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**Records of the
Zoological Survey of India**

**Animal Remains from Jaugada
Archaeological Site, Orissa and their
Relevance to the Ancient Civilization**

**S. NANDY
T.K. PAL**

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INTRODUCTION

The archaeology of India south to the Vindhyan range, the Deccan or peninsular India has had certain distinctive features and that revealed a chronology of an Indian culture characteristically different from the prehistoric cultures of other parts of the country. Though studies on the southern Neolithic was initiated in the first half of the nineteenth century our knowledge and concept about the civilization grow considerably during the decades since India's independence (Settar & Korisettar, 2002). A neolithic culture was explored at Jaugada, an important settlement site in southern Orissa. The antiquity of the place was believed by the local people to be as old as the days of 'Mahabharata' when Duryodhan constructed a lac fort with an evil intention of ruining 'Pandavas' Although its antiquity could not be traced back to the time of Mahabharata but its history could well be established since the time of Mauryan emperor Asoka, with supportive facts. The place received attention of the archaeologists since the time of Beglar who visited Jaugada in 1874 (Cunningham & Beglar, 1882) and said that the original name of the place was *Jagata* from which the current name Jaugada (or 'lac fort') was transformed. In post-independence period Jaugada was systematically excavated by the Archaeological survey of India (ASI) in 1956-57 which revealed potteries, coins, craft works, and various objects of archaeological importance along with remains of animals.

The aim of the present work is to deal with the zooarchaeological aspects of Jaugada on the basis of recovered animal remains and to throw some light upon the past environmental set-up of the place and human-animal relationship in the cultural life of the past human folk.

LOCATION

Jaugada is situated (Lat. 19 ° 33' N and Long. 84 ° 50' E) near village Pandia on the northern bank of Rishikulya River, at a distance of about 30 Km. from Berhampur and 5 km. from Purushottampur, a nearby town of Ganjam district of Orissa (Text-figs. 1 & 2) The place bears a great historical importance as one of the famous rock edicts of Asoka has been located here.

HISTORY OF EXCAVATION

Jaugada was excavated by Archaeological Survey of India, under direction of Debala Mitra in 1956-57. Five cuttings were made in different parts of the site and a trench laid across the defensive rampart. From that excavation, a number of materials such as plain potteries, painted potteries, vessels, iron implements and beads of shells, bones, agates,

crystals etc. were found. Punch marked coins of Maruyan age and Puri-Kushan coins were also recovered from the site.

From the archaeological excavation, it is revealed that, Jaugada was a quadrangular earthen fort surrounded by a deep and wide moat. The fortification round the town consisted of an earthen rampart reaching to an average height of 25 ft (7.62 m.) and breadth of 70 ft (21.336 m.). It was roughly square in plan, with each side pierced by two gateways about half a mile in length.

On the natural soil was a sandy layer of flimsy occupational debris with sherds of fine black and red ware, over which the first defensive wall was built. Its material was derived from a ditch cut into the sandy layer. In the core of the wall stray shreds of the same nature as in the sandy layer were found. In the next phase, a thick deposit of clay was laid on the existing top of the wall and later on was erected on the inner side a 60 cm. high wall of rubble and stone clips with large boulders on the top. The defensive wall continued to be heightened but its top was largely eroded (Ghosh, 1989).

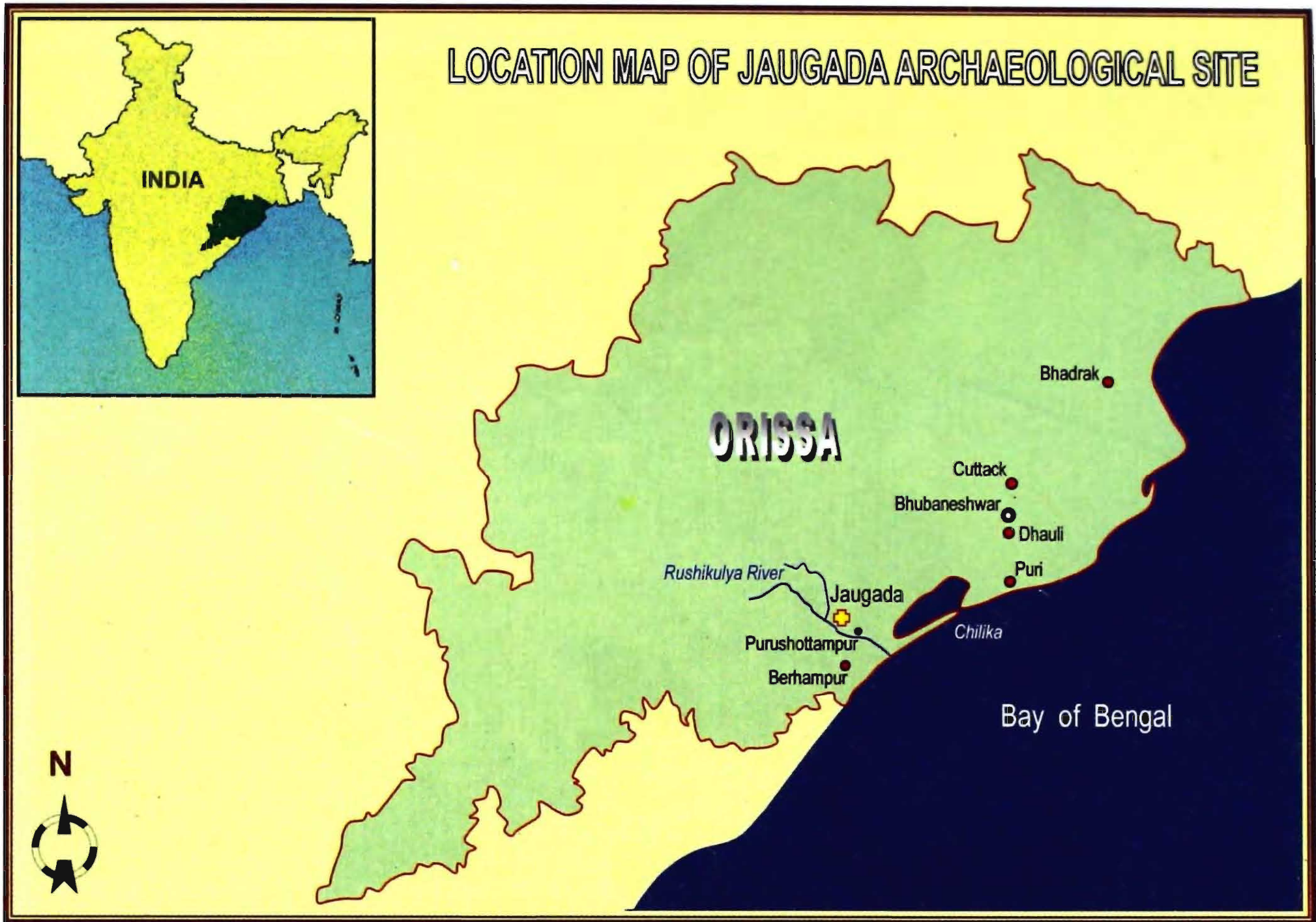
CULTURAL SEQUENCE

According to Das (1983), several neolithic implements or stone celts of oblong section which were found above natural soil (also surface finds) seemingly associated with black and red ware are suggestive of the Neolithic culture, well before the historic culture.

Broadly, the occupation was divided into two periods, apparent from the objects recovered from the excavations apart from the Neolithic implements of the site.

Period I represented a full fledged iron-using culture. The pottery was essentially plain and totally devoid of paintings and was utilitarian in character. From this period, three distinct wares types like ordinary dull red ware with or without slip, fine and well burnt black and red ware in the shapes of the dish and bowl and polished red ware were found. Another significant finding was a large number of beads, made of shell, bone etc along with some unfinished ones which indicate the local manufacturing of them. Post holes and patches of floorings (made of burnt earth or rammed gravel) were encountered in this period, but no brick structure was found.

In period II, brick and stone structures were scantily encountered. Principal ceramic industry of this period was a red ware, made of medium grained clay and mostly underfired, decorated with incised and applied patterns. Knobbed vessel, also found in period I, survived in this period with degenerated fabric. Other findings were some bead, mostly of semi precious stones, shell and terracotta and copper and iron objects and one punched marked coin and Puri - Kushan coins.



Text-Fig.1. Location map of Jaugada archaeological site, Ganjam district, Orissa



Text-Fig.2. Aerial view of Jaugada archaeological site. [After www.wikimapia.com]

CHRONOLOGY

Jaugada was an old fort. The excavated artifacts gave an impression that the occupation of the fort area started during the reign of Asoka (in 3rd century B.C.) and continued till 4th century A.D. The occupation of the area prior to 3rd century B.C. and after 4th century A.D. is however not ruled out. The appearance of punch marked coins can trace the history of the fort back to the pre-Maruyan era and the discovery of a copper plate grant of Madhavaraja from Purushottampur even corroborate to its existence during the Sailodbhava rule (between 550A.D. to 736 A.D.). Therefore, on the basis of these archaeological evidences its period can be tentatively assigned to a period, from the third century B.C. to about seventh century A.D.

