

# MARINE GEOPHYSICAL SURVEYS OFF KAVERIPPATTINAM FOR ARCHAEOLOGICAL INVESTIGATIONS

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## ABSTRACT

*Marine geophysical surveys were carried out in March, 1990 in the offshore regions of Tranquebar and Kaverippattinam covering the area between 5 and 15 m water depth. In addition to several isolated objects, a continuous belt of small objects extending parallel to the coast on 8 m water depth is recorded for a distance of more than 2 km between Chinnakudi and Chinnamodu. From the diving operations, it is confirmed that they correspond to heaps of shells (Gastropods) with their relief varying from few centimetres to half a metre. At 11 to 13 m water depth several isolated objects of strong reflectivity are recorded off Kaverippattinam and also off Tranquebar. A shipwreck is also recorded off Chinnamodu but no detailed investigations are carried out since the object is covered with broken pieces of fishing nets and barnacles. Many of the objects recorded at 7 to 8 m and 11 to 13 m water depth both off Tranquebar and Kaverippattinam appear to correspond to manmade structures. More detailed and systematic surveys are to be carried out to map all these features and to undertake the archaeological investigations.*

Side Scan Sonar and Echosounder surveys were carried out from 17th to 25th March, 1990 in the offshore region between Tranquebar (Tarangambadi) and Poompuhar to search for the underwater objects/structures of archaeological importance. These surveys were undertaken between 5 to 14 m water depth both parallel and perpendicular to the coast (Fig.1). Plans were also made to carry out the seismic profiler and magnetic surveys but they could not be carried out due to rough sea conditions and shortage of time.

Among the several objects recorded in the Side Scan Sonar records, those recorded at 7 to 8 m and 11 to 13 m water depth appear to

have greater significance from the geological and archaeological point of view. Between Chinnakudi and Chinnamodu (Chinna Vanagiri) scattered objects of different sizes are recorded continuously for a distance of more than 2 km extending along the coast at 8 m water depth (Fig.2). From the diving operations, it is confirmed that they are the heaps of shells, long spiral type (Gastropods) and they project over the ocean bed to a height of about half a metre. These shells require shallow water environment and hard substrata for their formation and growth. Because of poor visibility the divers could not undertake any digging operations to confirm the type of material present beneath these shell heaps. Since

they occur continuously at a particular depth of 8 m and extend more than 2 km length parallel to the coast, it is suspected that the hard substrata beneath these shells could be a man-made structure constructed when this area was exposed and later got submerged possibly due to rise in sea level. Alternatively, Gastropods are also found in warm region of comparatively shallow water of very less salinity, preferably the estuarine environment. Airlifting operations are required to know the details of the nature of the substrata beneath the shells in this area.

In addition to the lineated shell structure, isolated groups of objects with strong reflectivity and a sand bar, indicated as a topographic high of about 1 m relief in the echosounder records are also recorded at the northern end of Chinnamodu at 7 to 8 m water depth. A circular object of considerable size and strong reflectivity is also recorded at 8 m water depth at the southern end of Chinnamodu (Fig.3).

At 11 to 13 m water depth several isolated objects of different sizes are recorded. These are more prominent particularly between Kaverippattinam (Vanagiri) and Chinnamodu (Fig.4) Some of them are circular in shape while others are rectilinear or linear. In the absence of any topographic undulations as evidenced from the echograms collected in this area, these images which are of very strong reflectivity may correspond to man-made objects/structures that are scattered over the ocean floor.

As per the information obtained from the local fishermen, a shipwreck is suspected to be present at about 19 m water depth off Chinnamodu. Side Scan Sonar surveys carried out in this area recorded an object that resembles a shipwreck (Fig.5). From the Sonograms it appears that this object is pre-

sent as two separate pieces. Diving operations carried out confirmed that a large object is lying over the seabed with a pillar of about 2 m height projecting above the ocean floor. The object is fully covered with broken pieces of fishing nets and barnacles grown over it. Unless the barnacles and fishing nets are fully cleared it is not possible to assess the size and shape of the object. From the images recorded in the sonographs it is suspected that some more shipwrecks are present particularly between Kaverippattinam and Chinnamodu. Some images in the sonographs recorded with long shadow at about 13 m water depth appear to correspond to submerged shipwreck (Fig.6).

Off Tranquebar, the Side Scan Sonar recorded several objects at 7 to 8 m water depth off Masalamani Temple. Fairly large size objects are also recorded at 6 to 7 m water depth of the southern end of the Tranquebar Museum (Fig.7). Some isolated objects of fairly large size occur at 11 to 12 m water depth off Masalamani Temple and Museum off Tranquebar (Fig.8). The diving operations carried out off Masalamani Temple at 7 m water depth have revealed the presence of small boulders arranged in circular fashion which according to archaeologists correspond to the burial grounds of that period. Detailed investigations could not be carried out due to rough sea and poor visibility.

