or *Bo-maluva*. Nothing deserving special comment could be observed at this site.

Still further north, is a mammoth natural boulder, on the north-eastern corner of which, is a flight of steps chiselled out of the rock, leading to the flatter and upper face of it. The south-western side of it bears two or three chiselled out steps. Near these steps is a rock cut socket meant to take a timber post like a spur stone. This boulder has been the site of a dagoba of which, only a few bricks arranged in a circular form remain. The eastern slopes of it show evidence of keyed pockets having been cut for anchorage, perhaps for a boundary-retaining wall. At a certain height, they perhaps had a terrace or *maluwa*, from which rose the dagoba.

The olive green carpet of jungle tree-tops covering the plains, the belt of reverside Kumbuk trees and new clearings are to be panoramically viewed from this rock.

Against one vertical face of a mammoth boulder northwards of the Bo-tree are the remains of a lavatory enclosure and pit. The internal dimensions of the room are 9 ft. by 5 ft. 6 ins. Wall thickness averages 12 inches. One is meant to face the sheerface of the natural boulder when in a posture of toilet use. As such the door might have been on the narrower face. Evidence of a few pieces of broken tile indicates the original roof covering material. In the centre of the room, a flat dressed pedestal stone 39 ins. by 24½ ins. by 5¼ ins. thick, smooth on the upper face covers the pit below. A rectangular opening 8½ by 13¼ inches has been chiselled out in the centre of it. Another urinal bowl measuring 4¼ ins. by 4½ ins. over-all, sloping towards the rectangular opening is scooped out of the monolith. A circular aperture of 1 inch diameter connects the urinal and the opening, being pierced through the stone. This is meant to discharge the effluent to the pit.

The entire pedestal stone sits all round on cantilevered slabs of gneiss overhanging the edges of the pit. The present depth of the pit is 47 ins. from the upper face of the pedestal stone.

The stone stairway leading to the upper group of ruins is in this vicinity. The general formation of the flight is identifiable though treads, risers and balustrades have been dislodged. The average width of the stairway is five feet between balustrades. The stones are dressed but rather rough in texture and un-decorated. Large sections of the flight are not easily visible owing to the thick undergrowth that smothers the area. However, some balustrades observed were decorated very simply with single and double lines, and scroll-like decorative elements.

Walking along this flight and by scrambling along foot tracks, through the jungle, the upper group of ruins were reached. On the track was observed two lengths of dressed and moulded stones; one 34½ ins. long and the other 33 ins. long. Their profiles are identical (Fig. 2). It is conjectured that these two stones, once formed the corner and the edge stone of a *Malasuna* or flower altar, or a moulded stone architrave.

Close by and further up, a line of semi-dressed rough hewn rocks forming a retaining wall of a terrace was observed. The terrace measures an average width of 10 feet. Rising from it is a double platform structure, only the foundations of which are left (Fig. 3). The plinth of the eastern section stood an average of 50 ins. above the present ground level. It is built of semi-dressed stone, un-moulded and un-decorated, but set neatly and snugly to fit. It is in a surprisingly good state of preservation, considering the many centuries that this building would have been abandoned. A broad 27¼ ins. stone, smoothly cut and arranged along the upper face of the plinth seems to have been the base for walls of burnt clay bricks

that rose to carry the roof structure. This structure measured 32 feet wide and about 37 ft. 9 ins. long. Along the long face, it is connected to the ruined structure by a single monolithic slab of stone, the depth or thickness of which could not be determined. Steps consisting of three treads, flanked by two balustrades in stone and set on either side and along the plinth faces of the two structures, are seen. The monolithic slab that connects them measures 62 ins. by 93 inches.

The second structure is of a contrasting character to the former. The plinth that stands an average of 45 inches is constructed of five stones neatly moulded with classical profiles. Whether the two structures were on a perfectly levelled platform is not certain at this stage, but could be determined when the surroundings have been methodically cleared and restoration is effected. If, as could be conjectured today, these two structures were so constructed to have had a common and matching floor level, with varying plinth heights, owing to the sloping land, here is a good example showing how ancient architects sited a building on a falling ground-site without levelling it down before commencing designs. This will be a good example of the use of land for siting or conforming to natural contours in siting, without disturbing natural formations. On plan the structure measures 29 ft. 1 in. in width and the same length of 37 ft. 9 ins. on the other side. The periphery is bounded with huge monoliths about 8 ins. thick, forming the finishing stone of the plinth and base of a brick wall that would have arisen to enclose the inner chamber as one function and to support the roof, as its other function. Within this periphery are to be seen fallen columns and slabs of granite, dressed and finished smooth. It bears evidence of having had an inner structure of a small scale. The whole precinct within has in the recent past been excavated and spoiled by treasure hunters, blind to the historical value, and victims of village fables which say that there are treasures in every ancient site. It is presumed that sections of stone found lower down the hillside were from the flower altar in this structure or that they came from the architraves of the building.

Bricks of burnt clay, $3\frac{3}{4}$ ins. thick and burnt clay roof tiles about $\frac{3}{4}$ ins. thick are to be found in plenty, within the boundaries of these two structures. Systematic excavations should prove most informative. Many more items of archaeological interest should also be found.

The plan form and mouldings relate favourably to the double platform buildings found among the Western Monasteries[2] on the outer Circular Road, Anuradhapura.

Another group of structures are evident further south-west and lower than those described. They are so covered with jungle and bracken that very little can be observed without prior clearing.

2. Cf. Memoirs—Archaeological Survey of Ceylon—Vol. I. 1924—A. M. Hocart.

Descending away from these two ruins, along a foot-track, lies a fashioned stone, (Fig. 4) appearing like a giant rectangular looking glass with a handle at one end. The centre has been chiselled and excavated to a depth of $1\frac{1}{2}$ ins. connecting the handle like section, which is also scooped to the same depth. The broader section is also scooped to the same depth. The broader section is $13\frac{1}{2}$ ins. wide and the whole stone tapes 40 ins. No particular point of artistic interest was found engraved or carved upon it. It appears to have been a spout or gargoyle, which perhaps was a corporate stone in the terrace that accommodated the twin structures.

A steep game-track veering off in a north-westerly direction leads to the third and most interesting group of them all. Beneath high forest trees, amongst natural boulders strewn on the hillside, like a giant's miniature rock garden illusively stands a slightly inclined natural stone (Fig. 5). It is flat on one side, with a gently decreasing height on the fourth side. It measures about 6 ft. in width, 1 ft. 9 ins. in height and 5 ft. 6 ins. deep. On the flat natural surface of one side, there appears a figure of an animal, which I decipher as the ' Smiling Lion,' with broad barrel of chest, powerful foreleg and strikingly forceful stretched paw and oval face, finished off with eye brows, smiling mouth, pricked up ears, flat and slender body, spiralled tail, and the rear leg in a straight and upright posture.

From the rear leg to the wrist of the stretched paw it measures 21 ins. and stands 11 ins. to shoulder and $10\frac{1}{2}$ ins. to hip. The tail occupies a space of 5 ins. square, the head fills a 4 ins. square. Depth of chest barrel is 7 ins. and the small of the back or belly is 5 ins. It has been etched on the rock in a single line about one-eighth inch deep and as much wide.

The symbolic, artistic or other interpretations of connotations, of this " Smiling Lion " is beyond immediate comprehension. It is perhaps, an individual's graphic expression of a stylised national emblem of the Sinhalese nation—expressed simply, forthrightly and precisely, by the early settlers perhaps who would have colonised this district. It might also be a totemistic symbol of a particular clan, which had close genealogical connections to the ruling king and so would have been permitted to use the lion symbol.

About thirty feet away and to the north, half buried, face up and on an incline lies another natural stone, 12 ft. wide and an average 7 ft. across (Fig. 6). The left hand (or the western) end contains the figure of an animal which, may be termed the " Galloping Lion " with a huge head, open mouth, line of mane, folded forelegs—one of which is decorated with five toes—deep and barrel chested, outstretched rear leg and tail curled in a ' figure of eight ' on its side (Fig. 7). The figure measures 31 ins. from forehead to heel of hind leg and 21 ins. from crown of head to tip of the right forepaw. The head occupies a space of 14 ins. square. The depth of chest is $10\frac{1}{2}$ ins. at the widest point; the tail is 10 ins. long and curves $4\frac{1}{2}$ ins. above the rump.

This lion also bears the same character of line as the former. It is also of the same depth and width of line, but the expression of character is acking when compared to the former. On the other hand, it has a character of its own.

Once again the symbolic interpretation, if there was meant to be one, evades one's understanding. So, it is to be considered along lines earlier suggested until a more definite theory is adduced to it.

The next group of figures observed, engraved on the same rock, on the right hand edge of it or at the eastern end, is by far the most exciting work of them all. It should provoke controversy and provide ample material for artists, sculptors, archaeologists, anthropologists and sociologists, to interpret what this group was meant to convey. My duty is only to accurately describe the scene, provide a truly representative facsimile of the group and perhaps suggest an impression it made on me.

The group contained in the etching consists of two human faces, a fish, a " clockwise " swastika and a trident, above the head of the female figure (Fig. 8).

The head on the extreme right is that of a bearded man, with a small mouth, one large earlobe, eyebrows running into the nose and clearly defined eyes which are focussed away from the female figure, who is depicted beside him and on his right. This figure having a coy and timid expression of face, large bulging eyes, simply indicated nose, nostrils and small mouth, large drooping earlobes, a necklace, tuft of hair across the right forehead and a knotted lock of her adorned *konde* or hair roll above the forehead is distinguished as a female. Her body elongates rectangularly downwards below her neck. A line connects her left earlobe to a fish that dangles at the end of it. The clockwise swastika appears below the fish's tail. A line also connects her earlobe to a trident which appears directly above her figure.

The male face measures 8 ins. from forehead to bottom of beard and $6\frac{1}{4}$ ins. across the cheeks. The female head is oval and occupies a space of about $3\frac{1}{4}$ ins. square. The left earlobe is 3 ins. long and the right one $3\frac{1}{2}$ ins. The figure stretches 5 ins. below the chin. The $7\frac{3}{4}$ inch fish lies $8\frac{1}{2}$ inches below the chin of the female figure and the swastika, which is $2\frac{1}{2}$ ins. by $2\frac{1}{4}$ ins. is seen at the tail end of the fish. The trident is $6\frac{1}{2}$ ins. long and lies $2\frac{1}{2}$ ins. above her crest.

The depth and width of line is the same as the other two figures of lions. It is not unlikely that these figures were inscribed by the same author. The style is cruder and more primitive. Lines lack confidence of expression, which is observed in the former two examples. They are shaky ; not forthright and bold. Proportions are not as refined as the others. Expression is satisfying. But, the artist's intentions are clear : it conveys a message : it tells a story, to those who will go about this tract of country with ears open. It is symbolic beyond doubt.

Observe the old man wilfully gazing away from the woman looking down on the plains and the river that meanders through the flats. See the tapering face of the man with his prominent cheek bones and his tufty beard. Note the shy, delicate and coy expression of the female, the fashionable look of knotted hair, the dainty tassel-strands of hair draped across one edge of her forehead. All this build up and expression is needed to succeed in the relation of a tale.

In order to attempt an interpretation of this group a digression is considered necessary.

A legend is told in this locality of a superhuman who is called *O' Vedda*. Perhaps, it is another form of the words " Oya Vedda," meaning River Hunter. He is said to be a votary of Kataragama Deviyo. He is a benevolent sort of person, though greatly feared by the local inhabitants. His specially assigned duties are to forewarn villagers of forthcoming hardships, particularly in regard to weather conditions affecting cultivation. So he warns his people of impending changes of weather or heavy floods or devastations by rains, by changing the colour of rocks ; yellow to warn of drought and red as a warning of heavy rains[3]. Being the guardian god of the locale he objects to people fishing at night, in the precious waters, that are needed for irrigation. Salient points of the legend are—

1. That the O'Vedda is a votary of Kataragama Deviyo.
2. That he is a benevolent person.
3. That he is greatly feared.
4. That he is the guardian deity of the locality.
5. That he objects to fishing.

"*O, Vedda*" appears to be another ancient tribal name for Kataragama Deviyo, whose other common names are Skanda, Kandasamy, Arumukkam and Kanda Kumara[4]. The local inhabitants of recent times might have interpreted that the O'Vedda is only a votary of Kataragama Deviyo, but much in the same way as Ganesa, the brother of Skanda, who is also called Pilleyar, Pulleyar and several other names in various districts, it could be assumed, as is, with legends of other Gods, demi-gods and deified heroes, that O'Vedda was only another name for God Kataragama.

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3. See Collins: Who also relates the same legend and vouches for having seen these colour changes. " I myself saw the rock and when I saw it, it showed both colours, red and, yellow, with yellow predominating. I was told later by the Aratchchies whose Wasem border other parts of the river, that the rocks in the river show these colours. I do not know what the explanation is."
4. Some of his lesser known names are derived from legendary incidents and are agni-bhu—born of fire, as he is said to have been born out of a spark that emanated from the frontal eye of Siva.

Cangesha	— for his associations with the ganges.
Saravanamuttu	— the pearl of Sarvana, the lake connected with legends of his birth.
Shanmukkam or Arumukkam	— the six faced God.
Kandaswamy	— the youthful God.
Murukkan	— the tender child.
Kanda Kumaraya	— sinhala for Skanda and Kumara meaning youth.

Cf. J.R.A.S. [C.B.] Vol. XXIX, No. 77, 1924. Sir P. Arunachalam.

This God, worshipped and regarded more with fear than love[5], is also worshipped as a god of benevolence[6]. That he is one of the four guardian deities of the Island is undisputed, for the southern and south-eastern plains are his domain. Thus, it seems to point to a favourable conclusion that these two names might have been synonymous during early times.

Valli-amma, the renowned mistress of Kataragama Deviyo, is more associated with the God than his officially wedded spouse, Theyvannai-amma, daughter of Indra. According to one legend, yet prevalent in the east coast jungles Valli was discovered by the God, off the fields of Buttuwa[7]. She was an offspring of a doe, fathered by Vishnu. According to another legend, she was the adopted daughter of a Vedda Chieftain and was seduced by the God[8]. The association of a *Vedda* girl should bear relavance to us.

The trident is one of the traditional weapons held by Skanda in one of his twelve hands. Skanda was sent to Lanka by his father Siva, to destroy the titanic Sun-God, Sūrapadma and his brother Taraka. After fierce battles, these monsters fled to the bed of the ocean and were finally defeated and destroyed by Skanda with the trident. Any graphic representation of the God, would invariably show one of his hands carrying a trident.

Turning to the swastika, it is a very ancient symbol of Aryan nations[9]. A type indigenous to this country appeared on coins and votive plaques of the second and first century B.C.[10] and has been dealt with in detail by H. W. Codrington[11], John Still[12] and H. Parker[13]. Swastikas on some of those coins were also in a clockwise motion, though they were mounted on a staff and surrounded by a railing. It is said that this represented the promulgation of the doctrine of the Buddha. Parker assumes that it represented the Royal seal or mark of the time and that, what it actually meant would, perhaps never be known[14]. The swastika that appears on this etching, deserves much greater and deeper study, but it suffices to conclude (until such time as there is more research done and published)

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5. Ref. a. Robert Knox—" An Historical Relation with Ceylon." 168-81 revised 1966 [Saparamadu].
   b. Paul Wirz —" Exorcism and the Art of Healing in Ceylon," p. 148.
6. According to " Tiru Muruk Arrup" verses 90-118, a Tamil poem written about the 3rd century, A.D. ref. to by Sir P. Arunachalam, [1924] the second face of Skanda plays the part of " Graciously seeking his beloved folk and granting them their prayers."
7. This legend was collected by the present author and published as a press article titled " A legend of Kataragama "—Saturday Magazine, C.D.N. of 17.7.65. For a different version see also Wirz p. 145.
8. Cf. Wirz, p. 145.
9. Cf. (*a*) Thomas Wilson—" The Swastika," Washington, 1909.
   (*b*) Edward Thomas —" On the Meaning & Origin of the Flyfot and Swastika," Westminster, 1884.
10. As 13., (*c*) Numismatics Chronicle N.S. Vol. XX p. 18-45 " The Indian Swastika and its Eastern Counterparts."
11. Codrington, H. W.—Ceylon Coins and Currency, 1924.
12. Still—John. J.R.A.S. [CB] Vol. XIX, No. 58, 1907—p. 201, fol.
13. Parker, H. Ancient Ceylon 1909—p. 482, fig. 155.
14. Parker, H. J.R.A.S. [CB] Vol. VIII, No. 27, 1884—p. 151.

that this one was perhaps worked into the design to convey the geneological connections to Royalty, of patrons of the monastic establishment, which we call Budugala.

When these connected legendary incidents are taken cognizance of and the etching of this group is studied, it appears to illustrate the local legend of the O'Vedda, the origin of which is rooted in antiquity. It is suggested that the male figure is that of Kataragama Deviyo. The female companion is that of Valli-amma. These two are crowned by the traditional weapon of the war-god, Skanda—the trident. The fish is connected with the prohibition of fishing in the river by night. The swastika is a clan symbol of the patrons of this ancient religious establishment or the race of people who colonised this locality.

It is suggested that these engravings belong to a very early era of the inhabitation of this land. An accepted theory is that the earliest Aryan migrants landed on all coasts of the island and continued their navigations up the perennial rivers, navigable in those times[15]. They ceased their wanderings when they came up against gorges, ravines and rapids in the upper reaches of the river valleys. This point they called Kal-tota:—(*Kal*—Sank.—*Kalya;* Pali—*Kalla;* Sinh.—*Kal;* meaning scenic, attractive, beautiful, enchanting: like *Manakal*—appealing or enchanting to the mind : *Toṭa*—meaning—Ford, causeway, crossing—point). Thus Kaltota means " Scenically enchanting ford."

This fact of early settlement is borne out by the several Brahmi inscriptions of a very early age such as the 2nd and 3rd cent. B.C.[16] Inscriptions at Balangoda and Kuragala are two of them. According to Dr. Brohier,[17] the first stages of Indo-Aryan colonisation and irrigation is indicated by the pattern of remains of ancient tanks. A perusal of the one-inch topographical sheet indicates a multitude of abandoned tanks on the left banks of the Walawa Ganga. Their orientation and locations across minor streams and rivulets would point to a fact that this locality was inhabited in those ancient days close upon the early arrivals of Indo-Aryans to this Island. With them could have come the worship of Skanda or Kataragama Deviyo.

After a second visit to the site for checking former measurements and verifying facts, I chanced to meet the monk Rev. Wikiliye Narada who now resides at Sri Vijaya Tennekone Mudalindrä-rāmaya at Wikiliya.

From him I gathered that the Sabaragamuwa *Mahalekam-mitiya* claims the founding of Budugala was in 1300 of the *Sakavarsa* (i.e. 1379 A.D.) accredited to be the work of a District Governor, Viramahasuriya, by name.