MATERIAL AND METHODS

Many animal remains along with the objects of archaeological importance were recovered from the excavations of 1956-57 by the Archaeological Survey of India (ASI). These faunal remains belong to either of the periods I & II of early historic stage. These remains were sent to the Zoological Survey of India for examination. The animal remains are often fragmentary, fragile and considerably mineralized. A zoological-taxonomical inventory of the available animal remains is made by critical study of the samples and by comparative assessment with skeletal components of different animals in the standard reference of ZSI. Co-lateral information about the human culture and past ecological set up has been retrieved from various literatures.

SYSTEMATIC ACCOUNT OF THE ANIMAL REMAINS

The animal remains of Jaugada archaeological site are worked out and the result of it is presented in Table 1.

Table 1. Systematic analysis of animal remains recovered from Jaugada archaeological site

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
Site : JGD-3 L : XXIII-XXV Stratum : (8A)	<i>Bos indicus</i>	Fragments of ribs (2 nos.)	Heavily mineralized
	”	Fragment of horn-core	Heavily mineralized
JGD-3 XXX-XXXI (2C)	”	Distal fragment of the shaft of right humerus without distal epiphysis a one	Young, with chopping mark
	”	Fragment of the lateral tuberosity of humerus	Broken
JGD-1 O-N (3),(4)	<i>Bubalus bubalis</i>	Fragments of horn-core (2 nos.)	Eroded
JGD-1 O-IV (4)	<i>Bos indicus</i>	Fragment of the blade of scapula	Heavily mineralized
	”	Fragment of a rib	Broken
JGD-3 XXX-XXXI (2C)	”	Fragment of the medial condyle of right humerus	”
JGD-3 XXIX-XXX (2C)	”	Fragments of thoracic vertebra (5 nos.)	Two with cut mark
	”	Right 1 st phalanx of fore foot	Broken
	”	Right lunate bone of the right proximal carpus	Almost intact
	”	Fragment of the shaft of 3 rd and 4 th metacarpal	Broken
	<i>Bubalus bubalis</i>	Longitudinal half fragment of the 1 st phalanx	Longitudinally broken

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bubalus bubalis</i>	Right upper 3 rd premolar teeth	Intact
JGD-4 VI-VIII (7A)	<i>Bos indicus</i>	Fragments of the shafts of femur (6 nos.)	Broken
JGD-2 GK (10A)	”	Fragment of the anterior body of sacrum	”
	”	Fragment of rib	”
	”	Left upper 1 st molar teeth	”
JGD-2 O'-N' (11)	<i>Bubalus bubalis</i>	Left lower 3 rd molar	Charred
	<i>Bos indicus</i>	Fragment of the left lower 1 st molar	Of young
	”	Left lower 1 st premolar	Charred
	”	Fragments of the shaft of femur (6 nos.)	All charred
	<i>Sus scrofa</i>	Fragments of right upper 1 st molar	Charred
	”	Right calcaneum	Of young
JGD-1 O-IV (3)	<i>Bos indicus</i>	Fragments of the shaft of 3 rd & 4 th metatarsal	Of young, charred
JGD-2 O'-N' (11)	”	Distal fragment of the 1 st phalanx of forefoot	Partly charred
	”	Proximal fragment of rib	Broken
	<i>Ovis vignei</i>	Fragment of the shaft of femur	Charred
	”	Fragment of the shaft of tibia	Partly charred
JGD-2 O-VI (10)	<i>Bos indicus</i>	Proximal end fragment of the right scapula with glenoid cavity & a portion of neck	With distinct cutting and chopping mark
	”	Fragment of the head of a femur	Of young
	”	Fragment of the medial condyle of the left humerus	Broken
	”	Proximal fragment of the left ulna with olecranon process, processus anconaeus and a portion of semilunar notch	Of young
	”	Fragment of a rib	Broken

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of the body of a thoracic vertebra	Broken
	"	Fragment of the proximal end of the right astragalus with a portion of lateral and medial trochlea	Charred
	"	Fragment of the proximal epiphysis of the right tibia	With distinct cut mark
	"	Fragment of the body of a cervical vertebra	Broken
	"	Fragment of the left pelvis with a portion of acetabulum	With definite cut mark
	"	Fragments of lumber vertebra (3 nos.)	Of young, charred
	"	Distal fragment of the shaft of tibia	Of young, With distinct cut marks
JGD-3 XXIV'-XXV (2D)	"	Rib fragment	Broken
JGD-3 XXX-XXXI (2C)	"	Fragment of the shaft of tibia	"
	"	Fragmentary piece of ilium of the pelvic girdle	"
	"	Upper 1 st premolars (2 nos.)	Eroded very much
JGD-3 XXVII-XXIX (2C)	"	Fragments of ribs (2 nos.)	Broken
JGD-1 IV-VIII (4A)	<i>Bubalus bubalis</i>	Fragments of horn cores (2 nos.)	Eroded and broken
JGD-2 M-P (14)	<i>Bos indicus</i>	Fragment of the blade of scapula with broken spine	Charred
	"	Broken 1 st phalanx of the fore foot without distal portion	"
	"	Fragment of a rib	"

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of the distal end of 1 st phalanx	Charred
	"	Proximal end fragment of the right scapula with a portion of glenoid cavity and neck	Charred and with cut mark
	"	Fragment of left calcaneum with a portion of shaft and a portion of sustentaculum tali	Broken
	"	Fragment of the right calcaneum with sustentaculum tali	"
	"	Fragment of the right calcaneum	"
JGD-3 XXI-XXVII (8)	"	Fragmentary piece of the lateral proximal end of the 3 rd and 4 th metacarpal	"
JGD-2 O-V (12)	"	Right upper 3 rd premolar	Intact
	"	Fragment of a rib	Charred
	"	Proximal fragmentary piece of the lateral end of the 3 rd and 4 th metacarpal	Broken
	"	Fragment of the maxilla of skull with facial tuberosity	"
JGD-1 O-IV (4A)	"	Right upper 2 nd molar teeth	Intact
JGD-2 O-IV (10)	"	Left upper 3 rd premolar	"
	"	Right upper 1 st molar	"
	"	Fragment of the anterior portion of the horizontal ramus of mandible with a portion of body (corpus mandibulae) and mental foramina	Charred
	"	Fragment of the tip of tuber calcis of calcaneum	Broken
	"	Fragment of the shaft of femur	Charred
	"	Fragment of the ischium of left pelvis	Broken
	"	Fragment of upper jaw without teeth	"
JGD-3 XIX-XX (8)	"	Left lower 1 st molar of an young one	Intact
	"	Fragments of a lower molar teeth (4 nos.)	Broken

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
JGD-2 II-IV (4)	<i>Bos indicus</i>	Left upper 1 st molar	Intact
	''	Right upper 3 rd premolar	''
	<i>Capra hircus</i>	Fragment of the shaft of tibia	Broken
JGD-2 O-IV (10)(11)(12)(13)	<i>Bos indicus</i>	Fragment of the right horizontal ramus of mandible with 3 rd molar teeth	Charred
	''	Fragment of the right scapho-cuboid of the proximal tarsal	Slightly charred
	<i>Ovis vignei</i>	Fragment of the right pelvis with a portion of acetabulum & ischium	Charred
	''	Fragment of the shaft of ileum of the right pelvis	''
	''	Fragment of the great cornu of hyoid bone	Charred
JGD-4 IV-VI (6)	<i>Bos indicus</i>	Distal fragment of the shaft of femur	With cut mark
	''	Distal condyles of the 3 rd & 4 th metatarsal bone (2 nos.)	Broken end
	''	Proximal fragmentary piece of left 3 rd and 4 th metacarpal	Broken
	''	Fragment of the right scaphoid of the proximal carpus	''
JGD-1 O-IV (4C)	''	Left upper 3 rd premolar	Intact
JGD-1 O-IV (4)	''	Fragment of the right vertical ramus of the mandible with a portion of coronoid process & condyle	Broken
	''	Fragment of the shaft of femur	''
JGD-3 XXXIII-XXXIV (11)	''	Distal end fragment of the right humerus with portion of lateral condyle	''
	<i>Canis familiaris</i>	Right 5 th metacarpal	Slightly broken
	''	Left 3 rd metatarsal	''