Side Scan Sonar and Echosounder surveys are also carried out parallel to the coast between 5 to 9 m water depth upto about 5 km south of Masalamani Temple. The Sonographs and Echograms have recorded the extension of submerged river valleys of Nandalar and Uppanar rivers upto 6 m water depth (Fig.9). These river valleys got covered up by sediments beyond 7 m water depth. Opposite these two river mouths, objects of considerable size

and strong reflectivity are recorded at 7 and 8 m water depth.

From the preliminary surveys carried out, it could be provisionally inferred that the human habitation was quite active upto about present 8 m water depth in the ancient period. Many of the objects recorded in this area could correspond to the manmade objects/structures which are later submerged due to transgression of the sea.

Similar to 7 to 8 m water depth, the area between 11 to 13 m water depth also shows the presence of several isolated objects of considerable size and strong reflectivity all along the coast between Poompuhar and Tranquebar. At several places along the east coast and west coast of India, coarse sand regions are located at depth between 20 and 30 m. Investigations on the occurrence of these coarse sand patches at these depths have led to the conclusion that they are deposited during the still stand at about 7000 to 8000 years B.P. If the objects recorded at 11 to 13 m water depth are found to be manmade structures, it may provisionally be inferred that they may belong to the age much older than those recorded at 7 to 8 m water depth.

All these surveys are carried out at random and without proper position location system. In order to map those objects accurately and to assess their nature it is important to carry out detailed and systematic geophysical surveys comprising of Side Scan Sonar, Shallow Seismic Profiler, Magnetometer and Echosounder with close profile interval and proper position location system. It is estimated that at least 30 days are required for mapping the area between Chinnakudi and Poompuhar from 5 to 20 m water depth and to make some preliminary investigations such as airlifting and diving before undertaking detailed archaeological investigations. It is also

essential to make necessary arrangements to stop the fishing activity in this area during the survey period because the fishing vessels including the catamarans not only obstruct the survey operations but also produce false images in the sonographs and spurious anomalies in the Magnetometer readings.