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15. Brohier, Dr. R. L.—Ancient Irrigation Works—Pt. I.p.4. Vestiges of Very Early Times. Cf.—Deraniyagala, P.E.P.—as 21 (Introduction p. 125).
16. Cf.—Parker, H.—Ancient Ceylon, London, 1909, p. 415—Earliest Inscriptions. Paranavitana—Dr. S. Ceylon Journal of Science—Sec. G. Vol. I & II, 1924-33. See also Paranavitana on Brahmi Inscriptions, yet under preparation to be published shortly.
17. Brohier, Dr. R. L.—Ancient Irrigation Works, Pt. I (1934), p. 2. fol. Introductory Sketch. p. 4. Vestiges of Very Early Times. Pt. II—(1935), p. 1. fol.—Preamble.

The records refer to the site as *Māligā-Hela* and *Māligā-tänne*. He gave me the following verse from memory,

දිවන් සතන් තුන්සියවරුසෙට ලන් දුරුතු මසේ පුර සත කා ලේ
ගලුත් කපා වටකණුමුල් දුරා සීමා පදුරකි මැද මා ලේ
දිවන් එරන්කොත් නවයක් සිටුවා ශක්‍ර පුරේමයි ඒ කා ලේ
නමත් විරමහසූරිය නරපති සැදෙවි මැදගම දේවා ලේ

The following note he also wrote in my Field Notes book.

පුරාණ ලේකම් මිටියේ ඇති උග්ගල් කල්තොට බදුගල යයි දැන් ව්‍යවහාර කරණ පැරණි මැදගම කතරගම දේවාලයයි ප්‍රසිඩ ස්ථානය ගැන ඉතිහාසයක් මේ කවෙන් කියවේ.

It is now perhaps possible to imagine what these buildings were. The lower group of twin structures would appear to have been a devale with its square sanctuary or *maligava* and the rectangular one, the *bera-maduva* or antehall, where drumming took place.

The twin building at the upper level is most likely a *Viharage* or image house. It is suggested that either the image lies buried within the existing plinth structure or it has been removed to another vihara or as a third possibility, was removed by treasure hunters.

That the conjectured interpretation of the figurines is a graphical representation of the god of Kataragama would now appear more acceptable, if this was a site of a devale dedicated to that guardian deity.

The intention of this paper is not to accurately date these ruins, for that is the vocation of the Archaeologist: an interested Architect's intention being to accurately record what was observed during a week-end excursion through the forest end to induce the authorities to delay not in preserving these national treasures for posterity, and competent archaeologists to proceed from here on.

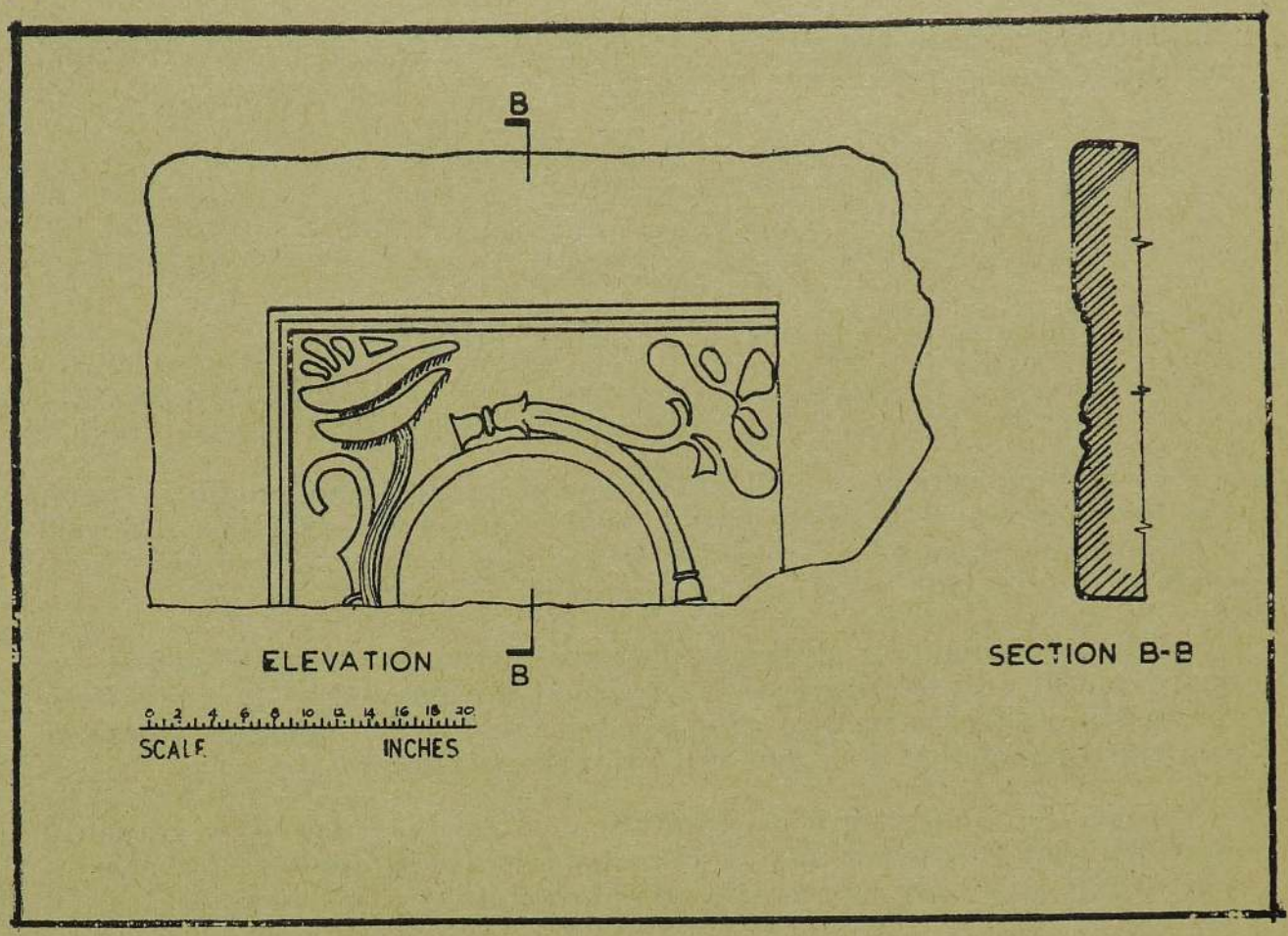


Fig. 1.

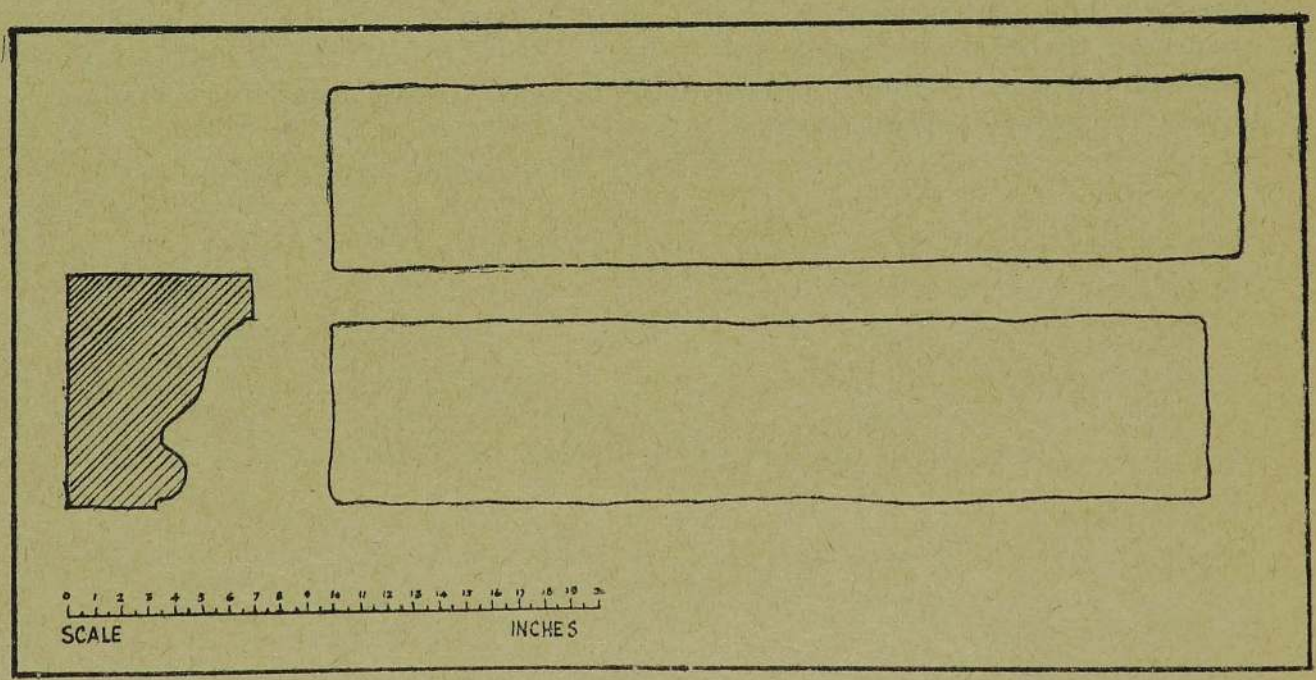


Fig. 2.

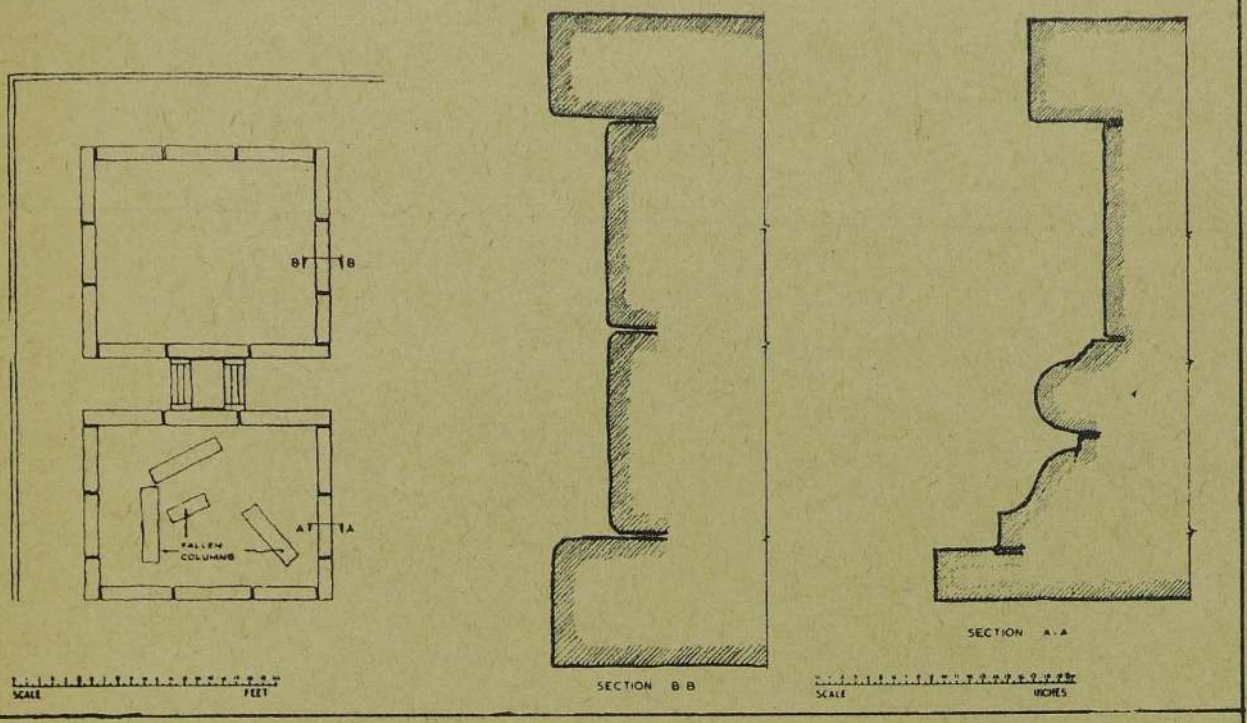


Fig. 3

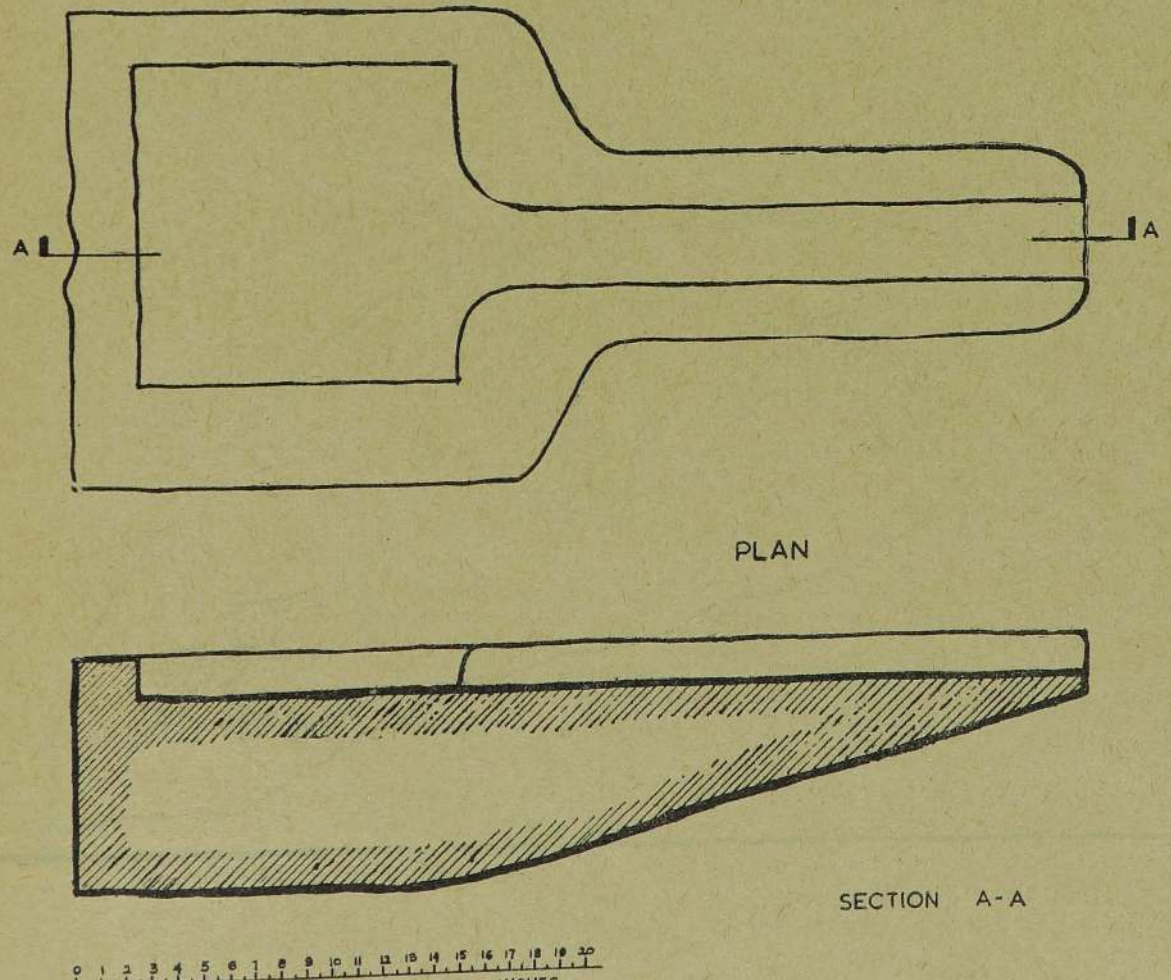


Fig. 4.

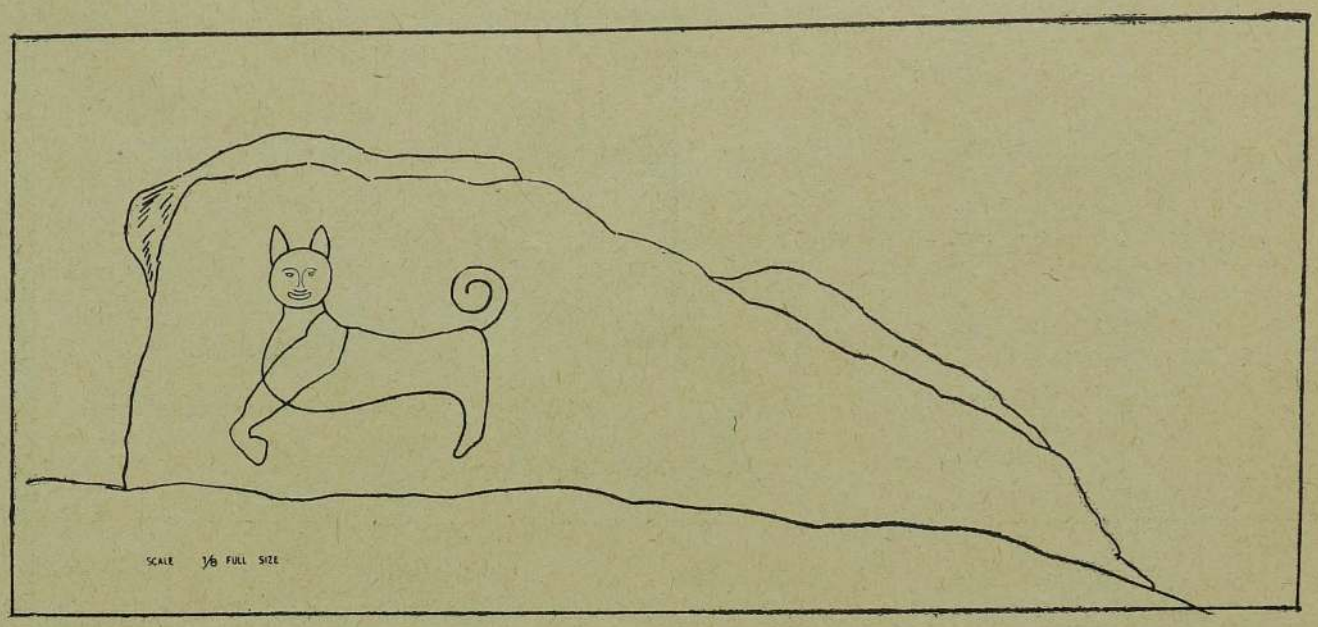


Fig. 5.