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Canis familiaris</i>	Proximal fragment of the 4 th metatarsal	Broken
	"	5 th metatarsal	Slightly broken
	"	Right 4 th metatarsal	"
	"	Fragment of left tibia	Broken
JGD-2 M-P (12)	<i>Sus scrofa cristatus</i>	Proximal fragmentary piece of the left humerus with lateral tuberosity	Partly charred
	"	Fragment of the right horizontal ramus of the mandible with a portion of 1 st molar teeth	Charred
	"	Proximal fragment of the left humerus	
	<i>Bos indicus</i>	Fragment of the shaft of left ulna	Charred
	"	Left upper 1 st premolar	Partly charred
	"	Fragmentary pieces of mandible (2 nos.)	Charred
JGD-3 XXXIII-XXXIV (II)	"	Fragment of the shaft of the humerus	Broken
	"	Fragment of distal medial condyle of left humerus	"
	"	Fragmentary piece of a mandible	"
	<i>Canis familiaris</i>	Proximal fragment of the left 4 th metacarpal	"
JGD-3 XXIX-XXX (2B) (2C)	<i>Sus scrofa</i>	Fragment of the left upper jaw with 3 rd molar	Of a sub adult
	"	Fragment of the left upper jaw with 2 nd and a portion of 3 rd premolar teeth	Broken
	"	Left upper 1 st molar	Intact
	<i>Bos indicus</i>	Fragments of the shafts of ribs (2 nos.)	Broken
	"	Fragment of the body of right premaxilla	"
JGD-2 O-IV (11)	"	Fragment of rib	Charred

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
JGD-4 VII-VIII (6)	<i>Bos indicus</i>	Fragment of the neck of scapula	Broken
JGD-3 XXXI-XXXII (2C)	"	Left upper 1st molar teeth	Intact
	"	Fragment of a rib	Broken
JGD-2 M-P (13)	<i>Lissemys punctata</i>	Fragment of the carapace	"
	<i>Bos indicus</i>	Distal fragment of the right humerus with a portion of medial condyle & olecranon fossa	"
	"	Right 1st phalanx of the fore foot of a young one	End broken
	"	2nd phalanx (right) of hind foot	Of young, charred
	"	Right combined middle & external cuneiform of the distal carpus	Partly charred
	<i>Sus scrofa</i>	1st phalanx of the third digit of left fore foot of a young one	Intact
	<i>Capra hircus</i>	Proximal fragment of the right scapula with neck having a portion of broken spine without glenoid cavity of a young one	Charred
	"	Fragment of a rib	Broken
	"	Fragment of the shaft of right ulna of a young one	"
JGD-4 VI-VII (4A)	<i>Bos indicus</i>	Proximal fragment of the 3 rd & 4 th metatarsal	Partly charred
	"	Proximal fragment of the left scapula with a portion of glenoid cavity & neck	Broken
	"	Fragment of the superior border of the right ramus of mandible	"
	<i>Capra hircus</i>	Fragment of the basilar portion of occipital bone with a single condyle	"
	<i>Lissemys punctata</i>	Fragment of the carapace	"

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
JGD-3 XXI-XXV? (9)	<i>Bos indicus</i>	Fragments of rib (7 nos.)	”
JGD-3 XXXIII-XXXV (1K)	”	Fragment of the shaft of femur	”
JGD-2 M-N (6)	”	Right lower 1st molar of a young one	Intact
	”	Distal fragment of right astragalus with lateral distal condyle	Broken
	”	A distal condyle of the 3rd & 4th metatarsal	Broken end
	”	Fragments of the shaft of the shaft of right radius (2 nos.)	Broken
	”	Fragment of rib	”
	”	Fragment of posterior articular process of a lumbar vertebra	”
JGD-2 O'-VI' (9)	”	Fragment of the right horn-core with a portion of frontal bone	Charred
	”	Fragment of the left pelvis with a portion of the shaft of ilium and a portion of acetabulum	”
	”	Distal fragment of the right calcaneum	”
	”	Fragmentary piece of horn	”
	<i>Sus scrofa</i>	Fragment of a rib	”
JGD-1 O'-VI' (2)& (4A)	<i>Bos indicus</i>	A broken right lower 3rd molar teeth	Broken
JGD-3 XXX-XXXII (9)	<i>Sus scrofa</i>	Proximal fragment of the right scapula with a portion of glenoid cavity, neck and a portion of blade	”
	<i>Ovis vignei</i>	Distal fragment of the left tibia	Partly charred
	”	Fragments of shaft of tibia (2 nos.)	charred

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Proximal fragment of the left scapula without glenoid cavity, with neck and without spine	Broken
	"	Fragment of a blade of scapula	"
	"	Proximal end fragment of the scapula with glenoid cavity	"
	"	Fragments of ribs (5 nos.)	Charred
JGD-2 O-V (10)	<i>Ovis vignei</i>	Fragment of the shaft of radius	Broken
	"	Fragment of a thoracic vertebra with neural arch and spine	"
JGD-1 O-N (4)	<i>Bos indicus</i>	Left lower 1st molar tooth	Intact
JGD-1 VIII-XII (4)	"	Fragment of the left lower 2 nd molar tooth	Broken
JGD-2 GK (10)	"	Fragment of the shaft of humerus	Broken
JGD-3 XXVIII-XXX (9)	"	Fragment of the left pelvis with acetabulum and a portion of ischium	Broken
	"	Fragment of a rib	Broken
JGD-2 H-K (10)	<i>Equus asinus</i>	Proximal fragment of the left metacarpal bone with proximal portion of the 2 nd metacarpal bone	Broken
JGD-2 O'-N' (6)	<i>Bos indicus</i>	Fragment of the shaft of left tibia	With distinct cut marks
JGD-1 IV-VIII (4)	<i>Bubalus bubalis</i>	Right 1st phalanx of fore foot	Intact
	<i>Axis axis</i>	Fragment of horn-core	Eroded
	<i>Bos indicus</i>	Fragments of the shaft of humerus (3 nos.)	Heavily charred

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of the medial condyle of right humerus	Charred
	"	Fragments of rib (2 nos.)	Charred
	<i>Ovis vignei</i>	Fragment of the blade of scapula	
JGD-3 XXVII-XXIX (2C)	<i>Gallus sp.</i>	Right metatarsus	Almost intact
JGD-2 O'-IV' (14)	<i>Bos indicus</i>	Left 1st phalanx of the hind foot	Intact
	"	Right 3rd phalanx of the fore feet	
	"	Distal fragment of the 1st phalanx of the fore feet	Broken
	"	Right upper 3rd molar	Intact
	"	Left malar bone of the skull with zygomatic & temporal process	Broken
	<i>Ovis vignei</i>	Fragment of a rib	"
JGD-1 O-IV (5)	<i>Sus scrofa</i>	Left lower 2nd molar	Intact
	"	Fragment of the distal end of scapula with glenoid cavity	Broken
	"	Fragment of a rib	"
JGD-3 VI-VIII (2R)	<i>Bos indicus</i>	Left lower 2nd premolar teeth	Intact
JGD-3 XXXIII-XXXV? (1B)	<i>Sus scrofa</i>	Right upper 3rd molar of a sub adult animal	"
JGD-2 G-K (10A)	<i>Bos indicus</i>	Left lower 1st molar	Slightly broken
JGD-3 XVI-XXII (6)	"	Right lower 3rd molar	Intact
JGD-3	"	Right upper 1st molar	Charred

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
XXIV-XXVII (2B)	<i>Bos indicus</i>	Proximal end fragment of right scapula (without glenoid cavity)	With distinct sharp cut mark
JGD-4 I-A Pit - 1	"	Fragment of the axis vertebra with odontoid process and anterior articular process	Broken
	"	Right 1st phalanx of the hind foot	Almost intact
	"	Right 3rd phalanges of the hind foot (2 nos.)	"
	"	Proximal end fragment of the left scaphoid with glenoid cavity	Broken
	"	Right 1st phalanx of the fore foot	Charred
	"	Proximal fragment of the left scapula without glenoid cavity and with a portion of neck	Broken
	"	Fragment of a right pelvis with a portion of a portion of acetabulum and pubis	"
	"	Fragment of the neck of the proximal portion of the right femur	"
	"	Fragment of a cervical vertebra	With sharp cut mark
	"	Fragment of a cervical vertebra with articular processes and a portion of arch with foramen transversarium	Broken
	"	Fragment of a lumbar vertebra with a portion of neural arch and neural spine having posterior articular processes	Of young
	"	Fragment of the body of a thoracic vertebra	"
	"	Fragmentary piece of the head of humerus	With distinct cut marks
	"	Fragments of transverse process of thoracic vertebra (2 nos.)	of young
	"	Fragmentary pieces of a lumbar vertebra with neural arch and anterior articular process (2 nos.)	Broken

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Body of a lumber vertebra	Broken
	"	Proximal fragment of the right 3 rd and 4 th metatarsal	Partly charred
	"	Fragment of anterior portion of the right premaxilla with body and a portion of nasal process of premaxilla	Broken
	"	Proximal fragment of a right ulna without olecranon process	"
	"	Fragment of the distal end of right astragalus with cuboid and navicular facets	"
	"	Fragment of the blade of scapula with broken spine	With cut marks
	"	Fragment of ischium of the left pelvis	Broken
	"	Fragment of the shaft of ileum of the left pelvis	"
	"	Left 2 nd phalanx with a portion of distal end chipped off	Of young
	"	Fragment of the malar bone of the skull	Broken
	"	Fragment of the occipital bone with paramastoid process	"
	"	Left upper 1 st premolar of a young one	Intact
	"	Proximal end fragment of the left 2 nd phalanx	Slightly charred
	"	Fragments of proximal end of scapula (one with a portion of glenoid cavity and a portion of neck) (2 nos.)	Broken
	"	Fragment of a lower jaw	"
	"	Fragment of the frontal bone of skull	"
	"	Fragment of the shaft of ileum of the left pelvis	"
	"	Fragment of the shaft of femur	"
	"	Fragment of the shaft of right ulna	"
	<i>Canis familiaris</i>	Right 2 nd , 3 rd and 4 th metacarpal bones	Almost intact