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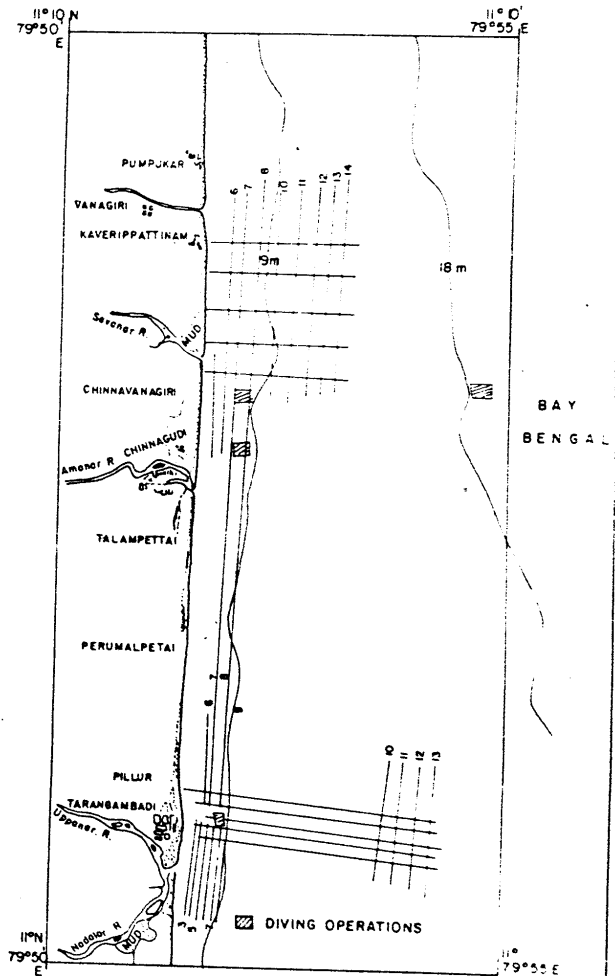
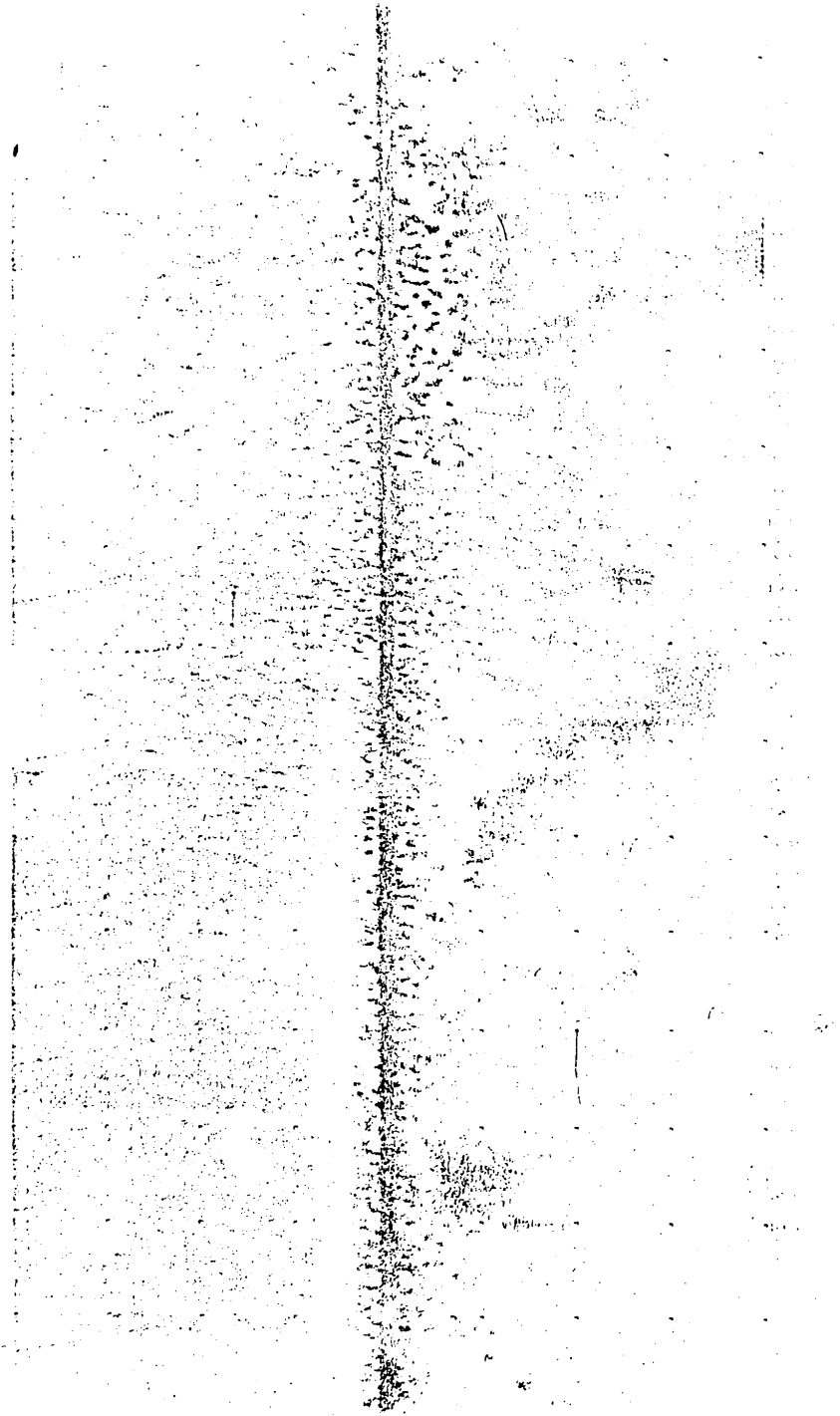
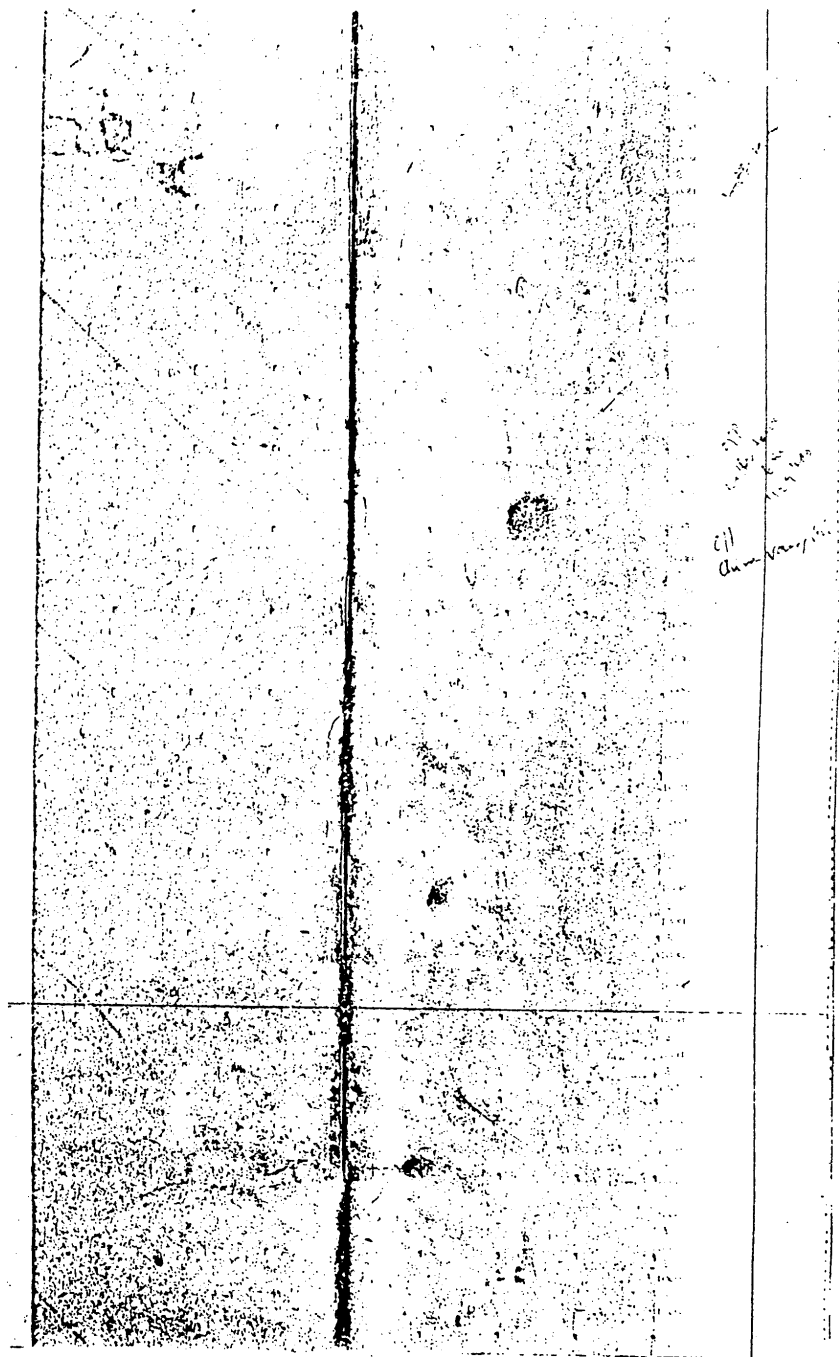