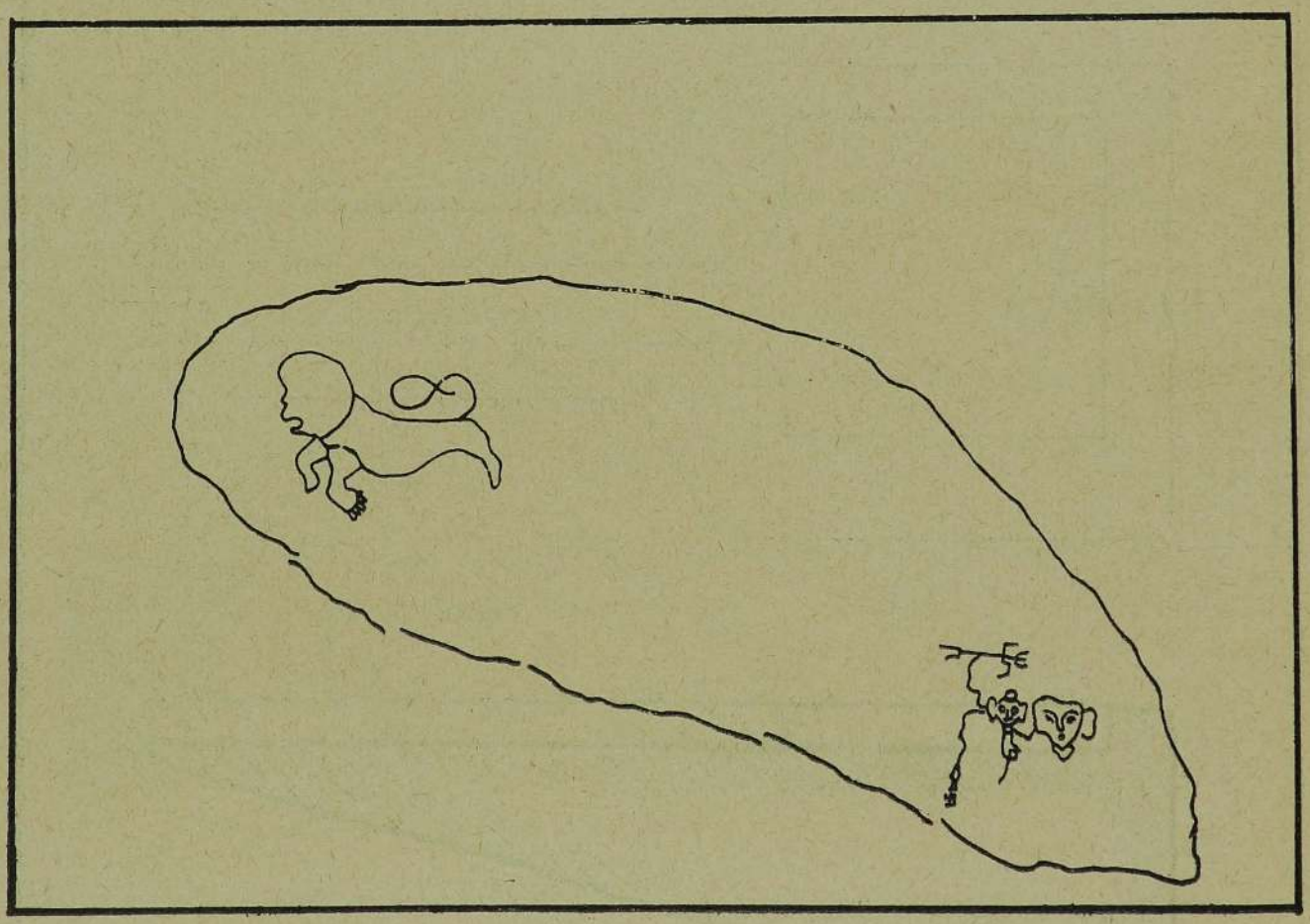


Fig. 6.

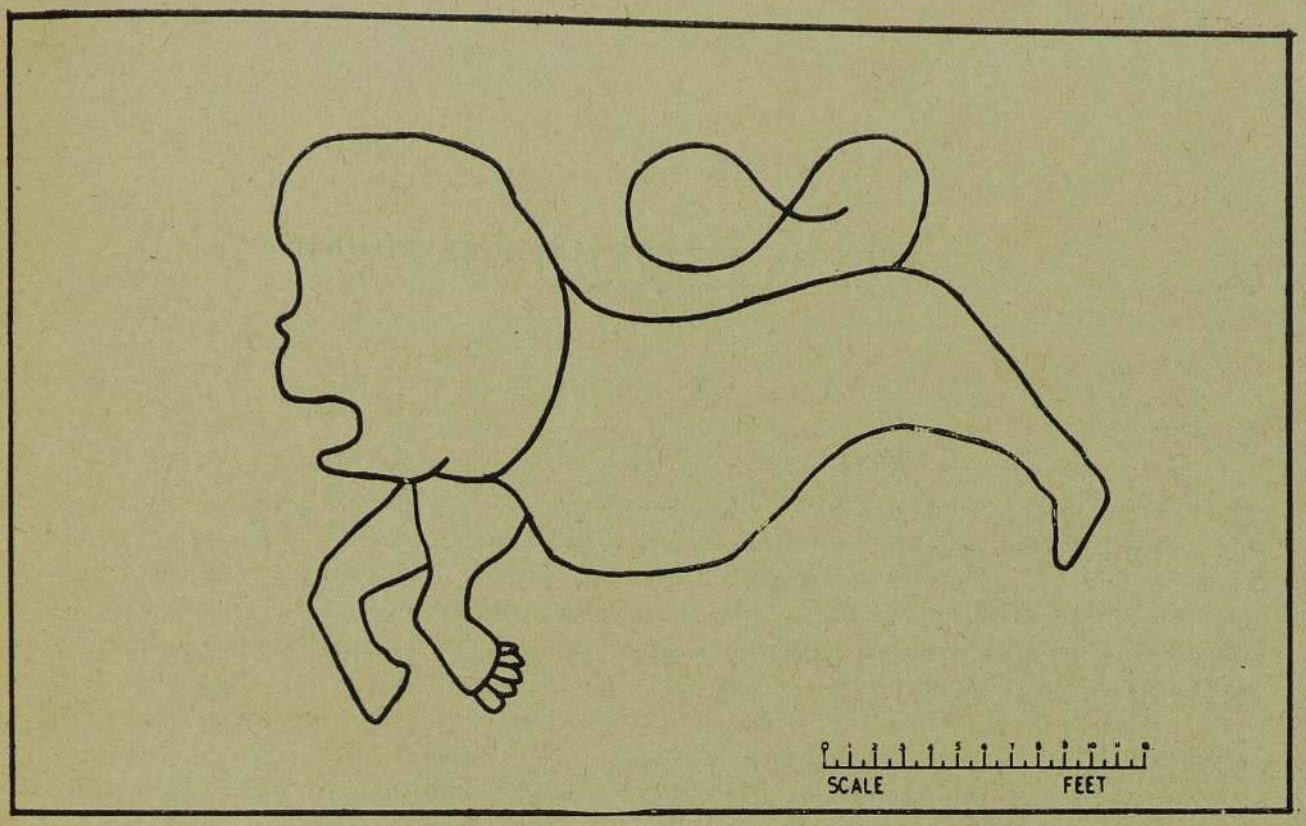


Fig. 7.

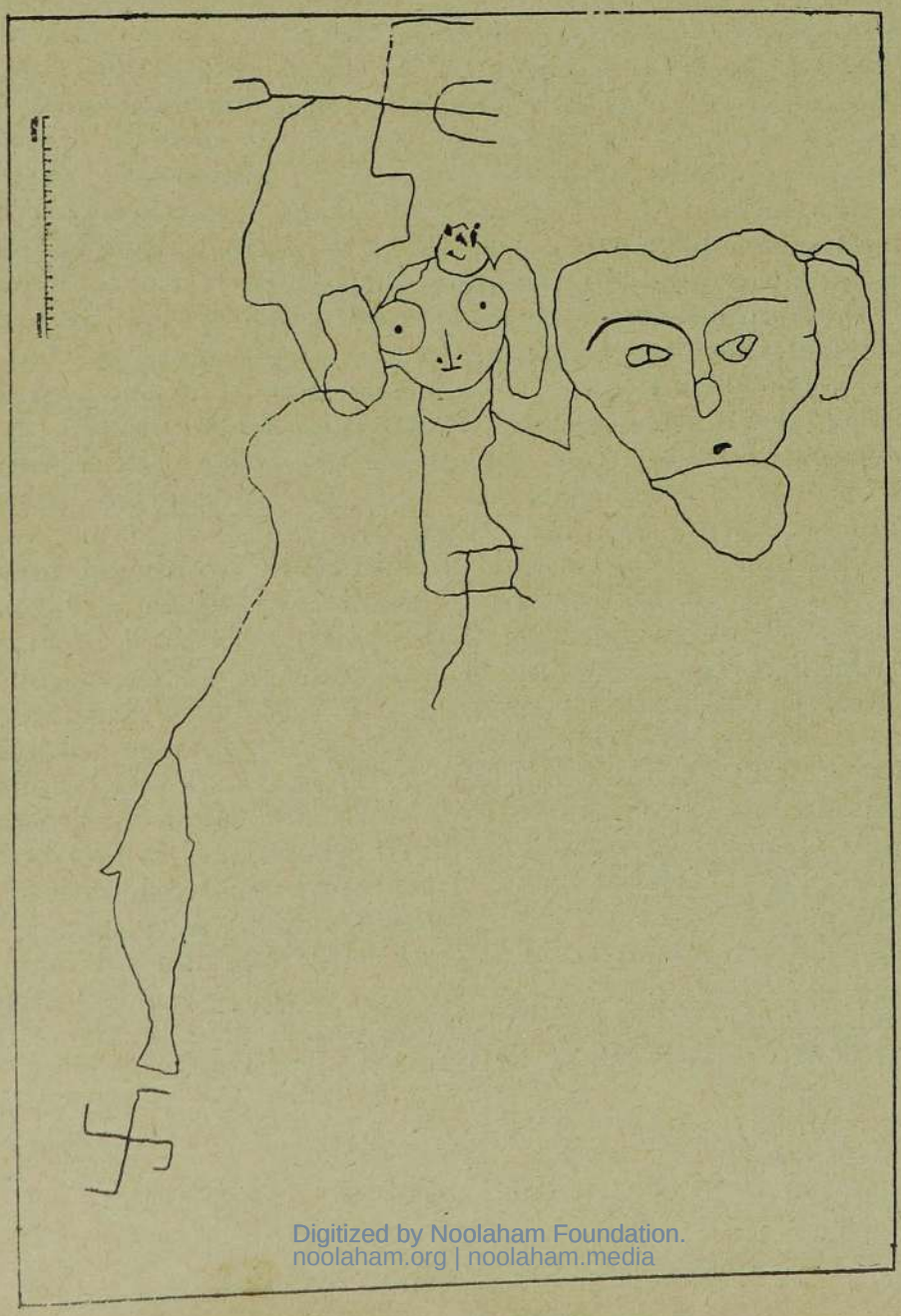


Fig. 8.

A CORPUS OF POTTERY FORMS FOUND IN CEYLON

U. Alex Gunasekera
P. L. Prematilleke
Roland Silva

THE intention of this article is to provide a scheme of classification for some of the typical pottery forms found in Ceylon. The analysis is based primarily upon the overall form of vessels, in terms of their cross-section and profile together with some considerations of their functions. We hope that this article will contribute towards the evolution of a common system for the classification of pottery in Ceylon. We trust that this will also provide a preliminary framework for the analysis of our pottery in terms of other criteria such as technique. It is hoped that future students of Archaeology concerned with stratigraphic sequences of pottery might find this classification of some use.

We decided to study pottery for a number of reasons. Though each of us have had some familiarity with pottery, it was a visit of a senior scholar, Professor K. de B. Codrington, to this island in 1965 that provided us with the incentive to give a somewhat systematic account of pottery forms. It was thought worthwhile to pursue the subject because pottery is one of the commonest artifacts found in non-sterile archaeological strata. It was decided not to examine all forms of earthenware but rather to confine ourselves to pottery vessels for practical reasons, partly, due to the limited time available to us, and partly, due to the fact that pottery vessels are the commonest of all earthenware in Ceylon. It was realized that the form of the vessel was one of the crucial features that guided a typology of pottery[1]. It was thought possible that one could consider the range of pottery forms as lying within two extreme limits of flat objects on the one hand and spherical objects on the other. Once the range of forms was clarified it was necessary to use an appropriate nomenclature which would be culture-free and which would lend itself to comparative study. In addition to the criterion of form the criterion of function of a vessel was thought to be relevant. As, many vessels have more than one function, the use of function alone as the criterion of classification might, at times, be confusing, for the function of a vessel cannot always be demonstrated conclusively especially in the case with pottery of antiquity. However, we are in a way fortunate that the tradition in the use of pottery still continues in Ceylon. It is, no doubt, judicious that functions should not be attributed to vessels where such usage is not clear. For example, an object which is considered a bowl may in fact be a cooking vessel. Hence, we prefer to speak of the bowl-type rather than the bowl as the latter indicates the form of a vessel which has a specific function. Pottery vessels, like all man-made objects being part of a particular culture, are likely to be affected by traditions and styles. Hence, in describing and classifying pottery it seems necessary to use such terms as those that convey the characteristic shape and function of the object.

It was thought appropriate that this classification of pottery should draw from local terminology which refers to specific physical types. For instance the dish-type may be referred to as a *tāṭiya* or the shallow-bowl-type called a *taliya*. Hence, within the range of each form, the generic type of each could be further classified as a variant of the species. Under such an analysis it was decided to use a Roman numeral for each generic type and a simple letter of the alphabet for each sub-variant. It was thought that the Arabic numerals together with a capital letter could be used at a future date for a similar analysis of pottery on the basis of technique. Such a system would avoid any confusion in the use of the suggested code for pottery distribution in diagramatic sketches of stratified sectional drawings. For example, the pottery found at Anuradhapura, Tissarama site, pit 25, level iii, could be codified as : $iv^{a}/7^{B}$, $xii^{c}/7^{B}$, $xiv^{a}/8^{A}$, etc.

The terms that have been selected for the purpose of this classification have been chosen primarily from traditional and contemporary use. Some of these have been given below and can be traced to early periods and so retain a long ancestry.

Valaṃ is a generic term for pottery vessels. This meaning is indicated in the common nursery rhyme:

" *Aṃbalamē pinā pinā*
Valaṃkadak genā genā"

Similarly Lawrie's Gazetteer refers to *valaṃdena paṃguva*, or a land holding for the supply of pottery vessels,[2] and *valaṃkada* or a pingo of pottery [3]. In some areas the potter woman is familiarly known as *valaṃ-ācci*. Pottery vessels are also referred to as *häli-valaṃ* which is a phrase that is akin to the English pots-and-pans. *Valaňda* is also used for specific vessels with a qualifying prefix such as *bath-valaṃ* or rice vessels [4]. Coomaraswamy states that the " generic terms for all pots are *häliya* and *valaňda*.[5] "

Kabala signifies primarily a pot-sherd. Flat cakes or *roṭi* are generally made in a large pot-sherd or *kabala*. A special pan made for this purpose is called the *roṭi-kabala*. An incense burner is also known as a *kabala*, presumably because pot-sherds were originally used for this purpose. The receptacle made for burning incense is referred to as a *dummala kabala* [6], A pot-sherd in which live charcoal is placed to warm the hands and feet of elderly persons is called an *anguru kabala*. It is probably the same vessel that is referred to when Coomaraswamy states, " *gini kabala* or 'fire dish' which is a form rarely met with, but suitable for use as a small hearth, or to provide a fire for the goldsmith's blowpipe."[7] Hence, the vessel called a *kabala* seems to have evolved with time to replace the original use of a pot-sherd.

Tāṭiya is a flat plate. It is also used in a special sense as a *pā-tāṭiya*, literally meaning an hour-plate, that is, a device for reckoning time [8].

Words such as *ran-tāṭiya* or ' golden-plate ' are also commonly used. The lines of a popular Sinhalese song read thus :

" *Handahāmi hängi hängi ebila balanavā*
Ahase āta vaṭakuruvaṭa sudaṭa pēnavā
Rantāṭiyaka kirībatui pāniyi gēnavā
Puñci apaṭa in ṭika ṭika dīlā yanavā."

In this connection it might be noted that words such as *tāla* and *tāli* occur in the *Mahāvaṃsa* and have been translated by Geiger as plate and pan respectively[9]. *Tāla* is referred to in the *Cūlavaṃsa* and Geiger translates this passage as, " golden and silver ' bowls ' " [10], *Tāliya*, according to Coomaraswamy, is a large wide-mouthed vessel similar to a *pātra*," [11]. An example is the *piṃtāliya* or free-water-pot. Hugh Nevill records the Sinhalese ' Ballad of the golden bowl ' or *Raṇ tāliya kavi* which refers to the ' bowl ' offered to the Lord Buddha by Sujata in the events connected with the Great Enlightenment [12]. This again stresses the similarity of the *tāliya* to the *pātraya*. Large bowls of this type are seen at the Dambulla rock temple where these are used to collect the sacred water or *pän* that drip through the rock.

Pātraya, better known as the begging-bowl has been traditionally used by monks. The *Vinaya* defines a begging-bowl thus, " A bowl means : there are two kinds of bowls : an iron bowl, a clay bowl. There are three sizes for a bowl : a large bowl, a medium-sized bowl, a small bowl. A large bowl means that it takes half an *āḷhaka* measure of boiled rice, a quarter or that quantity of uncooked rice, a suitable curry. A medium-sized bowl means that it takes a *nāḷika* measure of boiled rice, a quarter of that quantity of uncooked rice, a suitable curry. A small bowl means that it takes a *pattha* measure of boiled rice, a quarter of that quantity of uncooked rice, a suitable curry. (A bowl) greater than that is not a bowl, (a bowl) smaller (than that) is not a bowl." [13] The clay begging-bowl is called the *māṭi-pātraya* in Sinhalese and it is used today by Ceylon Buddhists to offer milk-rice at the shrines.

Kusalāna is an archaic term for a cup and is not commonly used today except in a special sense as a sports trophy like a challenge cup. However, in certain remote areas the original meaning of a drinking vessel is still prevalent. It is interesting to note that in Lawrie's Gazetteer of the Central Province, one of the traditional dues from a land holding in *koṇdadeṇiya*, *Hārispathu* was " . . . 5 *kusalān* " [14].

Nāmbiliya is one of the commonest vessels in domestic use today. It is used to sift sand and grit from the rice before it is boiled for the meal. In referring to this vessel Coomaraswamy records, "the *nāmbiliya* (=*nambu* + *häliya*) is most important. This is a shallow dish with a rim projecting inwards and completely covered inside with an elegant arrangement of deep furrowings. These are scored before firing by means of a rough wooden comb (*irigahana Kaṭuwa*). The *nāmbiliya* is used for washing rice to remove stones and dirt . . . The fragments of grit, etc., remain

behind in the grooves of the *nāmbiliya*, or are held back by its projecting rim, as the rice is stirred up in the water and gently poured over the edge; this vessel is in daily use in every household." [15] It is referred to as an item due from a potter's land holding in terms of traditional land tenure. [16] The complimentary vessel to the *Nāmbiliya* is the *Koraha*.

