well developed. Pottery produced by slow-wheel or on turn-table technique were also noticed. Black-and-red ware, mostly hand-made, unpainted and with some unusual shapes, was noticed throughout the period. Other wares met with were red ware, dull red ware, burnished black ware, burnished chocolate coloured ware. Post-firing paintings in red ochre were seen on several examples; the paintings were confined to necks and lips. These decorations consisted of vertical and oblique strokes and hatched triangles. The shapes commonly met with were vases, bowls, pots with carination at the waist, dishes, lids, jars and dishes-on-stand. The uncommon shape met with was a tumbler with slightly out-curved sides and featureless rim and a cut disc base, i.e. there was a recess between the base and the body. The shape was found only in black-and-red ware, and the pot was hand-made. Besides these shapes, miniature pots, about 5 cm in height, with featureless rim and curved base, were found from all levels of the period. These miniature pots were found in fairly good number and possibly were used as crucibles for smelting copper. Charred grains collected from the deposits of this period showed the presence of rice and kulthi, a coarse cereal. A detailed report on botanical studies is awaited.

Period II B – Iron Age

The deposit, a little over 1 m, belonging to this period, was confined to three top layers. The material recovered from this level was hardly different from the material found in the preceding level. The only difference lies in the fact that now iron also appears on the scene. One iron tool, resembling a polished celt in shape, was, however, the only discovery of its kind. It is possible that there were other examples too but so far we have not found them. Or else, it was imported here from some neighbouring iron-using site.

An examination of the iron celt shows that the knowledge of iron working was very primitive; some crude method of extraction of iron from the ore was employed. The object shows layers, and it appears that the ingot was beaten into the shape of a celt. As said earlier, all the cultural traits of Period II A continue.

Animal remains found from different levels show on primary examination the evidence of humped cattle, deer, Elephas maximus, and Capra hircus. The material from the last deposits of the last period does not bear any affinity either with the megalithic material in the neighbouring states or with that found in the earlier levels at Sisupalgarh which was dated by Lal to circa 300 B.C.

In the absence of radiocarbon dates, we can only propose some tentative chronology.

It is well established that the metallurgy of iron in India was known around 1000 B.C. Thus, the Iron Age level may be placed in the time-bracket of 1000 B.C. – 800 B.C.

Period II A at Golbail Sasan with a deposit of over 5 m can be dated to circa 1400 B.C. to 900 B.C. Period I, i.e. the Neolithic period, which is separated by a filling from period II A, may be dated to circa 1600 B.C.

Ancient Ports of Orissa: Probable causes of their decline

The Brahmāṇḍa Purāṇa, a text probably of 10th century A.D. mentions that Chilika in Orissa was a big harbour providing shelter to the seagoing vessels. Ships from Chilika ploied to Java, Malaya, Sumatra, Bali, Burma, China, Thailand, Ceylon and other places and they could carry thousands of passengers¹. Palur, was an international port which flourished from 600 B.C. to the 16th century. The Jaina Uttaradhiyāyana Sūtra and

B. K. Sinha

Dy. Supt. Archaeologist,
Archaeological Survey of India
Bhubaneswar
the Hathigumpha inscription mention that the deserted Pithunda port was renovated by King Kharavela and had a direct contact with Champa. Che-li-ta-lo, which Huen Tsang placed in the south-east region of Orissa, has been identified with modern Puri. Tamralipti carried out the flourishing trans-ocean trade with Burma, Ceylon and the islands of the Far East. The literary and inscriptive sources of Java and China frequently mention about the people of Orissa. The Jaha inscription of Java of A.D. 840 mentions that the Kalinga people had some contact with Java. Two thousand families migrated to Java along with the prince of Orissa, and later-period contacts have been reflected in the art history of Orissa. Apart from trade and cultural contacts, Orissa had matrimonial alliances with Sri Lanka.