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Lissemys punctata</i>	Fragment of left epiplastron	Broken part
	<i>Bos indicus</i>	Fragments of ribs (62 nos.)	Some charred
JGD-1 IV-VIII (4A)	"	Distal fragment of the 3rd and 4th metacarpal with both distal condyles	Broken
	"	Fragment of the head of right femur	"
	<i>Bubalus bubalis</i>	Fragments of horn cores (2 nos.)	Eroded
JGD-4 I-B Pit - 2	<i>Canis familiaris</i>	Fragment of the right horizontal ramus of mandible with canine, 2 nd , 3 rd and 4 th premolars and 1 st molar	Cut mark
	<i>Bos indicus</i>	Left astragalus of young one	Intact
	"	Right astragalus of an adult	"
	"	Proximal fragment of the left 3rd and 4th metatarsal (2 nos.)	Broken
	"	Fragment of the shaft of the 3rd and 4th metatarsal of young one	"
	"	Fragment of the shaft of right tibia	"
	"	Proximal fragment of the 3rd and 4th metacarpal	"
	"	Fragment of the shaft of the 3rd and 4th metatarsal with single distal condyle	"
	"	Distal fragment of the right tibia	Slightly charred
	"	Distal epiphysis of the right radius without styloid process	Broken
	"	Combined right scapho-cuboid bone of the distal tarsal (2 nos.)	One broken laterally
	"	Fragment of the frontal bone of the skull	Broken
	"	Left patella bone	Intact
	"	Fragment of the shaft of left calcaneum with tuber calcis	Broken
"	Fragment of the right calcaneum with shaft and sustentaculum tali	"	

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of the anterior portion of the right horizontal ramus of the mandible with a portion of body (corpus mandibulae) and mental foramina	Broken
	"	Fragment of the left vertical ramus of the mandible with condyle	"
	"	Fragment of the body of a lumber vertebra	"
	"	Cervical vertebra with a portion of neural arch and transverse process	Of young
	"	Fragment of a thoracic vertebra with neural arch and neural spine	Broken
	"	Fragment of the left pelvis with a portion of acetabulum and ischium	"
	"	Fragment of the head of the left humerus with a portion of neck	"
	"	Left condyle of the skull	Broken part
	"	Fragment of a thoracic vertebra with a portion of the body and the left transverse process	Broken
	"	Fragment of the right trochanter of the right femur without trochanteric fossa	"
	"	Fragment of the trochlea of right femur	"
	"	Fragment of a horn core	Eroded
	"	Right lower 1st molar tooth of young one	Intact
	"	Left lower 1st premolar tooth	Almost intact
	"	Left lower 2nd premolar teeth, one of young one (2 nos.)	"
	"	Fragments of the horizontal ramus of mandible without teeth (2 nos.)	Broken
	"	Right horn core with a portion of the frontal bone of young one	Horn portion intact
	"	Fragment of the basilar part of occipital bone with a single basilar tuber of the skull	Broken

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of the malar bone of the skull	Broken
	"	Fragment of the left malar bone of the skull with temporal process	"
	"	Fragment of ribs (18 nos.)	Five charred
JGD-4	"	Right horn core with a bit of frontal bone	Intact
I-B	"	Fragment of the left horn core with a portion of frontal bone	Broken
Pit-2sealed by (7)	"	Distal fragment of the right humerus with medial and lateral condyle	Much eroded
	"	Distal fragment of the 3 rd and 4 th metatarsal with a single distal condyle	Broken
	"	Left calcaneum with tuber calcis and sustentaculum talli	"
	"	Fragment of the right pelvis with a portion of the shaft of ileum and acetabulum and pubis	"
	"	Fragment of the blade of ilium of the right pelvis	"
	"	Fragment of the blade of ilium of the left pelvis	"
	"	Proximal fragment of the 3 rd and 4 th metacarpal	"
	"	Fragment of the of right femur with head and a portion of proximal shaft	"
	"	Fragment of the distal end of the right femur with medial condyle	"
	"	A single distal condyle of the 3 rd and 4 th metatarsal	"
	"	Proximal end fragment of the right 3 rd and 4 th metacarpal	
	"	Right patella bone	Of young

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Right upper 2 nd molar tooth	Of sub adult
	”	Left upper 2 nd molar tooth	Of young
	”	Left patella bone	Of young
	”	Fragment of the medial condyle of the right humerus	Broken
	”	Fragment of the sphenoid bone with orbital wing of sphenoid and internal plate of frontal bone with ethmoidal crest cribriform plate of ethmoid and optic foramen	”
	”	Broken thoracic vertebra with the spine and left transverse process, the body eroded posteriorly	”
	”	Fragment of the body of a thoracic vertebra	”
	”	Fragment of a cervical vertebra with posterior and anterior articular process of the right side with foramen transversarum and pedicle	With cut marks and charred
	”	Body of a cervical vertebra	Of young, slightly charred
	”	Fragment of a lumbar vertebra with a portion of body	Broken
	”	Fragment of distal end of right femur with a portion of medial condyle	With distinct sharp cut marks
	”	Right 3 rd phalanx of fore foot	Charred and eroded
	”	A distal condyle of the 3 rd & 4 th metacarpal	Of young
	”	Fragment of the anterior portion of the left ramus of mandible with mental foramen and without body	Charred
”	Fragment of the shaft of right tibia	With cut marks	

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of the inferior border of the right ramus of mandible	Broken
	"	Fragmentary piece of the angle of the right vertical ramus of mandible	"
	"	Fragment of the trochlea of right femur	Heavily charred
	"	Fragment of proximal end of the left scapula with glenoid cavity	Slightly charred
	"	Fragment of the major trochanter of a femur	Very much charred
	"	Right combined external and middle cuneiform of the distal tarsal	Intact
	"	Fragments of ribs (20 nos.)	Broken
JGD-1 IV-VIII (4)	<i>Bubalus bubalis</i>	Right scapho cuboid bone of the proximal tarsal	Intact
	"	1 st and 2 nd phalanges of the fore foot	Almost intact
	"	1 st phalanx of the hind foot	"
	"	Fragments of the horn core (7 nos.)	Eroded
	<i>Bos indicus</i>	Right 3 rd phalanx of the right hind foot	"
	"	Fragment of the 3 rd phalanx of fore foot	Broken
	"	Cuneiform bone of left proximal carpus of the fore foot	Almost intact
	"	Proximal fragment of femur	Broken
	"	Distal end fragment of tibia	"
	"	Fragmentary piece of left anterior portion of ramus	"
	"	Fragment of the ramus of mandible	"
JGD-4 IV-VIII (4)	<i>Equus asinus</i>	Right calcaneum	Intact
	"	3 rd phalanx of the fore foot	Intact
	<i>Sus scrofa</i>	One left canine teeth without tip	Broken
	<i>Bos indicus</i>	Right lower 2 nd premolar teeth	Intact

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
JGD-1 IV-VIII (5)	<i>Bos indicus</i>	Fragment of the right astragalus with a portion of the proximal articular process	Broken
JGD-3 XVII-XVIII (9)	<i>Bos indicus</i>	Proximal fragment of the right 3 rd and 4 th metatarsal with the internal cuneiform and combined middle and ext. cuneiform bone of the distal tarsal attached at its proximal extremity and without distal part	”
	”	Distal fragment of the 3 rd and 4 th metatarsal with both condyles	”
	”	Proximal fragment of the right radius with medial and lateral articular surfaces	”
	”	Fragment of the shaft of right radius	”
	”	Fragments of right ulna (4 nos.)	”
	”	1 st and 2 nd phalanges of hind foot fused in mass	Of young
	”	Fragment of the 2 nd phalanx	Broken
	”	Fragment of the 3 rd phalanx of forefoot	”
	”	Fragment of the right calcaneum without tuber calcis and fragment of the right astragalus fused together in mass	”
	”	A distal condyle of 3 rd and 4 th metatarsal	”
JGD-4 O-I Pit-2 sealed by (7)	”	Fragments of frontal bones of the skull (2 nos.)	”
	”	Fragments of ribs (7 nos.)	Two charred
	”	Fragments of the angles of the left ramus of the mandible without teeth (2 nos.)	Of young, with sharp cut mark
	”	Fragment of the right horizontal ramus of the mandible with a portion of the body with 2 nd incisor teeth (not erupted) and mental foramina and with 1 st , 2 nd , 3 rd and 4 th premolar teeth	Broken