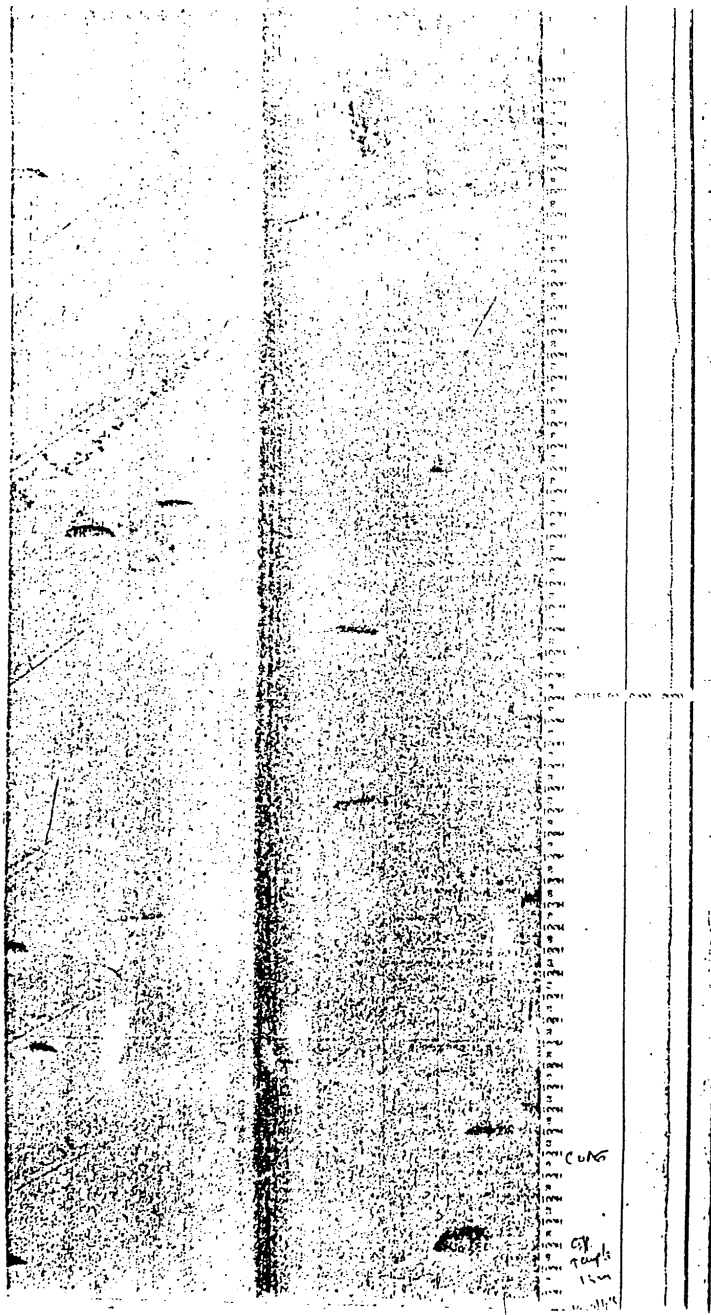
Fig. 1: Survey area and profile location.