Koraha is another popular vessel, and is used along with the *nāmbiliya* to sift and drain the rice before it is boiled. The term *diya-koraha* or water *koraha* indicates a larger vessel in which infants are bathed. [17] It was in this context that the popular papers suggested that the clay container found in the relic-chamber at the small dāgäba at Dädigama, was probably the bathing vessel of king Parākramabāhu I, who was born at this spot.[18] Coomaraswamy refers to the *pol-koraha* as the larger type of *koraha* in which dhobies washed clothes and mothers their children. [19] A still larger *koraha* is used for soaking paddy before it is sown and is known as a *vil-koraha*. [20] The character of the vessel is described by Coomaraswamy thus : " A similar vessel (to the *nāmbiliya*) made to stand by the addition of a ring foot is called a *koraha* . . . the ring foot is not made in one piece with the rest of the vessel, but is added after the completion of the underside of the vessel, as if for a *nāmbiliya*." [21] Another function of a *koraha* is seen in the exorcistic ceremony known as *koras-baliya*.

Batvalaňda literally means rice-pottery-vessel and is still used by the poorer classes for eating their meals. Grated coconut, and coconut milk is also collected in it. Again it forms an item of traditional dues from lands held by a potter. " . . . . 2 *batvalaṃ* ". [22] The *Batvalaňda* is also called the *māṭi-koppe* or clay-cup. The different sizes are indicated by the terms *loku* or large, etc. This is also sometimes called the *aḍi-valaňda* or the ' pottery vessel with a foot.' Coomaraswamy calls it " a shallow dish with ring foot thus resembling the smaller type of *koraha* but without internal furrowing. . . . . " [23].

Mūḍiya is a lid, the characteristic earthenware form commonly found in most homes even today. [24] The general type is a shallow conical cover. Those used for steaming purposes as in the making of traditional recipes such as *piṭṭu* or *idiāppa* (anglicized to ' stringhoppers'), is a bell shaped cover called an *idiāppa-mūḍiya* or stringhopper-cover. The *Kara-mūḍiya* is another term for the common lid. The expression *curry-mūḍiya* that describes a lid is also to be found. It, no doubt, is a loan-word from the English ' curry ' and has been associated with the Sinhalese term *mūḍiya*.

Ätiliya is a shallow vessel that is to be found in most kitchens. Coomaraswamy records two types of *ätili ;* one used for the cooking of curries and the other called *kanbola ätiliya*; the meaning and use of the latter remains uncertain. [25] He had compared this elsewhere to the English pre-serving pan [26].

Kuṇḍahaṭṭiya indicates a vessel that has a wider mouth than the *häliya* and is shallower. This is generally used, for boiling rice and yams,

and in the preparation of *mällum* or preparation of edible leaves that have been minced. The advantage of using this vessel is that the contents can be more readily stirred than in a *muṭṭiya*. The *kiri-haṭṭiya* or curd-pot is also a term that is commonly used.

Häliya is similar to a *muṭṭiya* but has a wider mouth and larger dimensions. The term *bathäliya* or rice-pot appears to indicate a quantity of rice that is meant for a group that is larger than the usual household. A derogative use of the same term is seen when it is used to apply to a person with a pot-belly. *Velli-häliya* indicates a vessel that is used by washerman to boil clothes. The *piḷi-häliya* or clothes-pot is used to store clothes. Coomaraswamy refers to a smaller version of this called the *halu-häliya*.[27] He also notes two further types of *häli*, the first being used to store betel leaves and called the *bulat-häliya*.[28] Raghavan presents a clear illustration of this and also records as follows, " . . . it was the betel box (pot) of the late king of Kandy."[29] Coomaraswamy also refers to the *halamba-häliya* or *nayi-häliya* as the pot has figures of snakes on it. An example is found in the Colombo Museum collection.[30] Other terms such as *häli-arakku* or pot-arrack refer to illicit brews of arrack that is prepared in this type of pot. Dry fish is preserved in pots that are larger than *muṭṭi* and hence, is known as the *karola-häliya* or dry-fish-pot. Ola books have also been stored in these vessels as those seen by us at the Danagirigala temple. It is interesting to note that the Dead Sea scrolls were themselves preserved in earthenware jars. The term *hälipodi* for small *häliya* is also used.

Appalla is a term used for a large *häliya* in which paddy is stored. It is usually placed on a *daranuwa* or foot which is made of clay. The *mahappalla* or large *appalla* denotes a vessel for boiling rice or paddy. *Taligeḍi* vessels are used " for soaking paddy before sowing the *maha harvest*."[31] We assume that this refers to the type known as *mahappalla*. Lawrie neither describes nor indicates the use of this type. Coomaraswamy refers to the small *appalla* or *appallapoḍi*.[32]

Muṭṭiya is a type of pot that is commonly used for cooking and storing and has a mouth that is smaller than that of a *häliya*. They are of various sizes. The very small ones are intended for ritual purposes when magical objects are buried in the ground for exorcistic purposes. Such vessels are called *ārakṣā-muṭṭi* or protective-pots. These are like children's play pots that are called *sellan-muṭṭi*.[33] Milk is generally boiled in a *muṭṭiya* and is often referred to as a *kiri-muṭṭiya* or milk pot. A nursery rhyme records :

" *Umbe ammā kiraṭa giyā*
Kiri-muṭṭiya gangē giyā."

Rice is also cooked in a *muṭṭiya* when it is for the family and this is generally referred to as the *bat-muṭṭiya* or rice-pot. This vessel is also used for the storage of sweetmeats and hence, such terms as *kävun-muṭṭiya* or sweetmeat-pot. The popularity of the *muṭṭiya* is expressed in the phrase *caṭṭi-muṭṭi* which represents all types of pots. Coomaraswamy refers to

uga-muṭṭi as that in which *kitul* syrup is collected. [34] He also refers to *ämbul muṭṭi* which are used for medicinal preparations. [35] *Gas-muṭṭi* or tree-pot is another term for a vessel used to collect toddy from palm trees. These have a distinct patterning on the exterior probably to provide a suitable grip. A variant of this type is called a *rā-kaṭē* and resembles a *labu-kaṭē*, which is a dried gourd that is used as a vessel. The *päni muṭṭiya* or honey-pot is used to store honey. [36] Another term is the *jāḍi muṭṭiya* in which cured fish called *jāḍi* is preserved. [37] Salt is also stored in a *muṭṭiya* and this is called the *lunu-muṭṭiya*. Laurie also notes some special types as *nānu-mura-muṭṭi* and *agaṣ-muṭṭi*. We presume that these were used for the bathing of images and symbols during the ceremony known as the *nānu-mura-maṇgalla*.

Kalē or *kalagediya* is the common water-pot that is carried on the hip while the neck of the vessel is held by the arm. It is used in most homes for transporting and storing water. The following line indicates the popular use of this type of vessel: " *Aḍu kale selavīma nisā ehi aḍukama pāvī.*" A nursery rhyme also refers to the *kale* thus :

" *Ṭikiri ṭikiri ṭikiri liyā*
Kalet araṃ liňdaṭa giyā."

The term *labu-kalē* refers to an ovate pot perhaps due to its resemblance to the water-gourd or *labu*. It is used nowadays to water tobacco plants. It is also employed in the storage of toddy when it is called the *rā-kalē* or toddy-pot. Pots that are ornamented with patterns that are both geometric and floral and others on which verses are incised have been manufactured in Kelaniya. [38] These were perhaps used for the various festive dances which had songs composed for them, as for instance, the *kala-geḍi-näṭum* or water-pot-dance. [39] *Kala-geḍī-māle* or water-pot-garland [40] and *kala-geḍi-pimbīma* or the water-pot-blowing. [41] The practice of blowing into water-pots to produce roaring sounds was a popular exercise at these dances and Phillipus Baldaeus the Dutch Evangelist of the 17th century records, " Here are certain women who know the art of playing upon earthen vessels (called *callangs*) by blowing into them. This produces a wonderful sound, which serves them in their dances and they feel that by these exhibitions they pay high compliment to strangers."[42] Geiger translates terms such as *kalasa* that occur in the *Mahāvaṃsa* and *Culavaṃsa* as pot or water-pot, *kumba* as jar and *ghaṭa* as pitcher.[43] In Ceylon the *ghaṭa* has been used as a container for oil. The *Cūlavaṃsa* records that, " The Ruler of men betook himself also in one day to the Sumanakūṭa and sacrificed there by pouring one hundred jars of oil into a lamp fifteen cubits in girth and five cubits high." [44] In recent times a vessel called *bujama* has been used to store oils and various preservatives.

Kalasa applies to a vessel that is known more by its use than by its form. It includes the types that have been described under *muṭṭiya* and *kalē*. In fact Coomaraswamy notes that this " specially applied to a kind of vase open at both ends, but otherwise resembling a *kalageḍiya* with an extended neck, and used for holding sprays of coconut flowers on auspicious

and ceremonial occasions . . ." [45] Geiger alludes to a similar idea when he says, " . . .. such vessels are mentioned in connection with festival processions : *kalasa*, *kumbha*, *ghaṭā*, *thāla*, *paṭiggāha*, *bhiṅkāra* . . . . They are filled with flowers carried along in the procession or set up as decoration at the side of the street . . . We must not assume that vessels of a special form are denoted by this word." [46] *Kalasa*, however, is used in pirith ceremonies or at the chanting of Buddhist Texts, to hold coconut flowers on which rests an oil lamp. These are also used at weddings. At some exorcistic ceremonies a *kalasa* which in fact is a *muṭṭiya* serves as a container for magical objects when it is hung on trees or on roof beams. The term *puṃkalasa* refers to a pot-of-plenty that is generally carved in stone and was popular in various phases of history.

Burlettuva or *gurlettuva* is a vessel that is used for the storage of drinking water and has a bottle-like neck. Lawrie, probably refers to this type of vessel when he mentions a goblet or jug. [47] The *Cūlavaṃsa* refers to goblets thus : " He gave the brahamanas delicious foods such as the King receives and gave them milk with sugar to drink in golden goblets." [48] The Pali term for this being *taṭṭaka* Coomaraswamy probably refers to this when he describes it as " a narrow-necked water vessel or goblet, generally rather rough in execution, is also sometimes met with." [49]

Funerary urns have gone completely out of use but have been found in early cemeteries as at Pomparippu. They are generally of two types : the large ones having been used for the inhumation of persons while the smaller example of a similar shape being utilised for secondary burials. [50] These have an unusually pointed bottom rather like the Roman amphora which were generally meant to stand in a sand bath.

Kotale is a vessel for drinking water. Knox illustrates this in his book. [51] It is also used for ritual purposes in Buddhist temples for the sprinkling of water on flowers and for the washing of hands. In exorcistic ceremonies it is used for sprinkling termeric water and the vessel is called *kaha-diyarakotala* or kotala with termeric water. This is also utilised in a ritual called *dolaha-pela-pāliya* or twelve rites. [52] *Kenḍiya* is a small *kotala* with a handle and is usually made of metal. It is used for sprinkling water at marriage ceremonies and in Buddhist temples to spray flowers. Peculiar contraptions called the *valalu-kotale* and *yathuru-kotale* are used for storing drinking water. [53] Some of these specimens can be seen at the Colombo and Kandy Museums.

Pūnāva or *pūnā-kalaya* is a pot-shaped vessel with a number of spouts like an elaborate *kotala* and has a mouth that is shaped in the form of a tiger's head at the mouth of the vessel. Coomaraswamy refers to the *pūnāva* as having the shape of a *kotalaya*. [54] This is used only in exorcistic ceremonies either to remove evil or to inflict it on enemies. The empty pot serves to collect magical evil or *vas* within it. In its exorcistic use the vessel is smashed on the head of a bull which becomes a magical scapegoat to which the evil is transferred. [55]

Diya-isnaya or sprinkler is a vessel used throughout most periods to contain scented water and is used to spray flowers or the clothes of a person.

This is also used at most religious and social occasions. Many good examples turned out in ivory are found in the Colombo Museum and the picture post card No. 31 illustrates two of these.[56] Some earthenware examples are listed among the finds in Pitalkhara, India.[57] *Pāna* or lamp falls into a separate category and needs to be investigated in detail as a distinct group. These are of numerous shapes and types and their stands are even more varied. Hence, lamps will not be discussed in this paper.

Karaṇḍuva or relic casket is generally made of precious metal or of precious stone. However, the outer casket is sometimes made of clay and those follow various fancy shapes. The basic design of a *Karaṇḍuva* consists of a base container which has a domical lid that is made to fit accurately. A popular shape is that of a stūpa where the hollow of the dome retains the previous inner *karaṇḍuva*. Descriptive legends are sometimes inscribed on these as in the Somāvatī dāgäba.[58] The one found at the Mihindusāya, Mihintale was tall and square in plan and had a distinct black polish on it.

Käṭe or till is a special container for collecting coins. Apart from the general spherical shape, fancy forms such as animals and fruits are also found.

Pūkuruva is a mug with a handle Coomaraswamy refers to it as a one-handed mug.[59]

Paḍikkama or spittoon is yet another vessel made of earthenware.[60] In recent times the shapes of these have been modified to imported designs made of metal.

Lipa or fireplace and *poranuva* or oven are alied utensils. The former replaces the normal three rest-stones of a cooking pot or *liggal*. The *poranuva* is described by Coomaraswamy as, " a large three-legged affair with a big lid, the interior is half filled with sand,..... the sand..... ..... retains the heat and preserves an even temperature."[61]

Daranuva which is a circular rest for a pot is normally made of straw or coir but the more formal type is made of earthenware. When such a *daranuva* is permanently fixed to the bottom of a round vessel, it is called a foot.

Sinna-saṭṭiya is probably a corruption of the Tamil *cinna-caṭṭi* or small-pan. It has been described by an informant as a plate on which rice was eaten. It is said to be somewhat curved though generally flat. The aged informant mentions that pilgrims who went to Kälaniya some decades ago returned with these plates, resting on their heads in an inverted position or *oluve navāgena*.

Filters made of clay were perhaps utilised only in the recent past. They consist of two units; the upper contains the filtering agent, and the lower retains the water. At times the upper part had a number of vessels that contained different filtering agents. As much as the clay filter is considered to be a non-traditional form, there are many other examples that belong to this category as for example clay cups, saucers, kettles, and flower pots.

A type of perforated pot has been found in the excavation at Anurādhapura but the sherds collected have been too small to conjecture their form.[62]

Code	Description	Reference
I.a.	*Kabala* :—A pan type that is very shallow with a slightly concave interior and a rim that is only emphasised on the convex exterior. The bottom of the vessel is smooth and thin.	Fig. 1. Anurādhapura Museum—Tissarāma excavation pit A3.
I.b.	*Kabala* :—A pan type that is very shallow with a slightly concave interior and a rim that flattens outwards. The exterior that convex extends to meet a flat protruding rim. The bottom of the vessel is smooth and thin.	Fig. 1. Nugegoda Vidyodaya University Museum—no number.
II.a.	*Tāṭiya* :—A plate type that is shallow and concave inside. It has a rim that is emphasised on its convex exterior. The exterior is patterned underneath.	Fig. 1. Anurādhapura Museum—Gedigē excavation Pit 3.
II.b.	*Tāṭiya* :—A plate type that is shallow and concave inside and has a rim on its exterior. The concave inside has a raised edge. The exterior is patterned underneath.	Fig. 1. Anurādhapura Museum—site unknown.
II.c.	*Tāṭiya*:—A plate type that is shallow and concave inside and has a moulded rim on its exterior. The concave interior is slightly raised to an obtuse angle. The exterior is patterned underneath.	Fig. 1. Anurādhapura Museum—site unknown.
II.d.	*Tāṭiya* :—A plate type that is shallow and concave inside and has a moulded rim on its exterior. The concave interior is raised shaply to a short vertical edge. The exterior is patterned underneath.	Fig. 1. Anurādhapura Museum—Samadhi Pilima site.
II.e.	*Tāṭiya*:—A rimless-open-tray-bowl with an incurving shoulder. The curve of the shoulder continuous along an almost vertical side to meet the bottom of the vessel at an obtuse angle. The bottom remains convex and patterned.	Fig. 1. Anurādhapura Museum—site unknown.
II.f.	*Tāṭiya*:—A rimless-open-tray-bowl with an incurving shoulder. This curve of the shoulder meets the convex bottom at a sharp acute angle. The bottom remains convex and patterned.	Fig. 1. Colombo Archaeological Laboratory—Pomparippu cemetery site.
II.g.	*Tāṭiya*:—A rimless-open-tray-bowl with an incurving shoulder. The curve of the shoulder continuous along the side while the bottom is flat.	Fig. 1. Anurādhapura Museum—site unknown.
II.h.	*Tāṭiya*:—A rimless-open-tray-bowl with an incurving shoulder and an angular side together with a flat bottom.	Fig. 1. Anurādhapura Museum—Gedigē site.

Code	Description	Reference
III.a.	*Pātraya* :—A begging-bowl type with an incurving shoulder and no rim. The curve of the shoulder extends along the side to the bottom to form a shape convex resulting in a deep vessel.	Fig. 1. Anurādhapura Museum—Ambalantota excavation pit. 57/1.
III.b.	*Pātraya* :—A begging-bowl type with an incurving shoulder. The curve of the shoulder is continued along the side to the bottom. It has a rim on the inside which is convex in section.	Fig. 1. Anurādhapura Museum—Gedigē site.
III.c.	*Pātraya* :—A begging-bowl type with an incurving shoulder. The curve of the shoulder is continued along the side to the bottom. It has a rim on the inside which is round in section.	Fig. 1. Anurādhapura Museum—Gedigē site.
III.d.	*Pātraya* :—A begging-bowl type with an incurving shoulder. The curve of the shoulder is continued along the side to the bottom. It has a rim that is emphasised on the inside, the upper end of which is flat.	Fig. 1. Anurādhapura Museum—Gedigē excavation pit 3.
IV.a.	*Tāliya* :—A large begging-bowl type with an incurving shoulder and a thick rim. The curve of the shoulder continuous along the side to the bottom. It is proportionately deeper than a *pātraya*.	Fig. 2. Kandy Archaeological Museum—exhibit No. 48.
V.a.	*Kusalāna* :—A small bowl or cuptype with no shoulder. The vertical side is continued to the bottom in a sharp convex form to make the vessel very deep in proportion to its size. It has no rim.	Fig. 2. Colombo Archaeological Laboratory—Pomparippu cemetery site.
VI.a.	*Nāmbiliya* :— A rice-winnower type that has characteristic comb marks on the inside. The mouth is wide and the rim only emphasized on the outside. It has no shoulder. The curve that commences at the rim is continued along the side to the bottom.	Fig. 2. Anurādhapura Museum—site unknown.
VII.a.	*Koraha* :—A rice-winnower type of bowl with a foot. It has a wide mouth but no rim or shoulder. The curve that commences at the mouth is continued along the side to the bottom where a foot is luted to steady the vessel when placed on a flat surface. The vessel has characteristic comb marks on the inside.	Fig. 3. Anurādhapura Museum—Gedigē excavation pit 3.
VII.b.	*Koraha* :—A rice-winnower type of bowl with a foot. It has a wide mouth and a rim that is emphasized on the outside. The curve that commences at the rim is continued along the side to the bottom where a foot is luted to steady the vessel. It has characteristic comb marks on the inside.	Fig. 3. Nugegoda Vidyodaya University Museum—no number.
VII.c.	*Koraha* :—A rice-winnower type of bowl with a foot. It has a wide mouth and a rim that is emphasized on the inside and outside which is distinctly flat at the top. The curve that commences at the rim is continued along the side to the bottom where a foot is luted to steady the vessel. It has characteristic comb marks on the inside.	Fig. 3. Anurādhapura Museum—Gedigē site.