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of the head of the right femur	With cut mark and sharp cut
	"	Proximals of the right 3 rd and 4 th metacarpal with lateral articular surfaces (2 nos.)	Broken
	"	Fragment of the distal end of the 3 rd and 4 th metatarsal with a single condyle	Charred and distinct cut of chopping
	"	Distal fragmentary piece of the right humerus	Broken
	"	Proximal fragmentary piece of the right radius without proximal epiphysis	Of young, with cut marks
	"	Fragmentary piece of the proximal shaft of right radius	With distinct chopping mark
	"	Left lower 1 st molar tooth	Of young charred
	"	Fragment of the upper jaw with 2 nd molar teeth	Charred and cut sign
	"	Proximal fragmentary piece of the 3 rd and 4 th metatarsal	Of young
	"	Proximal fragment of an ulna with olecranon process and semilunar notch	Charred and mark of cut
	"	Fragment of a thoracic vertebra with a portion of neural arch and spine	Of young, with chopping mark
	"	Fragment of right pelvis with a portion of acetabulum and pubis	Charred and with signs of cut
	"	Fragment of the angle of left ramus of mandible	Broken

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragmentary piece of ramus of mandible	Broken
		Fragmentary piece of the head of humerus	Chopped off
JGD-1 O - IV (4A)	”	Fragment of the frontal bone	With chopping mark
	”	Fragment of a horn-core	Broken
	”	Distal fragment of the shaft of radius	”
	”	Left 1st phalanx of fore foot	Of young
	”	Fragment of the left pelvis with a portion of the shaft of ileum and acetabulum	Broken
	”	Fragment of a rib	”
	<i>Axis axis</i>	Fragments of the antler (5 nos.)	Eroded
	<i>Sus scrofa</i>	Fragment of the left horizontal ramus of mandible with 1 st and 2 nd molar	Broken
	<i>Ovis sp.</i>	Distal fragment of humerus	”
JGD-4 O-I Pit-2 sealed by (7)	<i>Sus scrofa</i>	Fragment of the right vertical ramus of the mandible with condyle	”
	”	Left lower 2 nd and 3 rd premolars and 1 st and molars of young one	”
	<i>Bos indicus</i>	Fragmentary piece of the blade of right scapula with glenoid cavity, tubuscapula and a portion of neck	”
	”	Fragment of a lumber vertebra with body and a portion of the left anterior articular process with a bit of transverse process and without neural arch and spine	Of young
	”	Fragment of a thoracic vertebra with its transverse process	Broken
	”	Fragment of a thoracic vertebra with a portion of body	”
	”	Fragment of a thoracic vertebra with a portion of neural arch and spine	”

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of a cervical vertebra with a portion of neural arch with the basal part of spine and a portion of articular surface	Broken
	"	Portion of a piece of the proximal part of tibia	Of young
JGD-1 O-IV (4)	<i>Axis axis</i>	Fragments of the antlers (11 nos.)	Some with ends sharply cut
JGD-2 G-J (10A)	<i>Bos indicus</i>	Fragments of ribs (4 nos.)	Broken
JGD-2 O-IV (7)	"	Fragment of a rib	Partly charred
	"	2 nd left premolar tooth	Intact
	"	Distal fragment of the 3 rd and 4 th metatarsal	Broken
	"	Left 3 rd phalanx of the hind foot	Partly charred
	"	Body of a thoracic vertebra	Charred
	"	Left 1 st phalanx of the fore foot of a young one	Almost intact
	"	Fragment of the shaft of the shaft of 3 rd and 4 th metatarsal	Charred
	"	Fragment of the horn core with a portion of frontal	Charred
	"	Fragment of the blade of the scapula	Charred
	"	Fragment of the left mandible without condyle and coronoid process	Charred
	"	Fragment of the shaft of calcaneum	Partly charred
	"	Fragments of ribs (3 nos.)	One charred with cut mark
	"	Fragment of the frontal bone of the skull	Broken
	"	Fragment of the 3 rd phalanx	Partly charred
"	Fragments of the shafts of humerus (2 nos.)	One charred	
"	Distal fragment of 1 st phalanx	Charred	

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
JGD-2 M-P (12) (13) (14)	<i>Bos indicus</i>	Fragments of ribs (3 nos.)	Two charred
	”	Fragment of the inferior ramus of the mandible	Broken
JGD-2 M-P (12) & (13)	”	Proximal fragment of the left radius	With distinct cut mark
	”	Proximal fragment of the shaft of 3 rd and 4 th metatarsal without epiphysis	Of young
	”	Fragmentary piece of the left vertical ramus without condyle and coronoid process	With cut mark
	”	Proximal fragment of rib with head, neck and tubercle	Broken
	”	Fragments of vertebra (2 nos.)	”
	<i>Trionyx gangeticus</i>	Fragment of the plastron	”
	<i>Equus asinus</i>	Lateral splint bone 4 th	”
	”	Proximal fragment of the metacarpal II (splint bone of the 2 nd metacarpal)	”
JGD-2 G-K (7)	<i>Bubalus bubalis</i>	Distal fragment of the right 3 rd and 4 th metacarpal	”
JGD-4 I-B Pit-2sealed by(7)	<i>Bos indicus</i>	Proximal fragment of the right 3 rd and 4 th metatarsal	”
	”	Fragments of head of femur (2 nos.)	One of a young one
	”	Right calcaneum	Intact
	”	Fragment of the tuber calcis of right calcaneum	Broken
	”	Fragment of the left astragalus without proximal trochlea of a young one	”
	”	Proximal fragment of the left 3 rd and 4 th metatarsal	With sharp cut marks
”	Fragment of the distal end of the right radius of a young one	Charred	

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Right 1 st phalanx of the fore foot	Charred
	”	Right 2 nd phalanx of the fore foot of a young one	Intact
	”	Fragment of the proximal trochlea of the left astragalus	Broken
	”	Fragmentary piece of the shaft of the right tibia	
	”	Fragmentary piece of the proximal end of the 3 rd and 4 th metacarpal	With cut mark
	”	Fragmentary piece of the trochlea of femur	With cut mark
	”	Fragmentary piece of the distal end of the left radius	With distinct chopping mark
	”	Proximal fragment of the right scapula with glenoid cavity	With mark of sharp cut across it
	”	Fragment of a thoracic vertebra without spine and transverse processes	Much eroded
	”	Fragment of the body of a thoracic vertebra	Much eroded
	”	Fragment of a cervical vertebra with a portion of body, foramen transversarium and a portion of lateral branch of transverse process	Of young, with distinct mark of chopping
	”	Fragment of a cervical vertebra with foramen transversarium and pedicle having a small of transverse process	Broken
	”	Fragment of spine of a thoracic vertebra	With mark of cut
	”	Fragment of thoracic vertebra with spinous process and a portion of neural arch	Charred
	”	Distal fragmentary end of the left radius	Of young
	”	Fragment of a vertebra	Broken

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragments of the left pelvis with a portion of acetabulum and ischium (2 nos.)	Broken
	"	Fragment of the left pelvis with a portion of acetabulum and ischium	Charred
	"	Right lunate bone of right proximal carpus	Charred
	"	Proximal fragment of 3 rd and 4 th metatarsal	With longitudinal cut and charred
	"	Fragment of the right calcaneum with a portion of sustentaculum tali	Charred with cut mark
	"	Fragment of the frontal bone	Broken
	"	Fragment of the paramastoid bone of the skull	"
	"	Fragment of the anterior portion of the right horizontal ramus of the mandible with a portion of body (corpus mandibulae), mental foramina, diastema with 1 st and 2 nd premolar teeth	Charred
	"	Fragment of the left horizontal ramus of the mandible with 1 st and 2 nd molar teeth	Charred
	"	Left lower 1 st molar fragment	Intact
	"	Fragment of left 2 nd molar tooth	Broken
	"	Left lower 3 rd premolar	Intact
	"	Left lower 2 nd premolar of adult	"
	"	Left lower 1 st premolar teeth (2 nos.)	"
	"	Fragments of the molar teeth (2 nos.)	Broken
	"	Distal fragment of the shaft of right femur	Of young, partly charred
	"	Spinous process of a cervical vertebra	Of young
	"	Fragments of ribs (19 nos.)	Broken
	"	Left 1 st premolar	Of young

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Sus scrofa</i>	Proximal fragment of right humerus	Broken
JGD - 4 O-B Pit.2, (7)	<i>Bos indicus</i>	Distal fragment of the left humerus with distal condyles	Chopped off and with definite cut marks
	"	Right calcaneum	Intact
	"	Distal fragment of the right humerus with medial and a portion of lateral condyles only	Broken
	"	Distal end fragments of the right tibia with medial malleolus (2 nos.)	One of a young
	"	Distal end fragment of the left radius	Of young
	"	Distal fragment of the 3 rd and 4 th metatarsal with distal condyles	Charred
	"	Left combined scapho-cuboid of the proximal tarsal	Intact
	"	Proximal fragment of the right scapula with scapula with glenoid cavity and tuber scapula and with a small portion of neck	Broken
	"	Fragment of the medial condyle of right femur	Of young
	"	Fragment of the lateral condyle of right femur	With definite cut marks
	"	Distal fragment of the 3 rd and 4 th metacarpal with a single condyle along a portion of distal shaft	Broken
	"	Distal fragment of the 3 rd and 4 th metacarpal with a single condyle	With distinct mark of cut
	"	Fragment of body (fibular tarsal) of the right calcaneum	Broken
	"	Distal fragmentary piece of the left tibia with a portion of lateral articular surface	"