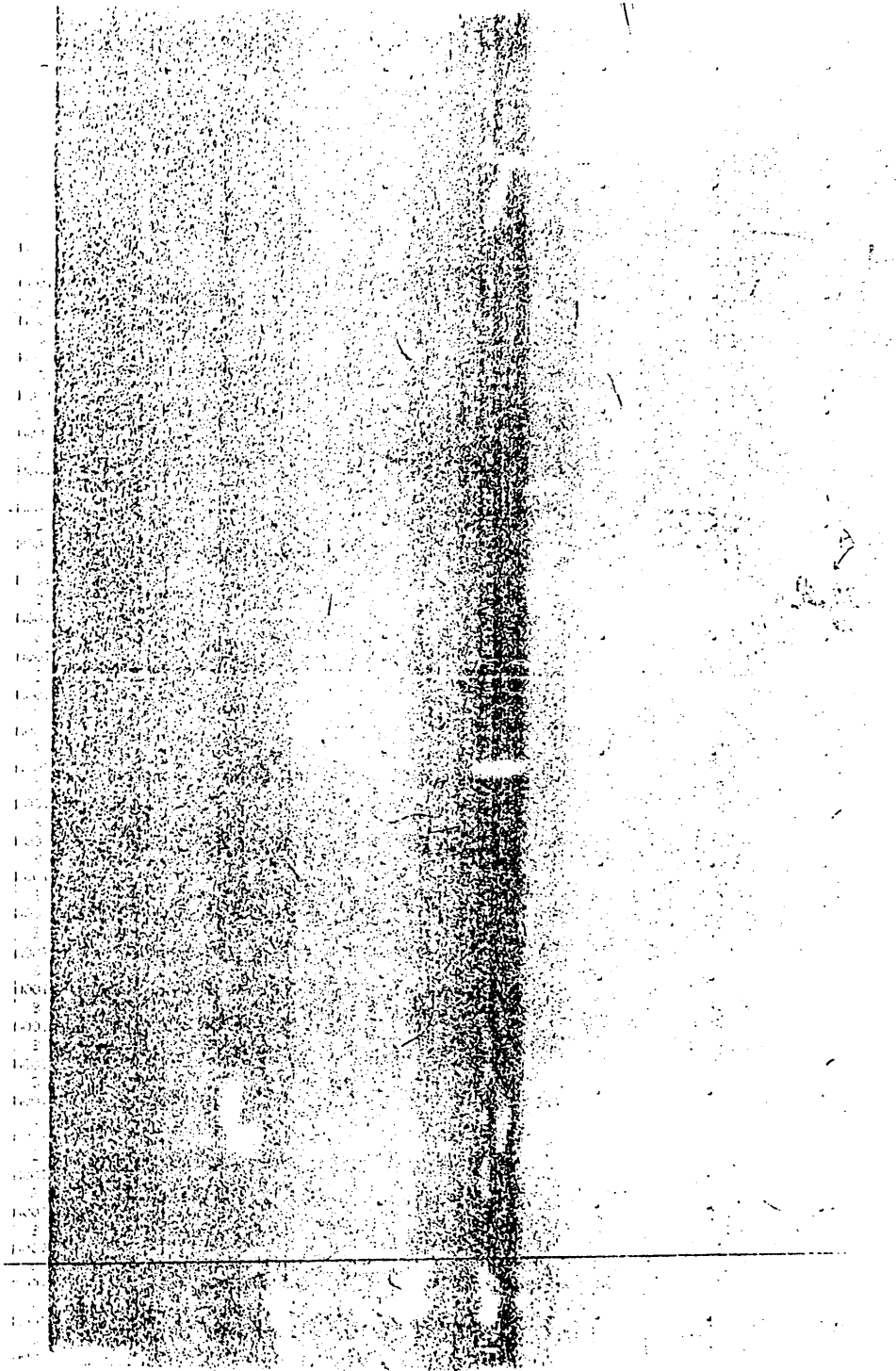
*Fig.2 : Shells (Gastropods) along 8 m depth between Chinnakudi and Chinnamodu.*