Code	Description	Reference
VIII.a.	*Batvalañda* :—A bowl-with-foot type of vessel which has a wide mouth and a rim that is only emphasized on the outside. It has no shoulder. The curve that commences at the rim is continued along the side to the bottom where a foot is luted to steady the vessel when placed on a flat surface.	Fig. 3. Anurādhapura Museum—exhibit No. L. N.
IX.a.	*Mūḍiya* :—A lid of a shallow-domical type. It has a flared rim and sits over a vessel that is similar in size. This has a luted circular hand grip at the top.	Fig. 3. Nugegoda Vidyodaya university Museum—no number.
IX.b.	*Mūḍiya* :—A lid of a shallow-domical type purpose made for the vessel it covers. It has a vertical edge that surrounds the rim of the vessel and also sits on the moulded rim. The lid has a luted circular hand grip at the top.	Fig. 3. Colombo Museum— exhibit No. 21-57-99-21 (3).
IX.c.	*Mūḍiya* :—A lid of a conical type. It has no moulded rim and covers any vessel that is smaller in size. This has a circular hand grip at the top.	Fig. 3. Colombo Archaeological Laboratory—Pomparippu cemetery site.
IX.d.	*Mūḍiya* :—A lid of a deep-domical type that is used to cover food which is steamed. The domical shape of the cover is continued in a smooth curve and ends in a moulded rim that is emphasized only on the outside. It has a luted circular hand grip at the top.	Fig. 3. Nugegoda Vidyodaya University Museum—no number.
X.a.	*Ätiliya* :— A wide-mouthed-shallow-cooking-vessel type which has a mouth that is wider than its belly. The rim flattens outwards.	Fig. 3. Nugegoda Vidyodaya University Museum—no number.
XI.a.	*Kuṇḍahaṭṭiya* :—A wide-mouthed-shallow-vessel type which has a mouth that is almost the same size as the belly. The vessel is shallower than the *ätiliya*. This vessel has a very squat spherical body. The underneath is not patterned. The rim is turned outwards.	Fig. 4. Nugegoda Vidyodaya University Museum—no number
XI.b.	*Kuṇḍahaṭṭiya*:—A wide-mouthed-shallow-vessel type which has a mouth that is almost the same size as the belly. The vessel is shallower than the *ätiliya*. This vessel has a very squat spherical body. The underneath is patterned. The rim is turned outwards.	Fig. 4. Anurādhapura Museum—Gedigē excavation pit 3.
XI.c.	*Kuṇḍahaṭṭiya* :— A wide-mouthed-shallow-cooking-vessel type which has a mouth that is almost the same size as the belly. The vessel is deeper than the *ätiliya* but shallower than the *häliya*. This vessel has a characteristically steep shoulder and meets the bottom at a sharp angle. The underneath is not patterned . The rim is turned outwards.	Fig. 4. Nugegoda Vidyodaya University Museum—no number.

Code	Description	Reference
XI.d.	*Kuṇḍahaṭṭiya* :—A wide-mouthed-shallow-vessel type that has a mouth that is almost the same size as the belly. The vessel is deeper than the *ätiliya* but shallower than the *häliya*. This vessel has a characteristically steep shoulder and meets the bottom at a sharp angle. The underneath is patterned. The rim is turned outwards.	Fig. 4. Anurādhapura Museum—Tissarāma excavation pit. A. 5.
XI.e.	*Kuṇḍahaṭṭiya* :— A wide-mouthed-shallow-cooking-vessel type that has a mouth that is almost the same size as the belly. The vessel is deeper than the *ätiliya* but shallower than the *häliya*. This vessel has a characteristic squat spherical body. The underneath is not patterned. The rim is turned outwards.	Fig. 4. Anurādhapura Museum— Site unknown.
XI.f.	*Kuṇḍahaṭṭiya* :—A wide-mouthed-shallow-vessel type that has a mouth that is almost the same size as the belly. The vessel is deeper than the *ätiliya* but shallower than the *häliya*. This vessel has a characteristic squat spherical body. The underneath is patterned. The rim is turned outwards.	Fig. 4. Anurādhapura Museum— Tissarāma site.
XII.a.	*Häliya* :—A squat-pot type that has a mouth which is smaller than the belly but wider than the *muṭṭiya*. The vessel is also deeper than the *Kuṇḍahaṭṭiya*. It has a flared rim no neck and sloping shoulders that meet the convex bottom to form a sharp angle.	Fig. 4. Nugegoda Vidyodaya University Museum—no number.
XII.b.	*Häliya* :—A squat-pot type that has a mouth which is smaller than the belly but wider than the *muṭṭiya*. The vessel is also deeper than the *kuṇḍahaṭṭiya*. It has a flared rim no neck and curved shoulders that meet the convex bottom in a continuous curve.	Fig. 4. Colombo Museum— exhibit No. 32-51-459 (2).
XII.c.	*Häliya* :—A squat-pot type that has a mouth which is smaller than the belly but wider than the *muṭṭiya*. The vessel is also deeper than the *kuṇḍahaṭṭiya*. It has a flared rim, no neck and curving shoulders that meet the convex bottom of the vessel in a continuous curve. A luted foot is fixed to the bottom of the vessel to enable it to rest on a flat surface while the vessel is used for storage purposes.	Fig. 4. Colombo Museum— exhibit No. 21-57-99-21 (3).
XIII.a.	*Appalla* :—This is a large *häliya* in shape. It has a flared rim, no neck and slopping shoulders that meet the convex bottom to form a sharp angle.	Fig. 5. Nugegoda Vidyodaya University Museum—no number.
XIII.b.	*Appalla* :—This is a large *häliya* in shape. It has a flared rim, no neck and curving shoulders that meet the convex bottom in a continuous curve.	Fig. 5. Colombo Museum— exhibit No. 48-4-213.
XIV.a.	*Muṭṭiya* :—A squat-pot type that has a mouth which is much smaller than the belly and that of the *häliya*. It has a flared rim, no neck and sloping shoulders that meet the convex bottom to form a sharp angle.	Fig. 5. Nugegoda Vidyodaya University Museum—no number.

Code	Description	Reference
XIV.b.	*Muṭṭiya* :—A squat-pot type that has a mouth which is much smaller than the be'ly and that of the *häliya*. It has a flared rim, no neck and curving shoulders that meet the convex bottom in a continuous curve.	Fig. 5 Anurādhapura Museum—Pomparippu cemetery site.
XIV.c.	*Muṭṭiya* :—A squat-pot type that has a mouth which is much smaller than the belly and that of the *häliya*. It has a flared rim, a neck and sloping shoulders that meet the convex bottom to form a sharp angle.	Fig. 5. Anurādhapura Museum—Pomparippu cemetery site.
XIV.d.	*Muṭṭiya* :—A squat-pot type that has a mouth which is much smaller than the belly and that of the *häliya*. It has a flared rim, a neck and curving shoulders to meet the convex bottom in a continuous curve.	Fig. 5. Anurādhapura Museum—Pomparippu cemetery site.
XIV.e.	*Muṭṭiya* :—A squat-pot type that has a mouth which is much smaller than the belly and that of the *häliya*. It has a flared rim, no neck and a pear-shaped body.	Fig. 5. Colombo Museum exhibit No. 31-9-453 (50).
XIV.f.	*Muṭṭiya*:–A squat-pot type that has a mouth which is much smaller than the belly and that of the *häliya*. It has a flared rim, no neck, and pear-shaped body and has rough patterning on the body.	Fig. 5. Anurādhapura Museum—Tissarāma site.
XV.a.	*Storage pot* :—This is a very large *muṭṭiya* used for storage. It has a flared rim, no neck and sloping shoulders that meet the convex bottom in a continuous curve. The body of the vessel has a rough patterning.	Fig. 6. Colombo Museum—exhibit No. 17-680-354 (C).
XV.b.	*Storage pot* :—This is a very large *muṭṭiya* used for storage. It has a flared rim, no neck and sloping shoulders that meet the pointed bottom in a continuous curve. The body of the vessel has a rough patterning.	Fig. 7. Colombo Museum—exhibit No. 17-680-354 (B).
XVI.a.	*Funerary Urn* :—An urn type with a mouth similar in size to a *muṭṭiya*, bulging sides and a flat bottom. It is large enough to contain a corpse. These are patterned on the outside.	Fig. 8. Archaeological Survey of Ceylon Annual Report 1957.
XVI.b.	*Funerary Urn* :—An urn type with a mouth similar in size to a *muṭṭiya*, bulging sides and a pointed bottom. It is large enough to contain a corpse.	Fig. 9. Archaeological Survey of Ceylon Annual Report 1957.
XVI.c.	*Funerary Urn* :—An urn type with a mouth similar in size to a *muṭṭiya*, bulging sides and a round bottom. It is not large enough to contain a corpse but used for secondary burial.	Fig. 9. Colombo Archaeological Laboratory-Pomparippu cemetery site.
XVII.a.	*Kale* :—A water-pot type with a flared rim narrow mouth and round belly. It has a short neck.	Fig. 10. Anurādhapura Museum—exhibit No. C/8/17.

Code	Description	Reference
XVII.b.	*Kale* :—A water-pot type with a flared rim narrow mouth and round belly. It has a long neck.	Fig. 10. Colombo Museum—exhibit No. 32-53-459 (11).
XVII.c.	*Kale* :—A water-pot type without a flared rim narrow mouth and round belly. It has a characteristic stiff collar type of neck.	Fig. 10. Colombo Museum exhibit No. 21-57-27-5.
XVIII.a.	*Burulettuva* :—A goblet type used for storing drinking water. It has a round belly and a long neck that is used as a grip. The bottom of the vessel is flat.	Fig. 10. Nugegoda Vidyodaya University Museum—no number.
XVIII.b.	*Burulettuva* :—A goblet type used for storing drinking water. It has a round belly and short neck that is used as a grip with a flared rim. The bottom of the vessel is flat.	Fig. 10. Nugegoda Vidyodaya University Museum—no number.
XIX.a.	*Kotale* :—A spouted-vessel type that has a round belly with or without a luted foot. The spout is plain and conical in shape. The round mouth with a flared rim has a simple neck that is used as a grip.	Fig. 10. Anurādhapura Museum—exhibit No. C/8/12.
XIX.b.	*Kotale* :—A spouted-vessel type with a round belly and with or without a luted foot. The conical spout has a drip-disc at the tip. The round mouth with a flared rim has a simple neck that is used as a grip.	Fig. 10. Anurādhapura Museum—exhibit No. C/8/3.
XIX.c.	*Kotale* :—A spouted-vessel type with a round belly with or without a luted foot. The conical spout has many discs. The round mouth with a flared rim has a simple neck that is used as a grip.	Fig. 10. Anurādhapura Museum—exhibit No. C/8/13.
XX.a.	*Pūṇāva* :—A spouted-vessel type with a round belly and with or without a luted foot. There are many conical spouts. The mouth has a tiger head and these are seldom fired. They are often found in a broken state.	Fig. 11. Nugegoda Vidyodaya University Museum—no number.
XXI.a.	*Diya-isnaya* :—A sprinkler-vessel with a vertical spout, a large neck and a spherical body. The spout has a distinct drip circle round it.	Fig. 11. Anurādhapura Museum—Ransimālaka site.
XXII.a.	*Lipa* :—An earthenware-fire-place type. A shallow vessel to contain the coals and three supports positioned within to hold the cooking pot. The exterior is convex.	Fig. 11. Anurādhapura Museum—exhibit No. 316.
XXII.b.	*Lipa* :—An earthenware-fire-place type, a vessel to contain the coals or hot sand and three supports positioned on the rim as a support for a cooking pot.	Fig. 11. Nugegoda Vidyodaya University Museum—no number.

Code	Description	Reference
XXII.c.	*Lipa* :—An earthenware-fire-place type together with the cooking pan. The unit is meant to be placed over a fire for controlled cooking while the pan is incorporated in the design of the unit. Two handles are provided to enable the unit to be moved about.	Fig. 11. Nugegoda Vidyodaya University Museum —no number.
XXIII.a.	*Daranuva*:—An earthenware support or an independent foot to support a round-bottomed-vessel. It is a cyllndrical unit which is convex in section and flares out both at the top and bottom.	Fig. 11. Colombo Archaeological Laboratory—Pomparippu cemetery site.

ACKNOWLEDGEMENT

It is with appreciation that we record the assistance rendered to us by the Archaeological Commissioner, Dr. R. H. de Silva, the Director of Museums, Dr.P.H.D.H. de Silva and the Vice-Chancellor of the University of Vidyodaya, Prof. D. E. Hettiaratchi who allowed us to examine the reserach material in the various museums. We are specially grateful to Messrs. L. K. Karunaratne, S. M. Seneviratne, Lal Chandra and K. K. U. Dharmasena who so diligently prepared the plates.

Foot Notes

(1) Coomaraswamy accepts this criterion when he records, " They (pots) may be classified according to form into *Kalagedi*, *muṭṭi*, *appalla*, and *ātili*, the *kalagedi* approaching a complete sphere, the others successively shallower." (A. K. Coomaraswamy (1), *Sinhalese Earthenware*, Spolia Zeylanica, Colombo, 1907, Vol. IV, pp. 5-6.) We have adopted the original diacritical marks to a standard form in all quotations.

(2) Laurie, A. C., *A Gazetteer of the Central Province of Ceylon*, Colombo, 1896, p. 495.

(3) *Ibid.*, p. 476.

(4) Also see p. 169.

(5) Coomaraswamy (1), *opp. cit.* p. 5.

(6) *Ibid.*, p. 7.

(7) *Ibid.*, p. 7.

(8) These are usually made of metal with a small aperture at the bottom. The hour-plate is placed in a vessel of water and the time taken for it to sink indicates an unit of time. It should, however, be noted that its shape is not representative of a true *tātiya*.

(9) Geiger. W., *Culture of Ceylon in Mediaeval times*, Weesbaden, 1960, p. 48.

(10) *Cūlavaṃsa* (Tr.), Geiger. W., Colombo, 1953, 89.20.

(11) Coomaraswamy. A. K. (2), *Mediaeval Sinhalese Art*, New York, 1956, p. 221.

(12) Nevill. B., *Sinhala Verse (Kavi)*, Colombo, 1954, Vol. 2, p. 1.

(13) *Vinaya-pitaka, Suttavibhanga*. (Tr.), Horner. I. B., London, 1957, Vol. II, p. 115.

(14) Lawrie, *opp. cit.*, p. 467.

(15) Coomaraswamy (1), *opp. cit.*, p. 6.

(16) Lawrie, *opp. cit.*, p. 495.

(17) This may in fact be a large *Batvalaňda* or *Matikoppe* as the comb marks in a *koraha* could scrape the body of an infant.

(18) The vessel is in fact referred to as a *nāmbiliya;* but it is exceptionally large, being 16″ in diametre and5″ deep. (C. E. Godakumbura, *Administration Report of the Archaeological Commissioner for 1960*, p.G. 81)

(19) Coomaraswamy (1), *opp. cit.*, p. 6.

(20) Lawrie, *opp. cit.*, p. 467.

(21) Coomaraswamy (1), *opp. cit.*, p. 6. On a recent visit to the Potters' village at Kälaniya an informant described the *Koraha* as " a large *Nāmbiliya* with a foot fitted on to it," He added, that this *koraha* is differently called *Nāmbili-koraha* and *iri-koraha*,

(22) Lawrie, *opp. cit.*, p. 495.

(23) Coomaraswamy (1), *opp. cit.*, p. 6.

(24) A popular expression is '*Jādiyaṭa mūḍiya*' meaning befitting, appropriate or complementary.

(25) Coomaraswamy (2), *opp. cit.* p. 220.

(26) Coomaraswamy (1), *opp. cit.*, p. 6.

(27) Coomaraswamy (2), *opp. cit.*, p. 22.

(28) *Ibid.* ,p. 222.

(29) Raghvan. M. D., *An Antique Kandyan Vase*, Spolia Zeylanica, Colombo, 1951, Vol. 26, p. 265.

(30) Coomaraswamy (2), *opp. cit.*, p. 222.

(31) Lawrie, *opp. cit.*, p. 467.

(32) Coomaraswamy (1), *opp. cit.*, p. 6; also Lawrie, *opp. cit.*, p. 495.

(33) Gunasekera, U. A., *Pūnā Maduva or the scapegoat idea in Ceylon*, Spolia Zeylanica, Colombo, 1953, Vol. 27, p. 69.

(34) Coomaraswamy (2), *opp. cit.*, p. 220.

(35) *Ibid.*, p. 220.

(36) A popular simile in Sinhalese runs as follows:—
"*Päṇi-muṭṭiyaṭa väṭuna ambalaya vage.*"

(37) See also *karola hāliya*, p. 170

(38) Coomaraswamy (2), *opp. cit.*, p. 226.

(39) Nevill, *opp. cit.*, Vol. I, p. 65.

(40) *Ibid.*, Vol. I, p. 61.

(41) *Ibid.*, Vol. I, p. 130.

(42) Baldaeus. P., *A true and exact description of the Great Island of Ceylon* (Tr.), Pieter Brohier, Colombo, 1960, p. 336; also see Coomaraswamy (2), *opp. cit.*, p. 210.

(43) Geiger, *opp. cit.*, p. 48.

44) Cūlavaṁsa, *opp. cit.*, 92. 17.

(45) Coomaraswamy (2), *opp. cit.*, p. 221.

(46) Geiger, *opp. cit.*, pp. 48-49.

(47) Lawrie, *opp. cit.*, p. 441.

(48) Cūlavaṁsa, *opp. cit.*, 48. 144. *Taṭṭaka* is also translated as a flat bowl. T. W. Rhys Davids and W. Stede, *The Pali text Society's Pali English Dictionary*, London, 1959, p. 293 .

(49) Coomaraswamy (2), *opp. cit.*, p. 222.