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Fragment of the left horn core with a portion of frontal bone	Of young
	”	Fragment of the shaft of femur	Broken
	”	Left 3 rd phalanx of the fore foot (2 nos.)	Of youngs
	”	Fragment of the lateral condyle of right femur	Much eroded
	”	Fragment of a thoracic vertebra with neural arch with a single transverse process and with spine	Of young
	”	Fragment of a lumbar vertebra with a single anterior articular process having a portion of transverse process	Of young, with definite cut mark
	”	Fragment of the body of a thoracic vertebra	Of young and with sign of a sharp cut
	”	Fragment of a frontal bone	Broken
	”	Fragment of the left ramus of lower jaw (2 nos.)	”
	”	Fragment of left pelvis with acetabulum and a small portion of the shaft of ilium and ischium	Charred
	”	Fragment of right pelvis with pubis and a portion of acetabulum	Broken
	”	Fragment of the blade of ileum of left pelvis	With definite cut mark
	”	Left 3 rd lower molar	Almost intact
	”	Right 3 rd upper molar	Of young
	”	Fragment of the right upper jaw with 1 st and 2 nd molar tooth	Much worn out
	”	Left upper 1 st molar	Of young
	”	Fragment of upper 1 st molar tooth	Intact
	”	Right lower molar with portion of mandible (2 nos.)	One of a young

EXCAVATION DATA Site/Locus/ Stratum	NAME OF SPECIES	IDENTITY OF MATERIAL	REMARKS
	<i>Bos indicus</i>	Right lower 2 nd molar	Broken
	”	Left upper 1 st premolar	Of young
	”	One right and one left upper premolar	Intact
	”	Fragments of ribs (39 nos.)	Broken

FAUNAL DIVERSITY

Remains of altogether eleven animal species have been recovered from Jaugada archaeological site as presented in Table 2.

Table 2. Animal forms recovered from Jaugada excavation and their present state of distribution

SYSTEMATIC POSITION	SPECIES	COMMON NAME	PERCENTAGE (%) OF OCCURRENCE IN TOTAL ASSEMBLAGE	PRESENT DISTRIBUTION
Mammalia Artiodactyla Bovidae Bovinae	<i>Bos indicus</i>	Indian domestic cattle	86.90	Throughout the world by human agency
-do-	<i>Bubalus bubalis</i>	Water buffalo	2.92	Wild form in India (terai and Brahmaputra valley of North East India, forests of Chattisgarh), Bhutan, Nepal and Thailand; Domestic form distributed in many parts of the world through human agency
Mammalia Artiodactyla Bovidae Caprinae	<i>Capra hircus aegagrus</i>	Goat	0.696	Wild form in India; Pakistan(Baluchistan); Iraq; Iran; Asia Minor; Domestic form distributed in many parts of the world through human agency
-do-	<i>Ovis orientalis vignei</i>	Sheep	1.81	Wild form ranges from Gilgit, Aster and Ladak in Kashmir, eastward to northern Tibet, Punjab; Pakistan (Sind, Baluchistan) and southern Persia(Iran). Domestic form distributed in many parts of the world through human agency
Mammalia Artiodactyla Suidae	<i>Sus scrofa cristatus</i>	Indian boar	2.78	Throughout India; Pakistan; Sri Lanka, Nepal; Bangladesh;

SYSTEMATIC POSITION	SPECIES	COMMON NAME	PERCENTAGE (%) OF OCCURRENCE IN TOTAL ASSEMBLAGE	PRESENT DISTRIBUTION
				Myanmar; Indonesia; Malaysia and Vietnam. Domestic form distributed in many parts of the world through human agency
Mammalia Artiodactyla Cervidae	<i>Axis axis</i>	Spotted deer	2.36	Peninsular India, West Bengal, Sikkim, northwards to Kumaon Himalaya; Nepal ; Sri Lanka
Mammalia Perrissodactyla Equidae	<i>Equus asinus</i>	Ass	0.696	Wild form in East Africa (Sudan, Somaliland). Domestic form distributed in many parts of the world through human agency
Mammalia Carnivora Canidae	<i>Canis familiaris</i>	Domestic dog	1.25	Worldwide
Reptilia Testudines	<i>Trionyx gangeticus</i>	Gangetic soft shelled Turtle	0.139	Ganga, Sind and Mahanadi river systems; Common in North West Pakistan, Bangladesh and Nepal foot hills
-do-	<i>Lissemys punctata</i>	North Indian flap shelled turtle	0.417	Bangladesh, Myanmar, India (including Ganga river systems, Kutchh, Sikkim, Andaman Islands), Pakistan (Sind river system), Nepal, Sri Lanka
Aves Galliformes	<i>Gallus sp.</i>	Fowl	0.139	

DISCUSSION

Orissa, known as Kalinga in part, with a cultural variation was spread over a large area encompassing zones of Gangetic basins to the Godavari and often up to the river Krishna. Topographically, the land may be divided into five different units viz., the central plains, the middle hilly terrain, the rolling uplands, the river valleys and the subdued plateau (Sinha 1971). The coastal plains of Orissa, stretched from Subarnarekha in the North to the Rishikulya in the south may be regarded as the land of deltas of six rivers: Subarnarekha, Burhabalang, Vaitarani, Brahmani, Mahanadi and Rishikulya. As a primary river basin, lithologically the coastal part is covered by the tertiary and recent alluvium (Wadia, 1961). The land as a whole is drained by numerous tributaries with a vegetation of tropical deciduous type. The climate is featured by hot summers, high humidity and well distributed rainfall. The average precipitation was 1600 mm that in recent times reduced to noticeably perhaps due to several natural and manmade factors (Tripathy, 2007). The major rivers in past were navigable throughout the year and most of the transportation system was based on water routes (Deloche, 1990). Kalingans were a seafaring nation from early times and they had taken part in inland as well as overseas trade. Its unique and strategic geographical location and favourable position on the shore of Bay of Bengal provided an excellent opportunity for its inhabitants for maritime trade (Tripathy, *loc.cit.*). It is also considered that one of the primary reasons of Asoka's Kalinga War was to gain control over important coastal ports in the region.

Archaeological excavations and explorations in recent times have revealed interesting points pertaining to urbanization and city formation during the Early Historic period in Orissa. Various authors have referred the process as 'Early Historic Urbanization' or 'Second Urbanization' (Ghosh, 1973; Makhan Lal, 1984; Ray, 1986; Erdosy, 1988; Allchin 1989, 1990, 1995; Sharma, 1991; Chakrabarti, 1995; Champalaxmi, 1996). In a broad sense, the time of 'Early Historic' refers to a period between 600 B.C. and 500 A.D. and this period witnessed the growth emergence of cities and complex politics with the growth of Buddhism throughout the subcontinent of South Asia (Heiztman, 1984; Erdosy, 1988; Kosambi, 1989; Sarao 1990; Ray, 1994; Chakrabarti, 1995a,b; Morrison, 1995). Jaugada was an important urban centre of ancient Orissa. The early historic settlement at Jaugada has been studied by scholars (IAR, 1956-57). It is emanated from the observations that one of the major reasons for urban growth was the occupational specialization, gem utilization and exploitation, iron smelting, craft productions (such as pottery, beads, metal items, coins etc.) during the early historic period. These facts further indicate that a suitable situation had been created for trade and exchange in that period.

After the victory of the catastrophic Kalinga war of c. 261 B.C., Kalinga was added as fifth province of Maruyan empire and Asoka became converted to Buddhism. Tosali near Bhubneswar and Samapa in Ganjam district respectively became the provincial capitals and subsidiary headquarters of Kalinga under him. At Jaugada, like Dhauli, one Major

Rock Edict of Asoka is found. But similar to Dhauli, the regular series of fourteen rock edict is partly replaced by two Separate Kalinga Edicts (which are only for the people of Kalinga). Jaugada inscriptions are specifically addressed to the *Mahamatras* of Samapa (a city existed in 3rd century B.C.), for administration. This historical city, Samapa and Jaugada may be two names of same place; or Samapa was the city and Jaugada was the fort adjacent to it and was an integral part of the city. Thapar (2002) emphasized the importance of Jaugada for being selected for the inscriptions was that the town was fairly large and fort might have been a military centre. Its proximity to the sea may have given it the added advantage of trade and maritime activities.

It is conjectured from the available evidences that a Neolithic culture evolved in coastal Orissa earlier than the Third Century B.C. Debala Mitra's excavations (1956-57) at Jaugada opened up the scope of study of Neolithic in Orissa in its broader geographical and chronological perspective. The Jaugada excavations revealed continuous human occupation from upper Neolithic through the Early Historic. This excavation also pointed out to a relative chronological sequence of cultural phases.