The excavations at Sisupalgarh, Khalkatpatna and Manikapatna confirm that Orissa had overseas trade contacts with Rome, China, Africa and the Arab countries. Apart from direct voyages, the merchants of Orissa used to sail with the Tamil and Kerala sailors to South-east Asian countries, Rome, and Arabia. Orissa had her colonies in Burma, Thailand, Malayan peninsula, Champa, Java, Sumatra and beyond South-east Asia. The ancient time voyages from Orissa to Malayan peninsula were through the straits of Malaca to Sumatra, Java, Bali, Celebes, Borneo and the Sunda straits to Champa and Kambuja. How these ports could have gone to disuse? Possibly both man-made and natural causes would have played their crucial role for the non-functioning of the ports.

Man-made Causes

The historical studies reveal that weak dynasties of Orissa could not protect the maritime trade interest due to internal disturbances. Economy was under the control of feudatories and producers as well as manufacturers who lost their interest in trade. The Imperial Cholas captured the islands of South-east Asian countries. The naval battle between the Sailendras and Cholas continued up to 11th century A.D. The interference of the Arabs in the Indian Ocean again disturbed the maritime trade and China became an important maritime power in the Bay of Bengal. The Muslims collected commercial taxes from the rulers of Orissa.

In ancient period, navigation was based on the skilled manual manoeuvres depending on the sun and stars. Moreover, vessels were sailing with the aid of favourable wind and in fair weather. Unskilled navigation and lack of communication facility at times caused the loss of lives and vessels. The sailors of Orissa lost their interest in marine trade due to above reasons. The absence of peace and order cut slowly at the roots of the seaborne trade of Orissa. The trade enterprises disappeared leaving only the memory of the overseas trade and was limited to rituals and festivals.

Natural Factors

Coastal Orissa played a major role in seafaring and human settlement since ancient times. The geomorphological features and network of rivers are important for marine archaeological search. The Orissa coast is characterised by long sand beaches with high and wide backshore. Natural factors like tectonic movement, coastal sedimentation, development of sand dunes in the navigational channels, change of river courses, floods, cyclones, sea level fluctuations etc. perhaps played a crucial role in the destruction of the port-cities of Orissa. A general description as to how these factors could have played their role is given below based on available scientific data.

Tectonic History

Tectonic activity can bring about major changes on the coastline. Evidences for this are present on the Orissan coast. For example, Balasore, the ancient sea port, is only 15 km away from the present seashore. The Konark temple was on the seashore once upon a time but presently the temple is situated about 4.8 km away from the shore. Ahuned feels that this is due to upliftment of the land. Ptolemy, the geographer of A.D. 100 stated that Konarkanagar (Konark) was a port. Perhaps he referred to the same Konark which was subsequently disused due to tectonic movement. Khalkatpatna served as a port nearby Konark in early medieval period.

Coast and Coastal Processes

The coastline is constantly affected by the physical processes which are the net results of prevailing coastal currents, causing sedimentation in a particular pattern. The important factors for coastal processes are the long shore sediment transport which is mainly due to the wave characteristics and near shore topography. The beach sediment transport is having a regional variation
due to the geological and physiographic factors. The studies on sediment transportation carried out along the coast-line of Orissa show that the direction of annual net transport is towards north-east and during south-west monsoon due to strong wind activity the transport is much higher. It is probably possible that these processes might have swallowed some of the port-cities like Palur in course of time. Based on 10 years' data of sedimentological studies at Konark and Puri, Chauhan concludes that the amount of sediment input is higher at Konark coastal region than at Puri coast. On the basis of the above studies it seems that Khalkatapatna might have also got silted up due to sedimentation.

During monsoon the tropical rivers of Orissa transport huge quantity of sediments to the Bay of Bengal. River Mahanadi discharges several tons of sediment load into the sea. According to Pasco the Chilika lake was an inlet of the sea that was first swallowed by the debris delivered by one of the tributaries of Mahanadi, later isolated by the formation of the spit. The formation of spit at the mouth caused due to the south-west monsoon and it is responsible for brackish water in the lake. Chilika lake was a busy port in the early historical times and ships plied to South-east Asian countries. The sedimentation probably caused the disuse of the port and some objects might have been, buried in it waiting archaeologists' spade.