(50) Deraniyagala. P. E. P., *Report of the Archaeological Survey of Ceylon for* 1956, p. G. 8.

(51) Knox. R., *A. Historical relation of Ceylon*, Colombo, 1966, p. 166.

(52) Wirz. P., *Exorcism and the art of Healing in Ceylon*, Leiden, 1954, p. 160.

(53) Coomaraswamy (2), *opp. cit.*, p. 222.

(54) Coomaraswamy (2), *opp. cit.*, p. 223.

(55) Gunasekera, *opp. cit.*, pp. 63ff.; also Wirz., *opp. cit.*, p.p. 158, 164 and Figs. 71, 72 and 73.

(56) Picture post card No. 31 of the National Museums Department.

(57) Despande. M. N., *The rock-cut caves of Pitalkora in the Deccan*, Ancient India, No. 15, p. 91.

(58) Godakumbura. C. E., *Administration Report of the Archaeological Commissioner* 1964-65, p. G. 69.

(59) Coomaraswamy (2), *opp. cit.*, p. 222.

(60) *Ibid.*, p. 222.

(61) *Ibid.*, p. 221.

(62) Deraniyagala. S., personal communication.

(63) The identification given to this form is not derived from current usage.

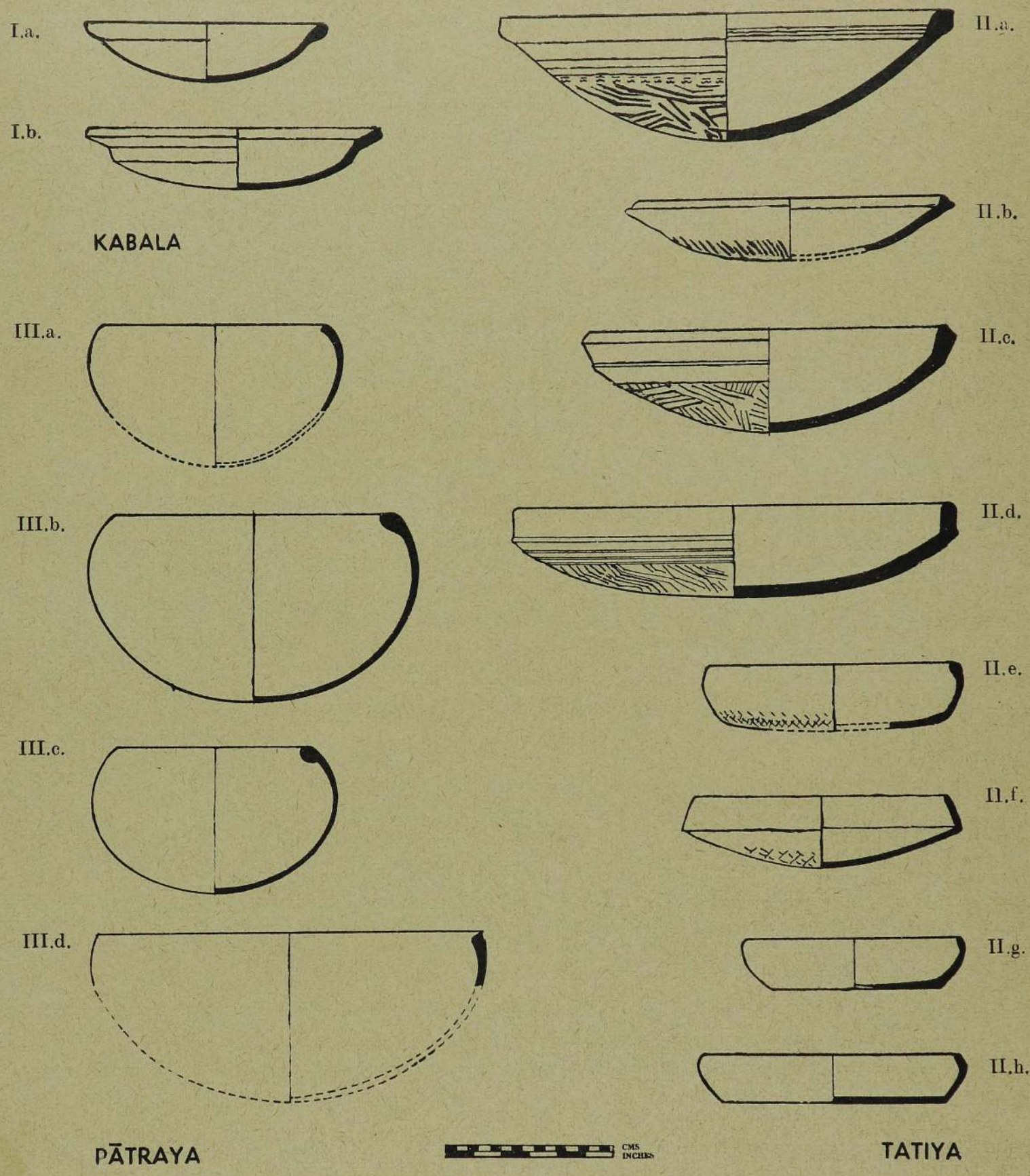
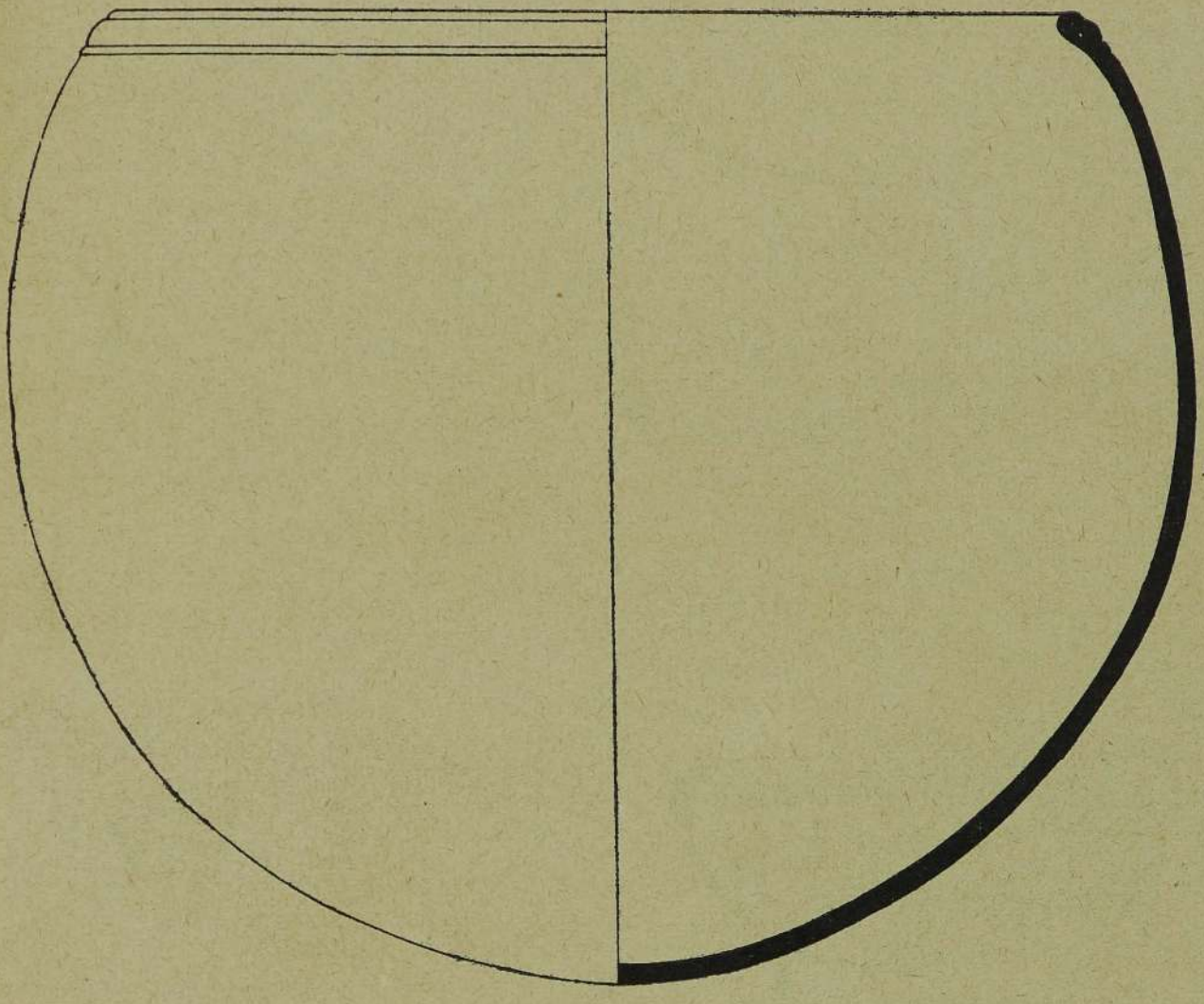


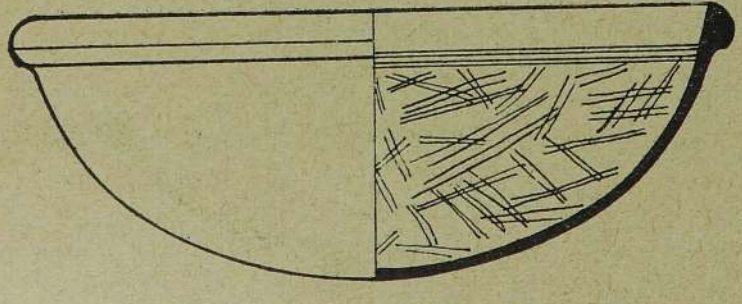
Fig. 1

IV.a.



TALIYA

VI.a.



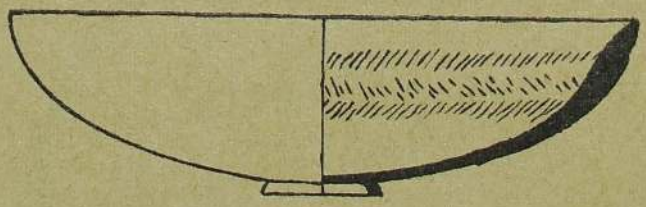
V.a.

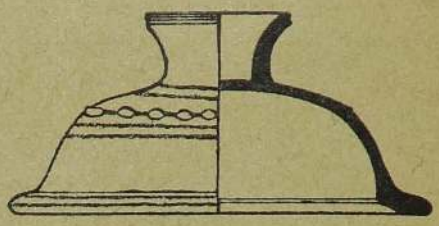
KUSALANA

NAMBILIYA

Fig. 2

VII.a.





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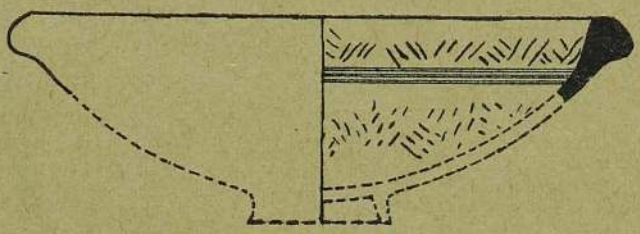

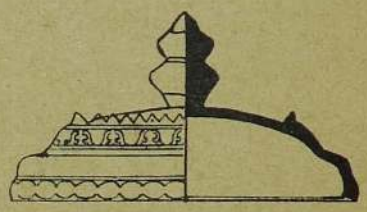

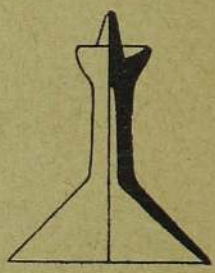

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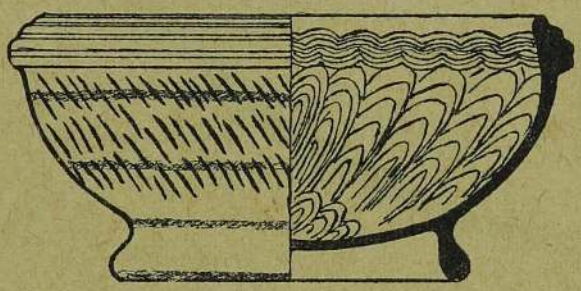
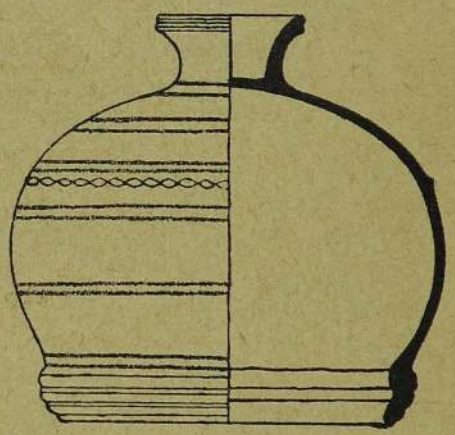
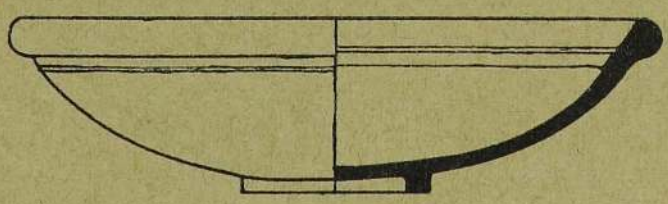


KORAHA



MŪḌIYA

VIII.a.



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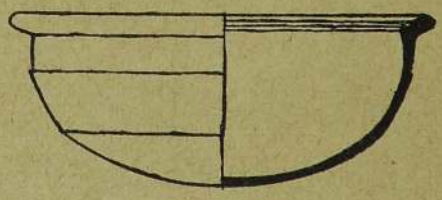


ÄTILIYA

Fig. 3

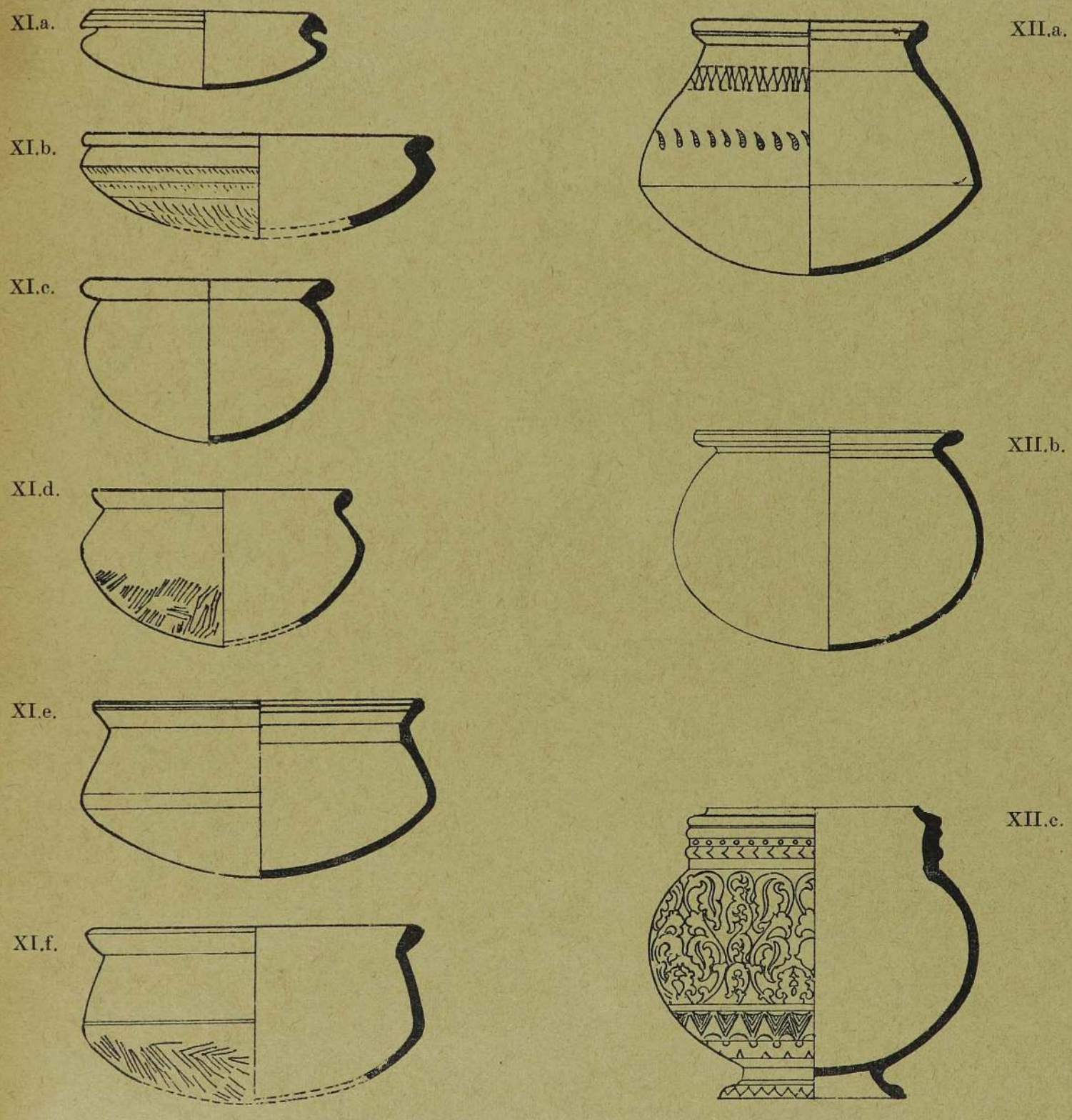
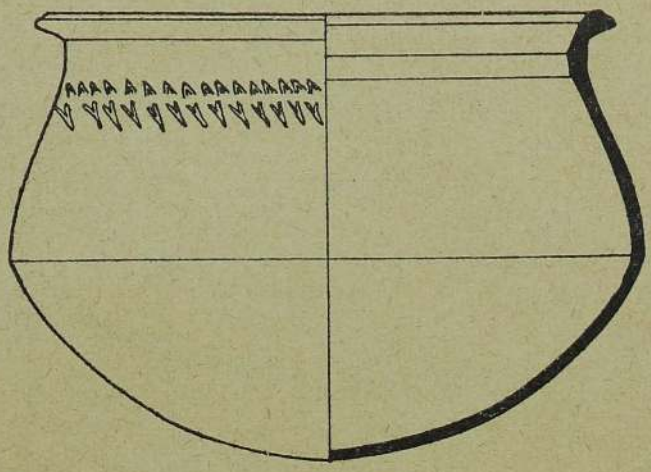


Fig. 4

XIII.a.