The study of animal remains can contribute to the past ecological conditions and human-animal relationships to certain extent. Animals with hard exoskeletons and endoskeletons were recovered from the excavations which were mostly the fragments of different bones and teeth. The animal species retrieved through the skeletal remains were not quite extensive and mostly of the domestic animals (see Table 1). Altogether eleven species comprising two of Reptilia, one of Aves and eight of Mammalia are encountered out of 718 specimens examined. Non-availability of fish remains and estuarine/marine molluscan shells in the recovered faunal remains are noteworthy features. The faunal analysis enabled us to understand about the meat/animal protein components of human diet, nutritional enrichment and useable items of animal products, as well as utility of animals as labour and protection forces (see Allchin, 1969; Allchin & Allchin, 1974; Saha *et al*, 2004; Pal *et al*, 2004; Talukder and Pal, 2007).

Quite a good number of domestic animal forms have been recovered from the excavations at Jaugada. However, remains of a few species *viz.*, Indian buffalo, pig/wild boar and spotted deer were found in very less number. The situation points out to a possible wider natural distribution of these animals in the past as the extraneous pressure were less and habitat conditions were congenial for thriving them. These animals were perhaps hunted by the earlier people. The fowl appear to be the domesticated form of *Gallus gallus* and that has been recorded from several prehistoric sites of India. Cattle (*Bos indicus*) bones are doubtlessly most prevalent amongst the recovered animal remains and virtually this species dominated in most of the Neolithic assemblages in our country (see Allchin, 1963b; Thomas, 1974; Badam, 1984; Sahu, 1988; Thomas & Joglekar, 1994). Allchin & Allchin (1974) opined that these cattles were indigenous breed domesticated from local wild forms. Caprine (goat and sheep) bones were encountered in lesser number. These two animals are in fact not indigenous forms and were primarily

domesticated in Southeast Asia (see Mason, 1984; Davis, 1987; Legge, 1996). These domesticated forms were apparently introduced by humans either by migratory folks or through trade practices. The earlier people were also familiar with the use of ass (*Equus asinus*) as the beast of burden and of dog (*Canis familiaris*) as the animal for protection. The turtles (*Trionyx gangeticus* and *Lissemys punctata*) were obviously the native forms of the estuaries of coastal Orissa. Critical analysis of the above mentioned bone remains according to the period/age and nature of the culture could not be fairly made due to the non availability of assigned cultural sequence for the strata in available archaeological literature/records. These however, conceivably belong to either of the periods I & II of Early Historic stage.

By studying the objects and animal remains it has been possible to throw some light on the life style and food patterns of the people of past of Jaugada. Significantly, the types of neoliths found in Jaugada are somewhat analogous to many of the Neolithic sites in southern India. The dispersal of the Neolithic cultures in India needs to be better understood. The changing human population size and activity had impact upon the vegetation cover, opening up of pastoral land and introduction of biota. Till now, we have very limited knowledge about the changing flora and fauna in this part of Orissa during the prehistoric human cultures and civilization.

SUMMARY

Jaugada located near the village Pandia on the northern bank of Rishikulya River in Ganjam district of Orissa bears a great historical importance as the place of occurrence of one of the famous rock edicts of Emperor Asoka. Archaeological excavations in 1956-57 revealed that Jaugada as an earthen fort surrounded by wide moat. It also unearthed ceramic potteries and vessels, variety of antiquities like semiprecious stones, iron implements, beads of shells, coins and remains of animals. The excavation revealed stray evidences (surface finds) of Neolithic culture. Otherwise, the human occupation in the site was broadly divided into two periods. Period I represented a full fledged iron using culture with the absence of brick structure, whereas in period II brick and stone structures were found scantily and the principal ceramic industry was a red ware. The human occupation of the area could tentatively be assigned to a partly to a period from the third century B.C. to about seventh century A.D. Jaugada was an important urban centre and port of Early Historic time and the inhabitants took part in maritime trade. The analysis of animal remains (718 examples/fragments) comprising hard exoskeletons of turtles and mostly endoskeletons of other vertebrates revealed the presence of eight species of Mammalia, one species of Aves and two species of Reptilia.

While presence of several animals indicates past ecological features of the coastal land, many others had pointed out their importance in the subsistence and economy of the people. Occurrence of some non-indigenous animals (*viz.*, *Equus* sp., *Capra* sp., *Ovis* sp.) with recovered potteries denoted migration of ethnic groups and introduction of exotic biota in the region.

An effort has been made here to put down the result of analysis of animal remains and information out archaeological and historical studies together to testify whether these come out with any functional attribute between the biological systems and socio-cultural set up of the past.

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PLATE I : *Bos indicus* : 1- Distal fragment of the right humerus with medial and lateral condyle (X 2.15); 2-Left 3rd lower molar (X 1.81); 3 - Fragment of the right horizontal ramus of the mandible with 3rd molar tooth (X 1.816); 4 - One right astragalus of adult (X 4.08); 5 - A cervical vertebra of a young with a portion of body, neural arch and transverse process (X 1.855); 6 Fragment of rib(X 3.405); 7 A&B- Right horn-core with a part of frontal bone (X 2.448); 8 Fragment of the left pelvis with acetabulum and small portion of shaft of ileum and ischium (X 1.99); 9 - Proximal fragment of the left radius (X 2.37); 10 Fragment of left pelvis with a portion of the shaft of ileum and acetabulum (X 2.15); 11 - Fragment of head of left humerus with a bit of portion of neck (X 2.89); 12 - A&B- Fragment of horizontal ramus of mandible with 2nd and 3rd premolar teeth (X2.28); 13 -Fragment of metatarsal (X 1.75)



PLATE II : *Bos indicus* : 14- Horn-core with a portion of the frontal bone (X 2.24); 15 - Right upper premolar (X 1.29); 16 - Fragment of anterior portion of the left horizontal ramus of mandible with a portion of body with 1st and 2nd incisor teeth (X 2.4); 17A & B - Fragment of frontal bone (X 2.42); 18 - Fragment of the left horizontal ramus of the mandible with 1st and 2nd molar tooth (X 2.26); 19 - Fragment of rib (X 1.73); 20 - Right 3rd lower molar of young (X 2.22); 21 - Fragment of head of femur (X 4.0); 22 - Fragment of right horn-core with a portion of frontal bone (X 2.18); 23 - Distal fragment of right tibia (X 1.94); 24 - Right calcaneum (X 2.65); 25 - Proximal fragment of right 3rd & 4th metatarsal (X 1.90); 26 - Right 3rd phalanx of the hind-foot (X 2.20); 27 - Fragment of left scapula with glenoid cavity, tuber scapulae and a portion of neck (X 2.14); 28 - Right 2nd phalanx of the fore-foot of young (X 1.41)



PLATE III : *Bubalus bubalis* : 29 Left lower 3rd molar (X 1.56); 30 Right upper 3rd premolar (X 1.29); 31 Fragment of horn core (X 1.60); 32A & B Right 1st phalanx of the fore foot (X 2.14); 33 Longitudinal half fragment of the 1st phalanx (X 2.1); 34 2nd phalanx of the fore foot (X 1.92); 35A & B Fragment of horn core (X 2.68); 36 Fragment of horn core (X 1.78); 37A & B Right scapho-cuboid bone of the proximal tarsal (X 2.18); 38 - Fragment of horn core (X 2.83)