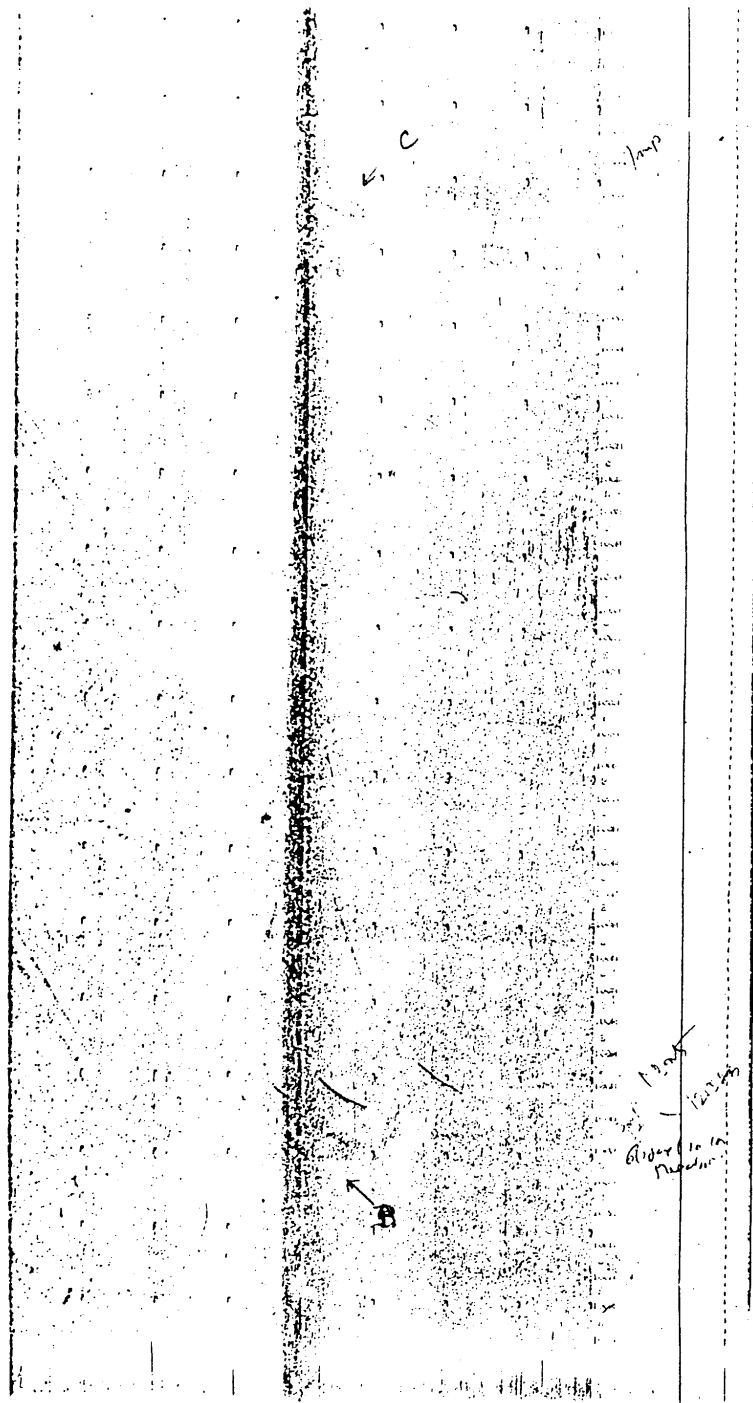
*Fig.3 : Circular object of strong reflectivity at 7 m depth off Chinnamodu.*



*Fig.4 : Isolated objects of strong reflectivity at 12 to 13 m depth off Kaverippattinam (Vanagiri).*