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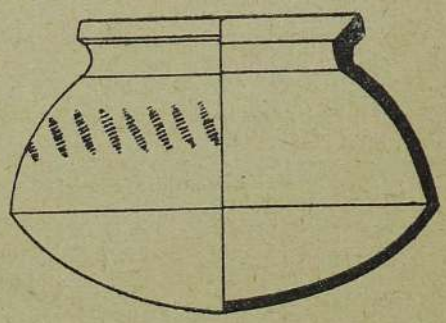

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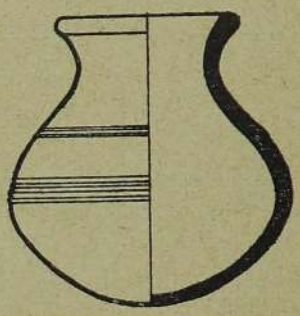

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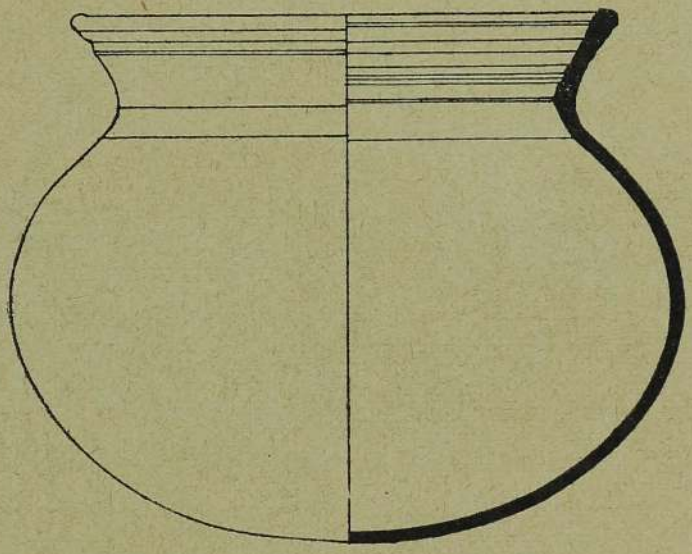

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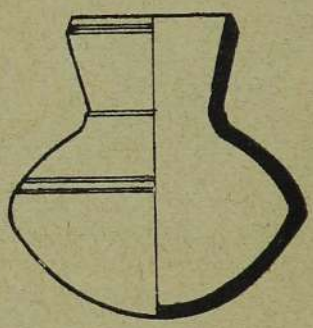
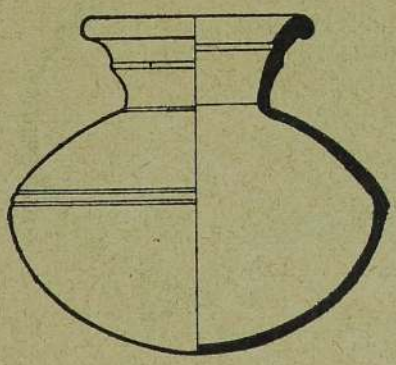


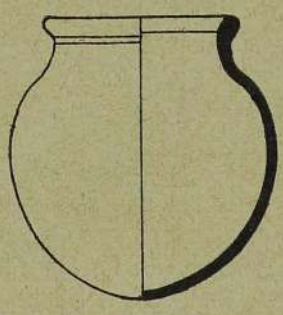
APPALLA

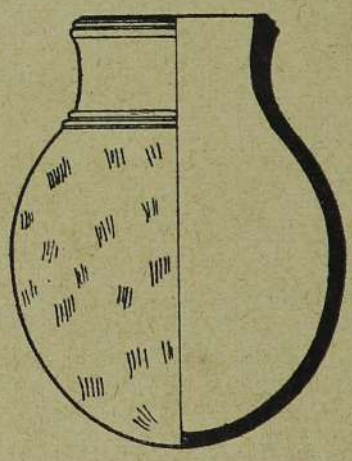
XIV.f.

XIV.d.



XIV.e.





MUṬṬIYA

Fig. 5

XV.a.

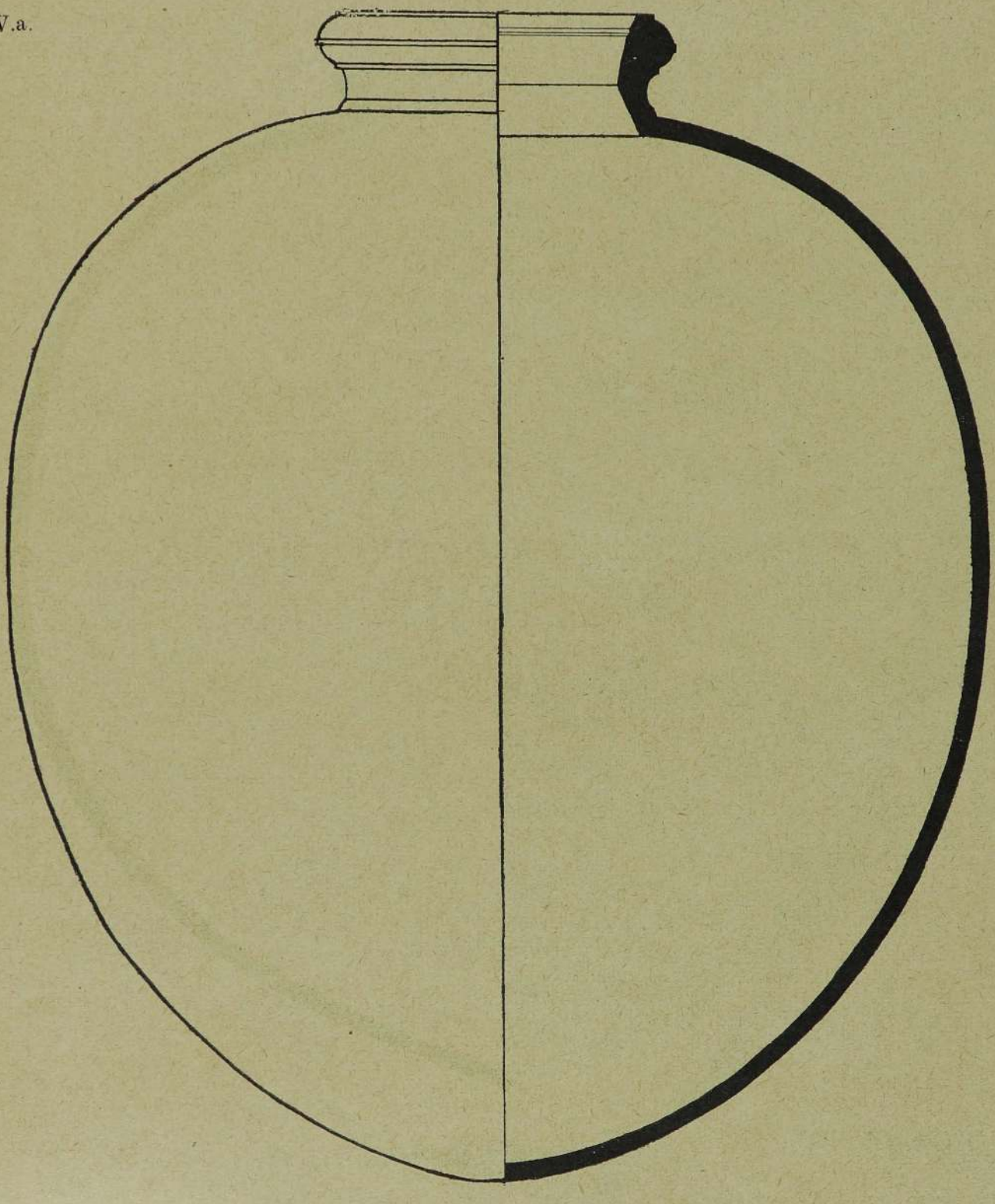


Fig. 6

XV.b.

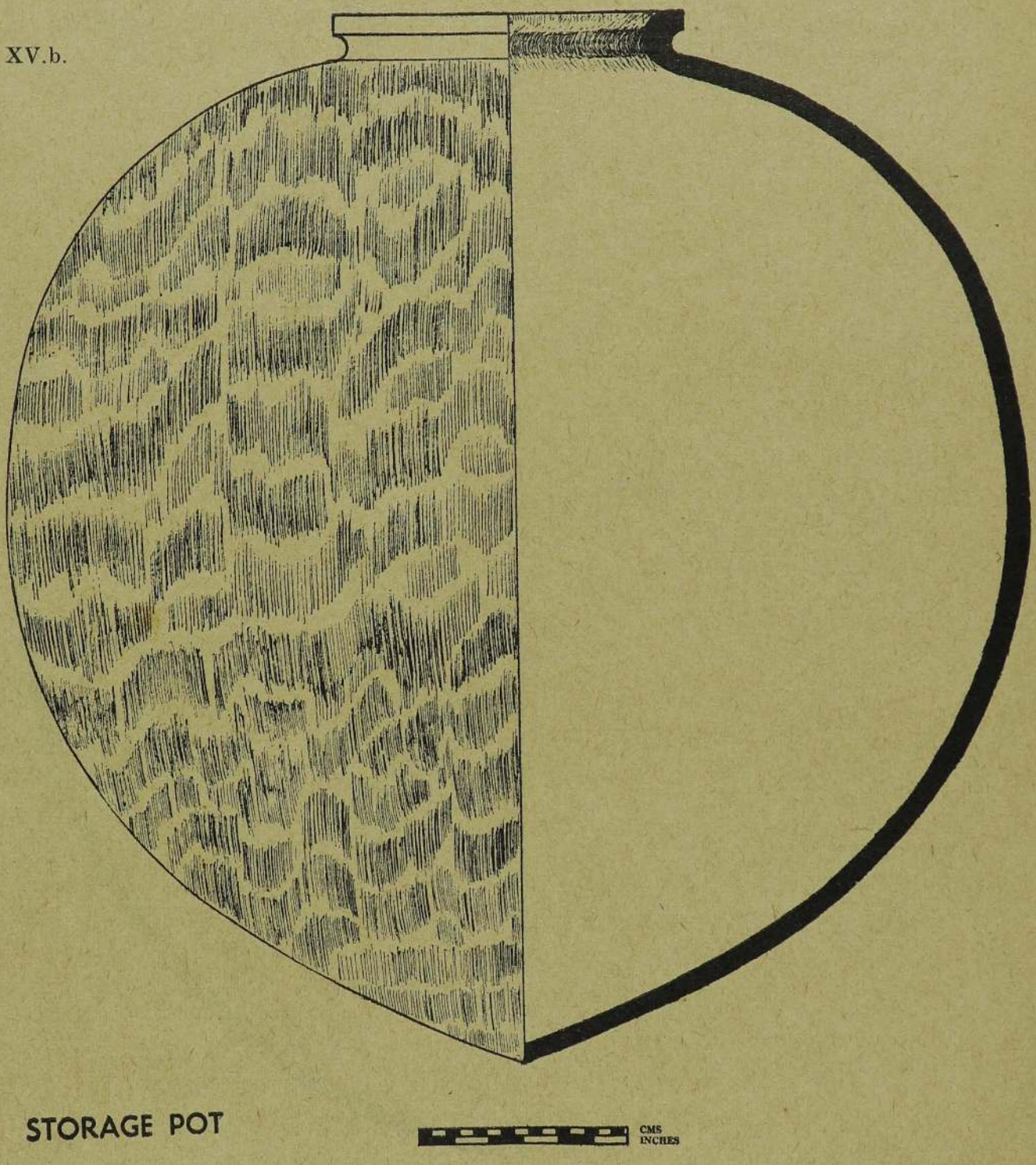
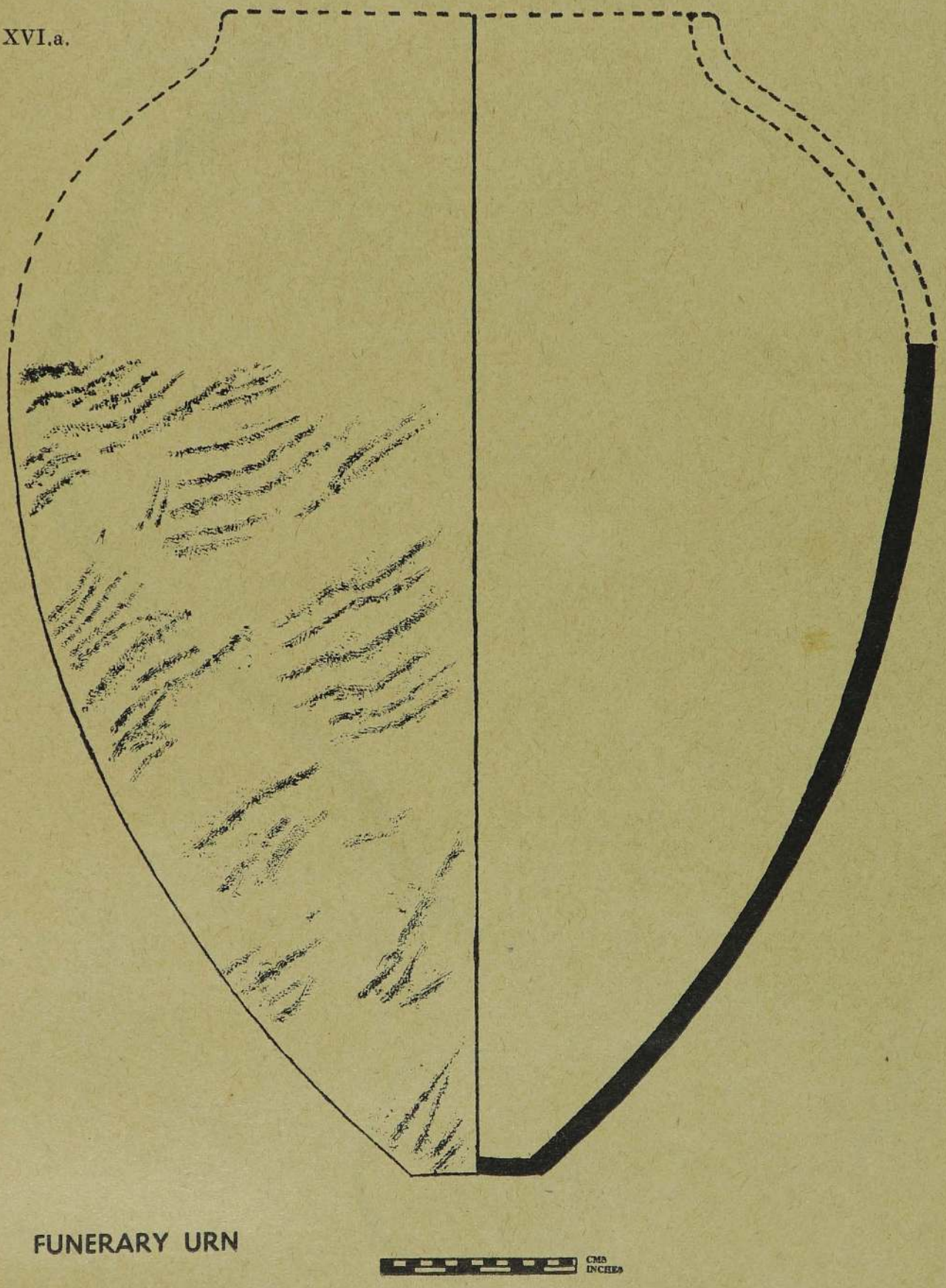


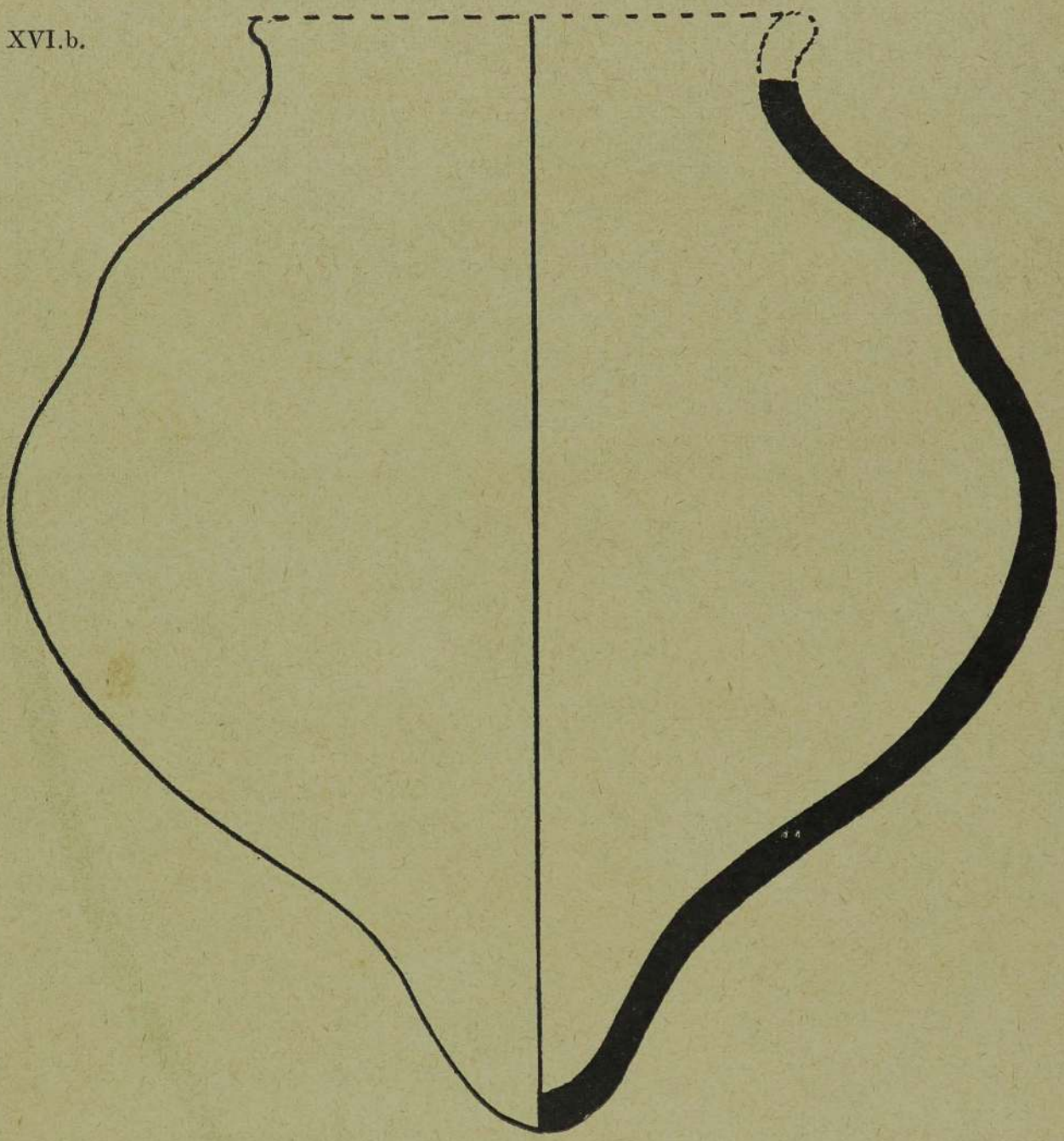
Fig. 7

XVI.a.



Fig, 8

XVI.b.



FUNERARY URN

XVI.c.