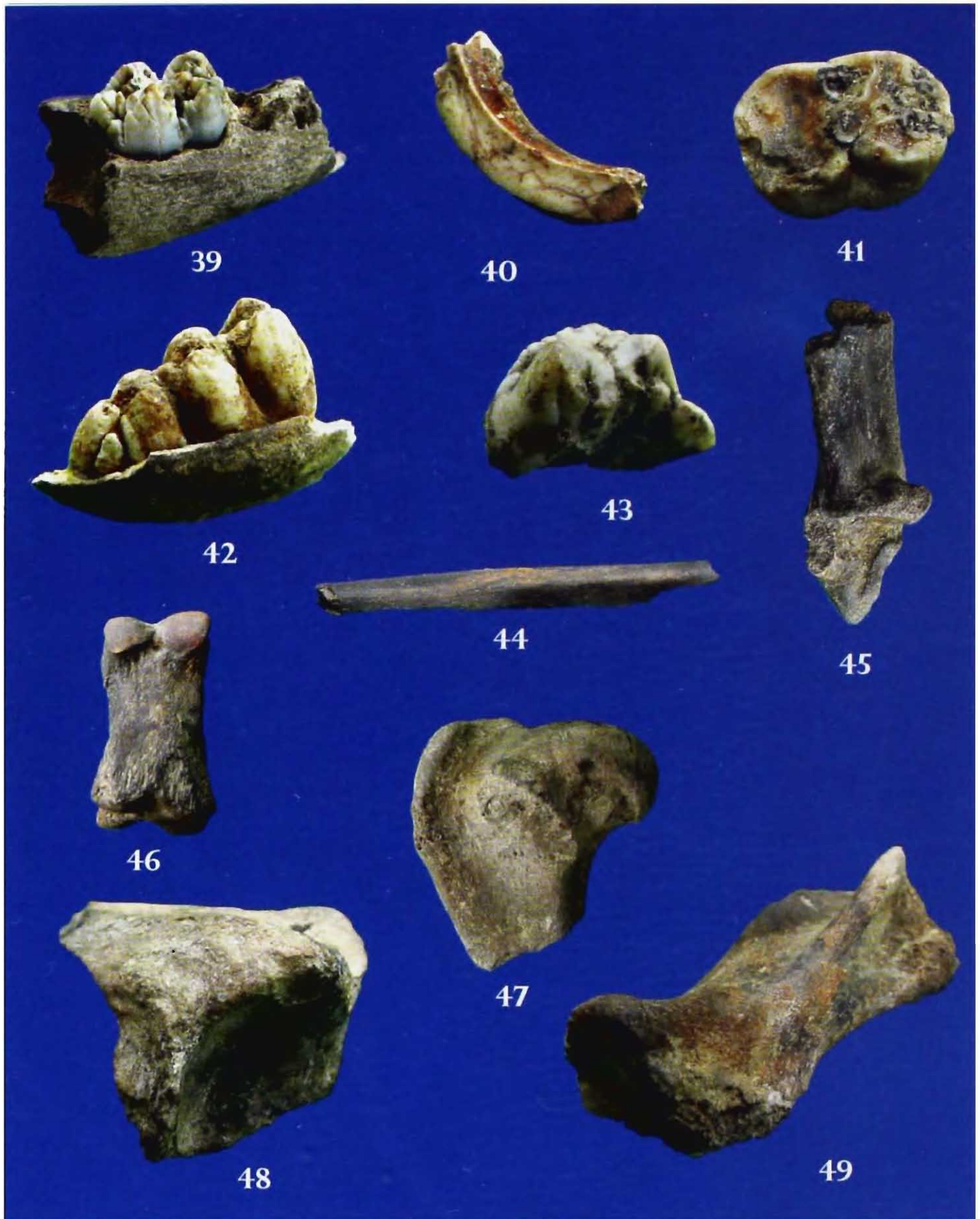


PLATE IV : *Sus scrofa* : 39 Fragment of right horizontal ramus of mandible with 1st molar tooth (X 0.83); 40 - Lower right canine without tip (X 1.17); 41 - Left lower 2nd molar (X 0.65); 42 - Fragment of left upper jaw with 3rd molar of subadult (X 0.96); 43 - Right upper 1st molar (X 0.64); 44 - Fragment of rib (X 1.25); 45 - Right calcaneum of young (X 1.20); 46 1st phalanx of the 3rd digit of left forefoot of young (X 0.87); 47 Proximal fragment of right humerus (X 1.09); 48 - Fragment of right scapula (X 0.69); 49 - Proximal fragment of right scapula (X 1.09)

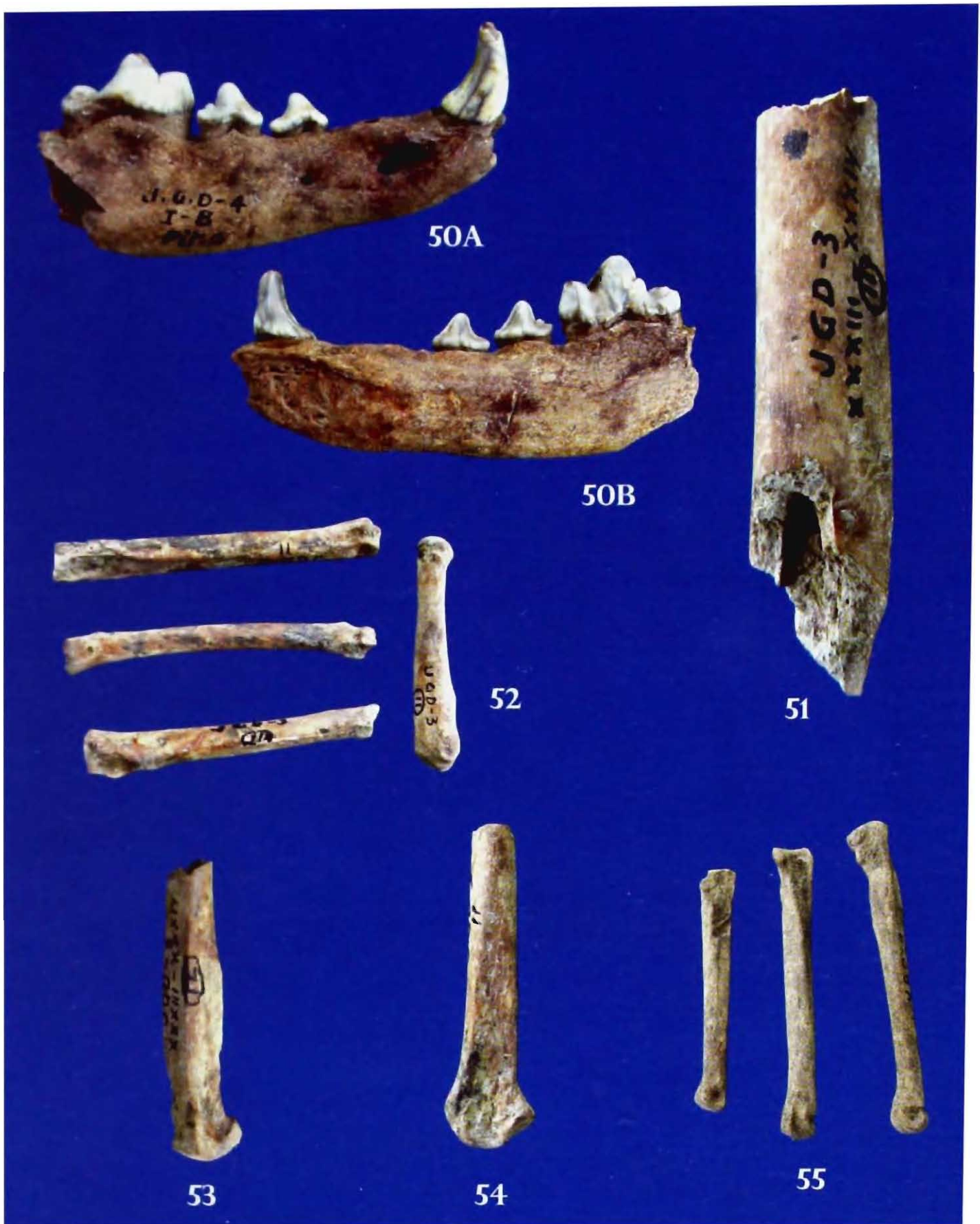


PLATE V : *Canis familiaris* : 50A & B Fragment of horizontal ramus of mandible with canine, 2nd 3rd & 4th premolar and 1st molar (X 1.10); 51 Fragment of shaft of left tibia (X 0.65); 52 Right metacarpals (X 1.48); 53 Proximal fragment of the left metacarpal (X 0.96); 54 - Proximal fragment of the left metatarsal (X 0.87); 55 Right 2nd, 3rd and 4th metacarpal bones (X 1.58)



PLATE VI: *Capra hircus aegagrus* : 56 - Fragment of shaft of tibia (X 1.13); 57 - Fragment of right ulna of young (X 0.65); 58 - Fragment of thoracic vertebra (X 1.05); 59 - Fragment of basilar portion of occipital bone with a single condyle (X 0.82); 60 - Proximal fragment of right scapula (X 1.26); *Equus asinus* : 61 - Proximal fragment of left metacarpal with proximal portion of 2nd metacarpal bone (X 1.06); 62 - Right calcaneum (X 1.96); 63 - 3rd phalanx of the fore leg (X 1.23); 64 - Lateral splint bone (4th metatarsal) (X 1.63); 65 - Proximal fragment of metacarpal II (X 1.09)



PLATE VII : *Axis axis* : 66 - Fragments of horn core (X 1.66); 67 Fragments of horn core (X 1.87); 68 - Fragments of horn core (X 1.93); 69 Fragments of horn core (X 1.34); 70 Fragments of horn core (X 1.91); 71-Fragments of horn core (X 1.46); *Ovis orientalis vignei* : 72 - Fragment of thoracic vertebra with neural arch and spine (X 1.56); 73 - Fragment of shaft of tibia (X 1.09); 74 - Fragment of right pelvis with portion of acetabulum and ischium (X 1.89); 75 Fragment of great cornu of hyoid bone (X 0.93); 76 Fragment of shaft of femur (X 1.09); 77 Fragment of shaft of radius (X 1.09); 78 Fragment of shaft of tibia (X 0.87); 79 - Distal fragment of left tibia (X 0.91)



PLATE VIII : *Trionyx gangeticus* : 80A & B Fragment of plastron (X 0.76); *Lissemys punctata* : 81A & B Fragment of carapace (X 0.92); 82 Fragment of carapace (X 0.79); 83 Fragment of left epiplastron (X 0.98); *Gallus* sp. : 84A & B - Right metatarsus (X 0.76)