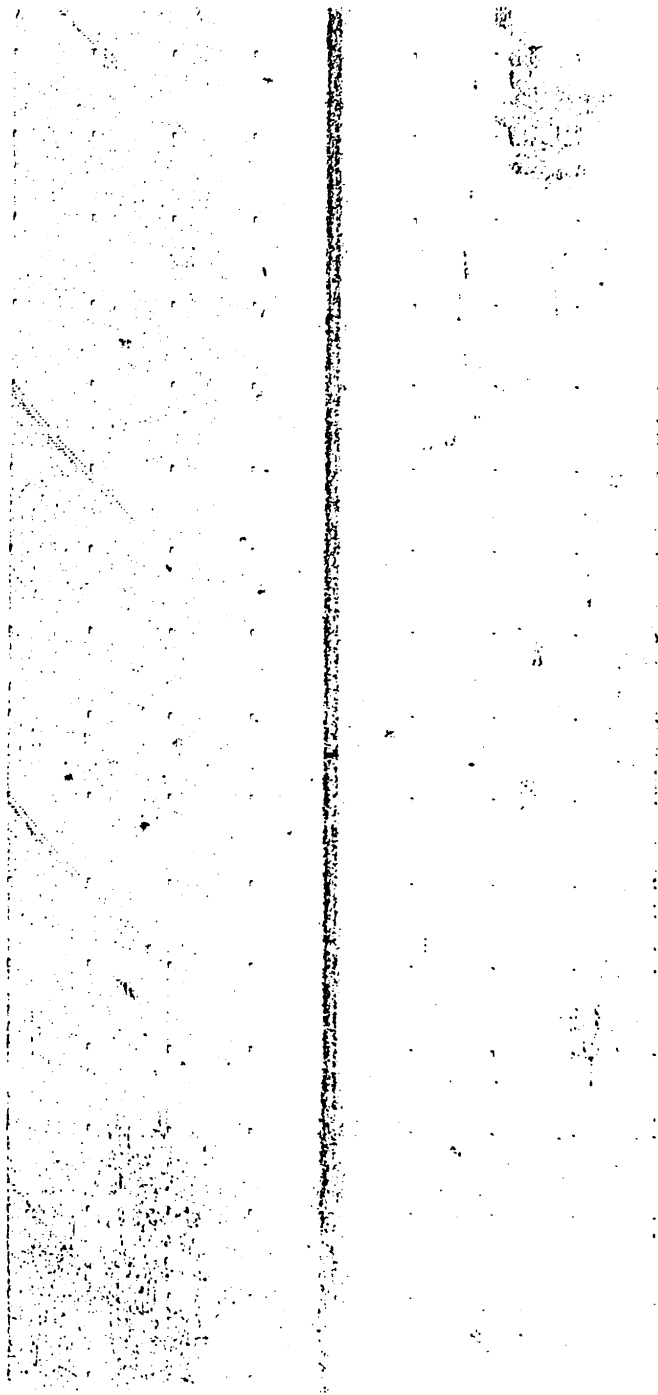


*Fig.5 : Shipwreck (A) off Chinnamodu.*

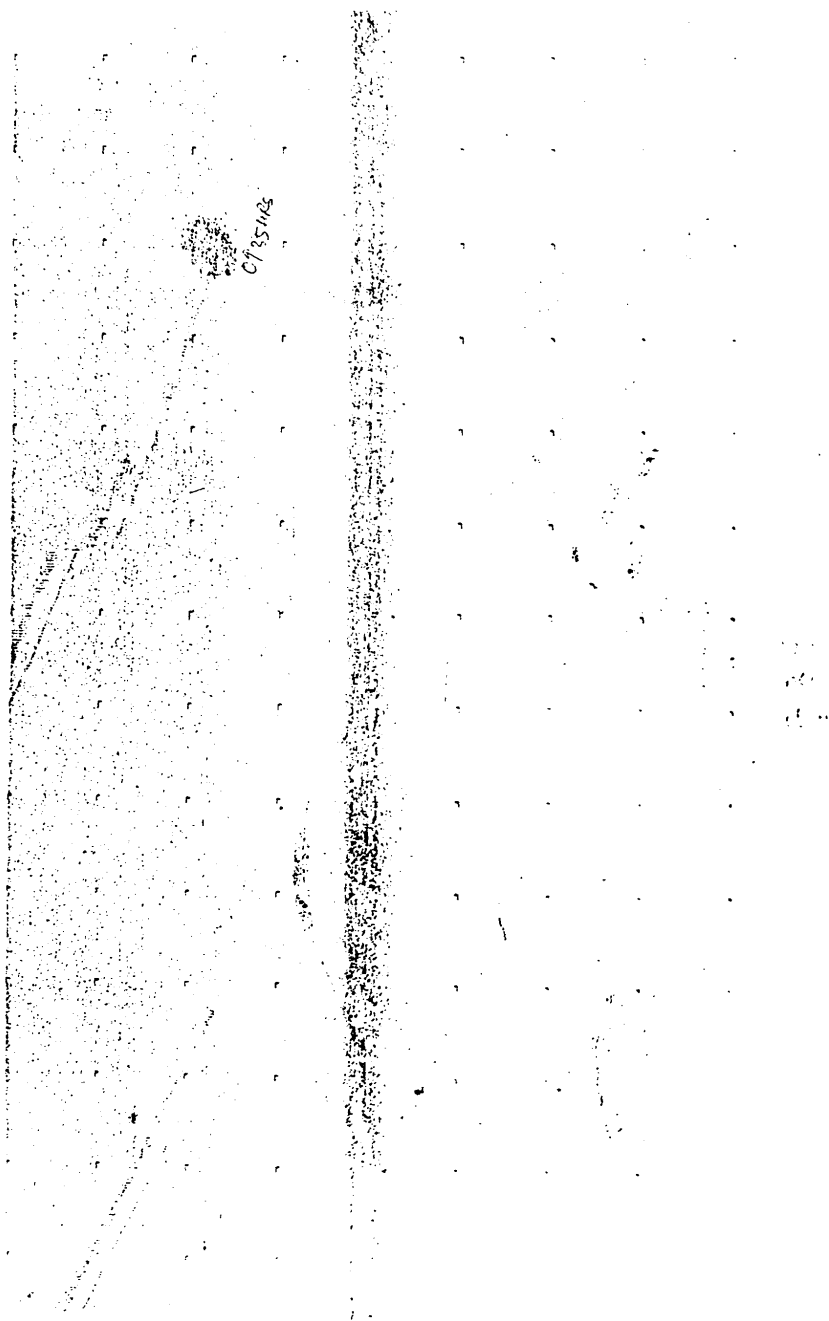


*Fig.6 : Suspected Shipwrecks (B, C) off Kaverippattinam.*

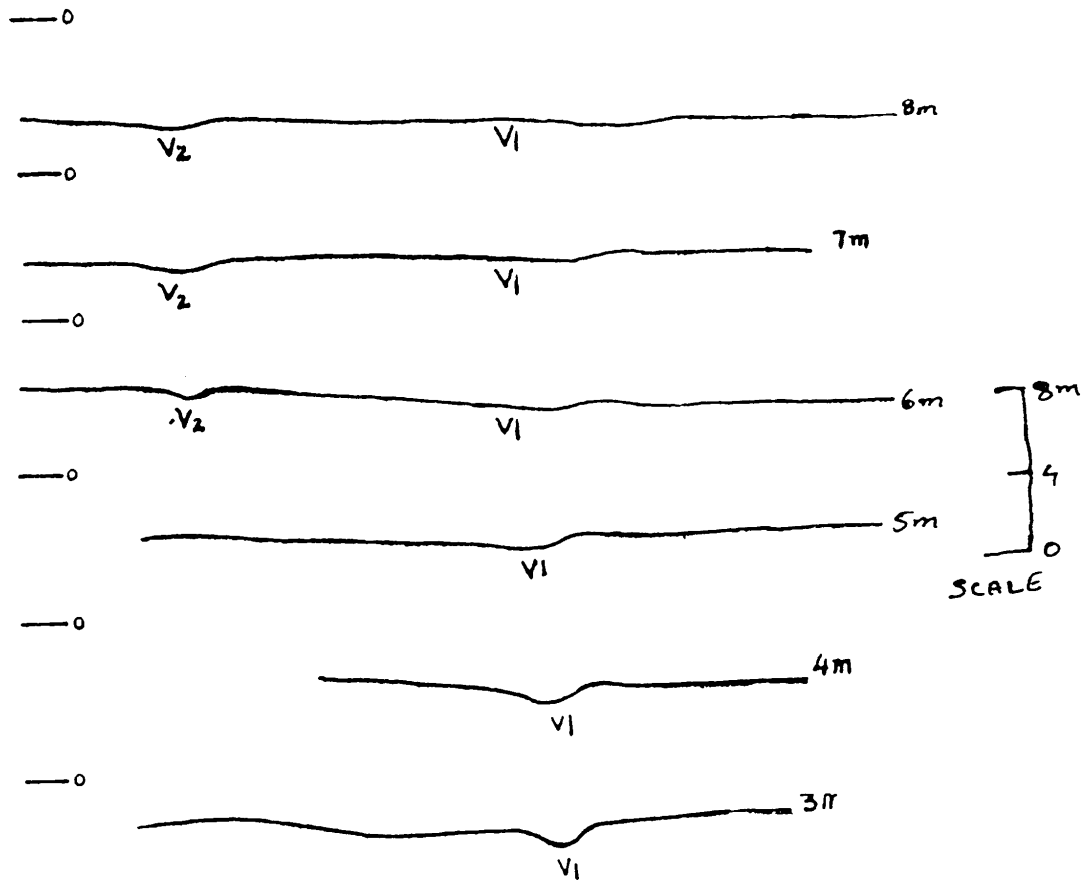




*Fig.7 : Objects of strong reflectivity off Tranquebar Museum and Masalamani Temple at about 7 to 8 m depth.*



*Fig.8 : Isolated objects of strong reflectivity off Masalamani Temple at 12 to 13 m water depth.*



*Fig.9 : River valleys recorded on Echograms of Nandalar River (V<sub>2</sub>) and Uppanar River (V<sub>1</sub>).*