Natural Hazards

The Bay of Bengal is prone to cyclones. Depressions in Bay of Bengal sometimes lead to cyclonic storms and cause havoc to the coastal settlements. Statistical studies show that between 1891 and 1970, as many as 1,036 depressions have occurred in the Bay of Bengal, out of which 360 intensified into storms. The wave height rises to 6 to 7m which bring deluge by inundating lowlying coastal areas. The timely monsoon sometimes brings heavy rainfall and rivers swell up with flood which damage the coastal and agricultural land. It is worthwhile to mention that some storms, cyclones and floods might have washed out some of the coastal structures and port installations like warehouse, wharf and buildings.

Shifting and Diversion of River Courses

The coastal zone of Orissa is marked by sand dunes. These dunes have also been blown inland by the force of wind. The inner limit of the coastal dunes may be set by some topographic obstruction and prevent the rivers falling directly into the sea. The diversion of river course made the port inoperational and this would have been the case perhaps with Palur port also. Recent explorations at Palur revealed pottery and other antiquities which are extensively scattered in the sand dunes and it deserves a systematic excavation. The studies carried out on Mahanadi delta provide that five million cubic metres of coarse sediment is deposited at the mouth of the Mahanadi river. Hence the reworking of the sediment by waves elongated spits and barriers at the northern side of the Mahanadi river mouth encloses a large body called Hakitola Bay. Hakitola Bay near Paradip served as a berthing place of ships but due to barriers and spits, it is non-functional now.

Sea level Fluctuations

The sea level fluctuation and changes in the climatic phenomenon are partly responsible for the decline of ports and coastal cities. On the basis of recent studies conclusion has been drawn that the rise of sea level is 60 to 90 m in the last 11,000 years on the west coast of India. It is obvious that the coastal Orissa might have also been affected due to similar transgression on east coast. The systematic study of sea level on east coast is required to ascertain it.

The recent explorations on coastal Andhra have brought to notice the evidences of palaeolithic cultures at places like Barua, Bhimunipatnam, Rishikonda and similar evidences also have been found in Tamilnadu. This may be attributed to the sea level changes. Since no exploration is known to have carried out on coastal Orissa, it can be inferred from the above that being in the same coastal belt, the possibilities that the palaeolithic culture may have existed along the Orissa coast, cannot be ruled out.

Based on the above facts, the history of the ports of Orissa and the causes of their decline is to be reconstructed. Generally after the decline of a particular port a new port is built in the same vicinity for marine trade. Man-made causes for decline of ports cannot be ignored. Whether natural causes collectively contributed to the decline of individual ports, or a particular fact is responsible for the decline of a port is yet to be found out. The natural causes of decline and the present state of preservation of the submerged and buried structures
as well as artifacts can be ascertained by marine archaeological studies.

**Acknowledgements**

The author is grateful to Dr. B.N. Desai, Director, National Institute of Oceanography for permitting to publish this paper. He is also grateful to Dr. S.R. Rao for his valuable guidance. The author is also thankful to Shri J.H. Vora for critical study of the paper. Thanks are also due to Sri M.C. Pathak and Dr. M.V. Ramana for reviewing the paper.

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**On the Identification of Bhakti-Deities in Rock Pictures**

A rock-painting accompanied by an Ashokan-Brahmi inscription which was found almost 55 years back at a site near the village Tikula (1), some 56 km south of Gwallor3, could be identified as an early icon of the Bhakti cult.

The painting is on the vertical back-section of a well protected rock-shelter, inside which a two metre high rubble packed platform was constructed to form a level ground. On account of the accompanying Brahmi-inscription this rock-painting has always been considered as very important, since pictures with obviously