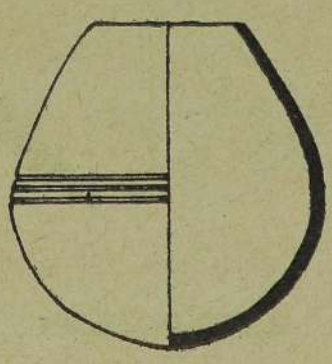


Fig. 9

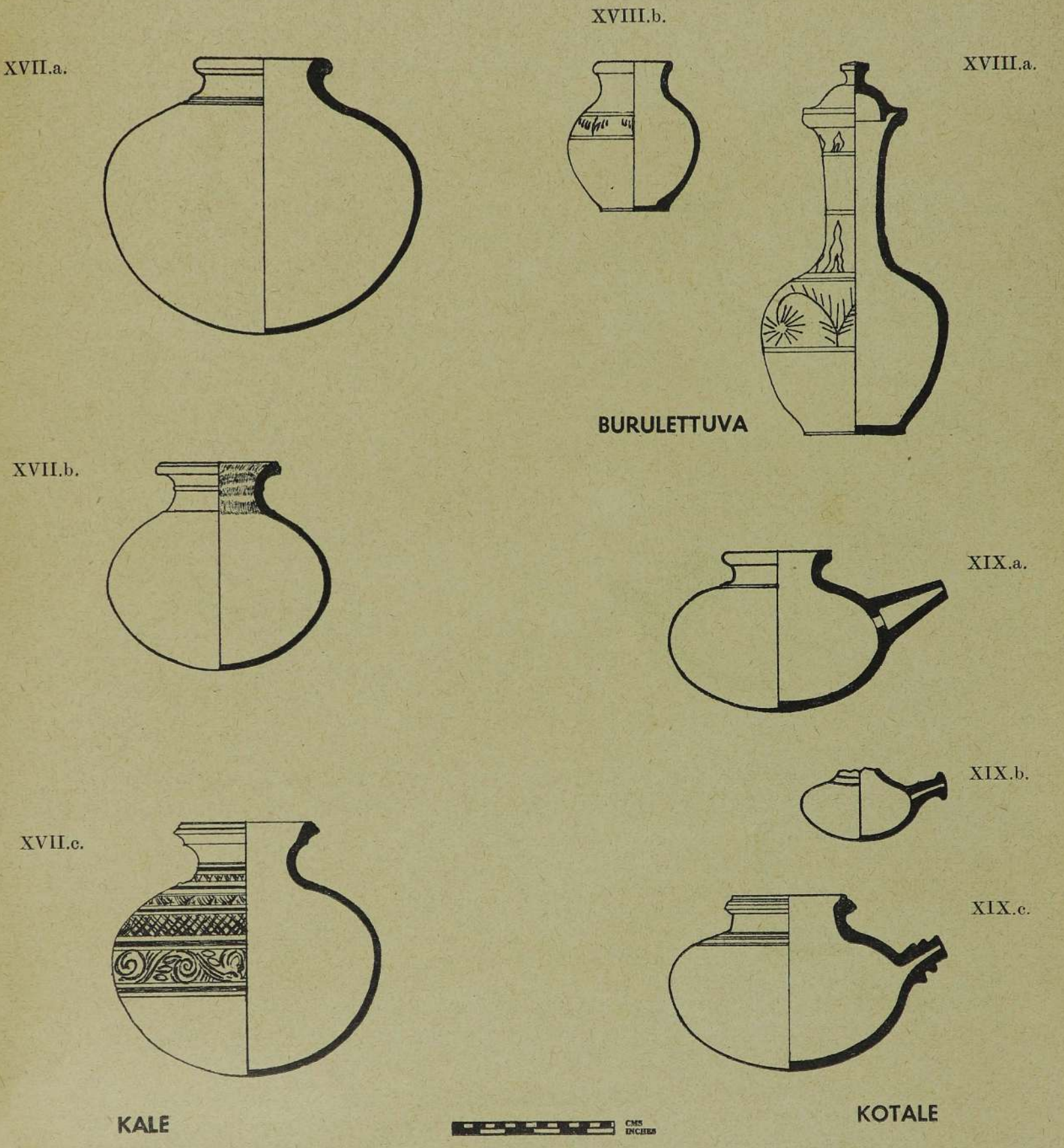
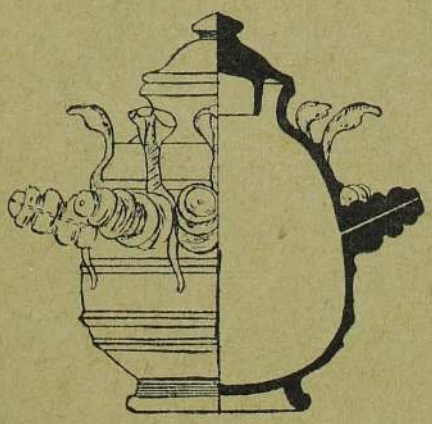


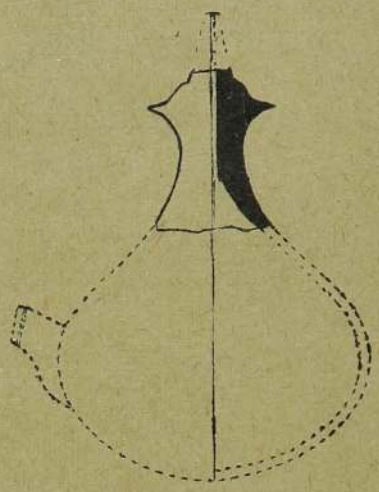
Fig. 10

XX.a.



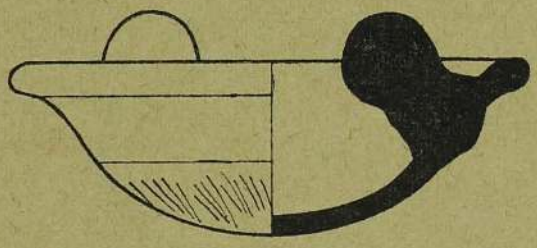
PŪNĀVA

XXI.a.



DIYA-ISNAYA

XXII.a.



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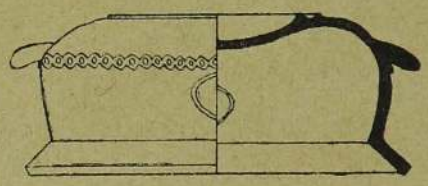

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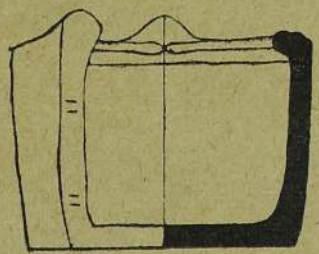
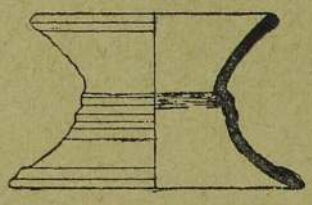


LIPA

XXIII.



DARANUVA

Fig. 11

AERIAL SURVEYS AND ARCHAEOLOGY

An indication of potentialities with special reference to the old course of the Mahaweli Ganga

A. Denis N. Fernando

THE full potential of some of the recent dramatic developments in certain fields of technology and science, and their tremendous significance and usefulness for the study of Archaeology and History have still been inadequately realised. These are developments which have revolutionised Archaeology. Some of them have even led to the total revision of accepted historical data. Their advantage lies in that some of these techniques enable the application of a precise methodology involving the identification and verification of objective data, to archaeological study.

These techniques embrace a wide spectrum of sciences but what I would refer to in this paper is just one of them, namely an important one—aerial photography. The Bronze Age monument of Stone-henge in England was the first Archaeological site to be photographed from the Air in 1906. Later on O. G. S. Crawford discovered the Bronze Age Celtic field system from photographs taken on a military photo-reconnaissance mission by the Royal Air Force. This opened a new exciting and challenging field of archaeological exploration, and today Air Survey techniques have become an accepted mode of archaeological investigations and are being increasingly used in a number of countries.

Unfortunately the application of these techniques to Ceylon Archaeological exploration has still to commence. I should like here to refer to just one casual result of an investigation which I undertook in the course of my duties

It was in 1965 that I was given the task of revising the two inches to the mile topographical sheets of the Mahaweli Basin by Air Survey Methods, in connection with the Mahaweli Development Project. While interpreting the aerial photographs, I came across what clearly appeared to be old river courses. Some of these old river courses had the same carrying capacity of the Mahaweli Ganga, i.e. their width was about the same and in some instances wider than the present Mahaweli Ganga. There was also something very strange in this discovery. The old Buddhist temples lay beside what was obviously the old Mahaweli, while there was a complete absence of temples beside the present river in this region (please see the accompanying Aerial Photograph and the map). This naturally made me come to one conclusion ; that those temples had been built on the banks of the river which then followed a course different to the present one.

Inscriptions found " in situ " near an ancient chetiya (identified today as Somawathie Chetiya) have been dated and translated by epigraphists. One of them dated between 100 B.C. and 100 A.D. (Buddhist era 450 to 650 A.B.) and translated for me by Dr. W. S. Karunaratne

of the Archaeological Department, records that " the income derived from the lands around the vihara and from the ford are to be used for the upkeep of the vihara." Now as seen in the aerial photograph, the dagoba is about a mile from the present course of the Mahaweli, and it is improbable that the ford was that far from the dagoba, as the old course is only about 175 yards from the dagoba. From this evidence, the change of the old river course at this place can be dated as having occurred after the building of the dagoba, and after the stone inscription was made, i.e. within the last 2,000 years.

The direction of the change of course is such that, it would have been a sudden change due to a cataclysmic occurrence. What strikes me as very peculiar is that to my knowledge no mention is made of this dramatic event in the chronicles of Ceylon, though it appears to have happened in historical times. This makes it still more mysterious and it is therefore necessary to investigate this matter more scientifically and date the old river course beyond reasonable doubt. Being a scientist by profession, I would naturally like to be guided by a more scientific basis, to give a more precise dating of the change of the river course. It is clear that radio active dating methods using Carbon 14 or Pollen and such like tests will be required for dating these old river courses with scientific precision.

A few more examples of the position of old temples, with respect to the present Mahaweli and the old Mahaweli are indicated in the accompanying map. It appears to me that the position of the ancient temples with respect to the old Mahaweli is no coincidence, but it only shows that they existed contemporaneously while the Mahaweli was flowing along its old course. The dating of these river courses will be of interest and use to Historians as the old chronicles will have to be read in the context of the Mahaweli Ganga of the relevant period.

The foregoing would perhaps illustrate the exciting potentialities of applying new techniques to the field of Archaeology—particularly Air Survey Techniques. The river Mahaweli alone, by itself offers wide possibilities of study, not to speak of others like the Malwathu Oya—for the earliest migratory settlements of the Sinhalese would have been on the banks of rivers, not to speak of the fortresses and temples which naturally came to be built along river ways and their tributaries (which were natural cradles for centres of civilisation in the dry zone). Indeed, here is one field where a tremendous potential is indicated for inter-disciplinary co-operation between the photogrammetrist and the archaeologist.

I wish to acknowledge the assistance given by Dr. W. S. Karunaratne in translating the inscription for me and to the Surveyor-General for granting me permission for reproducing the accompanying aerial photograph;

References:

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A. D. N. Fernando; 1967 " The use of Aerial Survey Methods in the study of river courses "; Procc. Cey. Assoc. for the Adv. of Science.

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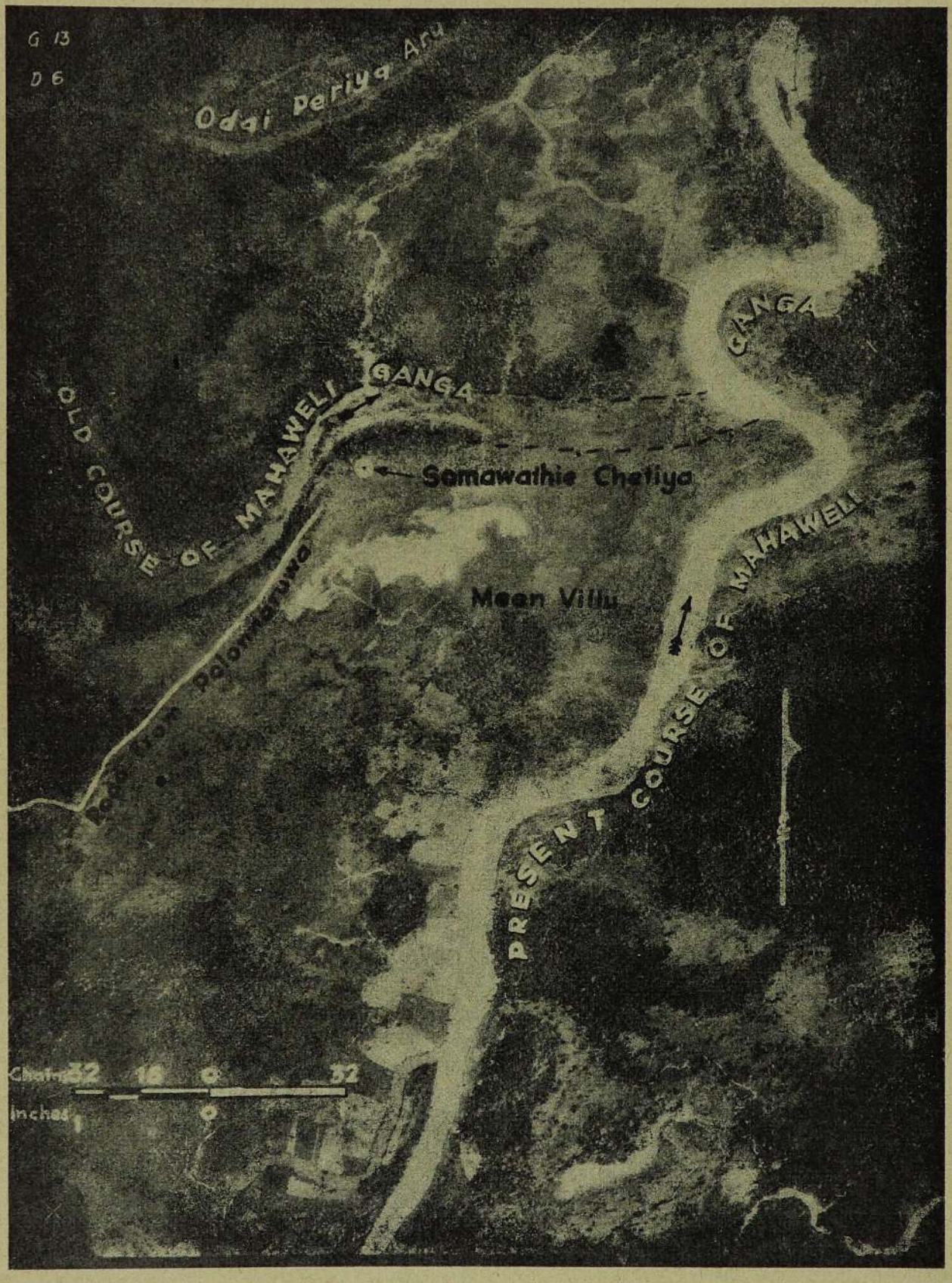
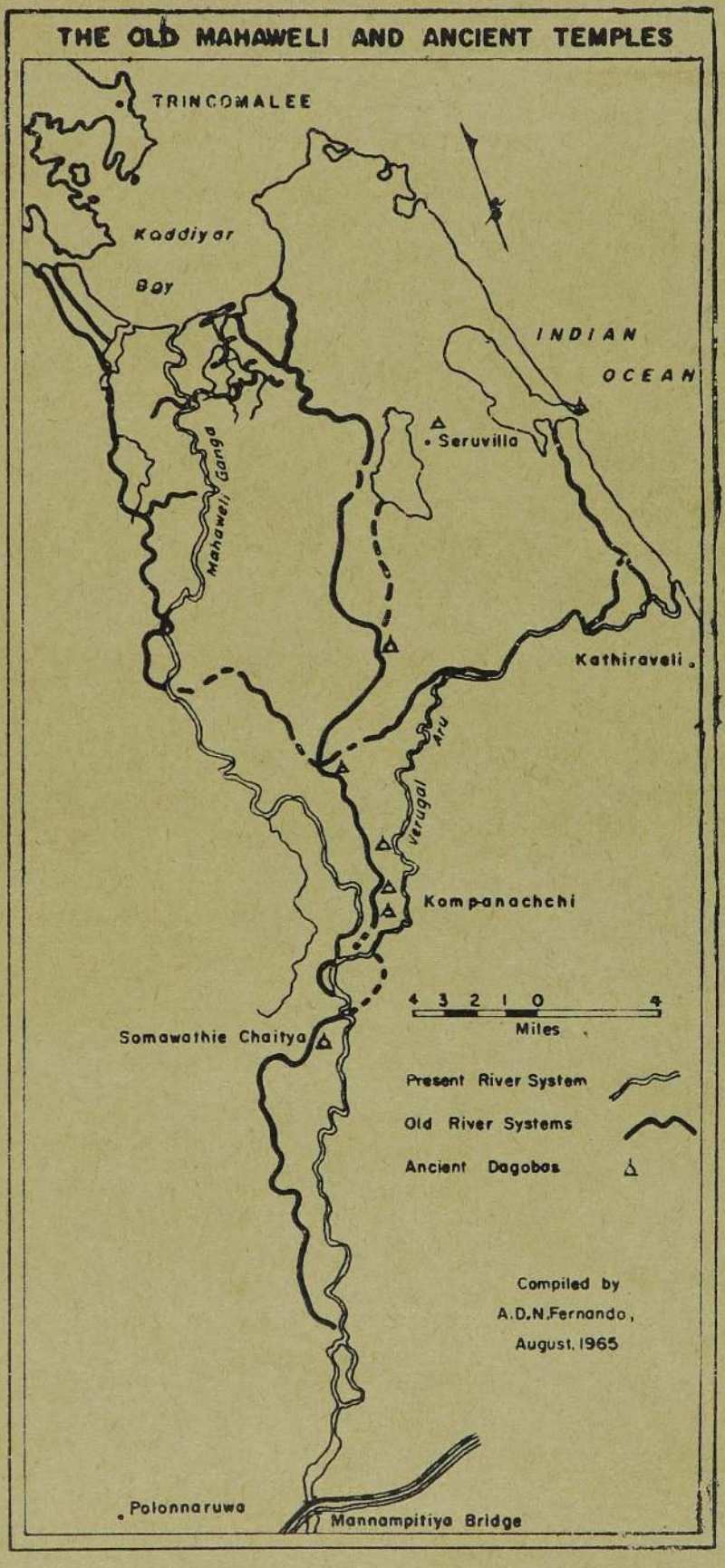


Aerial photograph showing the Old a d New courses of Mahaweli.



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