

GROWTH OF THE SAND BAR NORTH OF THE GODAVARI CONFLUENCE

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LA FOND AND PRASADA RAO¹ in their detailed paper on the erosion at Uppada attributed the erosion to the alteration of the circulation pattern in the Kakinada Bay as well as near Uppada caused by the growth of the Godavari Point. The sand bar which was non-existent a hundred years ago has grown first northwards of the Godavari confluence, and later towards north-west. It is interesting to study the factors responsible for the development of the sand spit. Most of the river mouths on the east coast of India are characterised by the existence of sand bars extending usually northwards. A person flying from Madras to Calcutta may notice several such sand spits. This is believed to be due to the presence of strong northerly currents, coastal and longshore. The southerly currents caused by the north-east monsoon are too weak to build sand spits in a southerly direction at the confluences.

Poornachandra Rao and Mahadevan² found that between Godavari Delta and Waltair, the offshore sediments contained green pyroxene, amphibole and plagioclase in small amounts when compared with garnet and zircon which are present in appreciable amounts. Colourless mica and kyanite also appeared. The detrital mineral assemblages vary in their proportion of quartz, felspar, sillimanite, zircon, garnet, monazite, bluish green amphibole and plagioclase felspar. This mineral association is characteristic of the rock types occurring in the drainage basin of the Godavari River. Hence it is believed that most of the sediment in this region is brought by the river.

All the earlier surveys made in the area were consulted, for a detailed analysis of the changes in the region of the Godavari River distributaries. Some of the charts are reproduced and are shown in Plates I, II and III. Plate I shows that Godavari Point was not existing in the year 1851. The present Kakinada Bay was mostly dry during the low waters. The Godavari River discharged its water through an opening towards east. A small sand bar exposed only at low tides was present. The shape of this shows an unmistakable northerly drift of sand at that time. By 1864 the 'sand bar' exposed at low tides became a full-fledged sand spit, resulting in the birth of the Godavari Point. The river was discharging its waters mainly northwards, although a small opening

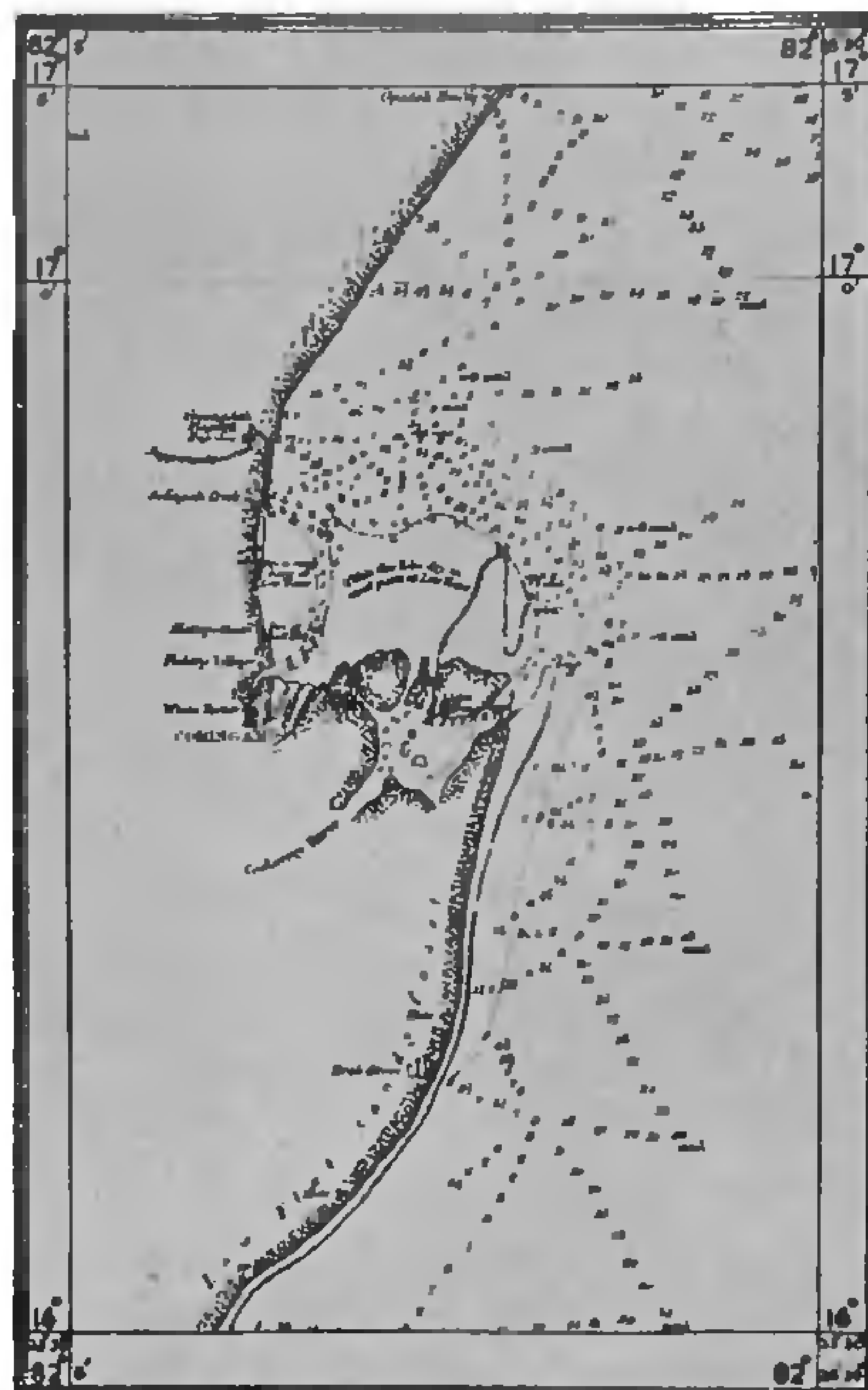


PLATE I. Admiralty Chart of the survey made in 1851, in the region of Godavari Distributaries and Coringah (Kakinada) Bay.

eastward was present at the time. During this period, the Hope Island took its present shape. A bay off Kakinada Town was formed which was previously known as Coringah Bay and now called Kakinada Bay. The bay appeared to have become deeper, the low mud flats were cut probably by the Godavari discharge.

The Godavari Point grew northwards by 1878 and the river was discharging its waters into the Kakinada Bay instead of directly into the sea, since the eastern channel has been completely silted up. The Sacramento Shoals (10 miles south of Kakinada) were slowly appearing by that time. A process of siltation was taking place north of Kakinada groyne. The subsequent charts upto 1893 show a still further development of Godavari Point northwards, the formation of Sacramento Shoals, and the accretion of sand north of the Kakinada groyne. The Godavari Point finally grew



PLATE II. Chart of the survey made in 1893.

towards north-west as the chart of 1929 (Plate III) and the subsequent ones reveal.

The birth and further development of the Godavari Point must have been due to a disturbance of equilibrium caused either on the shore itself or in the river basin. About half a century back, the Madras harbour was constructed. But the structure is too far away (about 300 miles) southwards from the Godavari confluence to have any influence over it. The construction of a breakwater at Visakhapatnam about 25 years back too could not have any effect at the river mouth, firstly since the southerly currents are too weak and secondly the shore structure is a hundred miles north-east of the area under investigation. Obviously no structure built on the coast near about a few hundred miles to the locality had resulted in any disturbance of the equilibrium. Hence changes in the environment in the Godavari Basin itself have to be sought for explaining the development of the sand spit. At Madras, a million tons of sand passes a given point every year along the coast. The same quantity of sand is found to migrate at Visakhapatnam too. This shows that if a sand spit

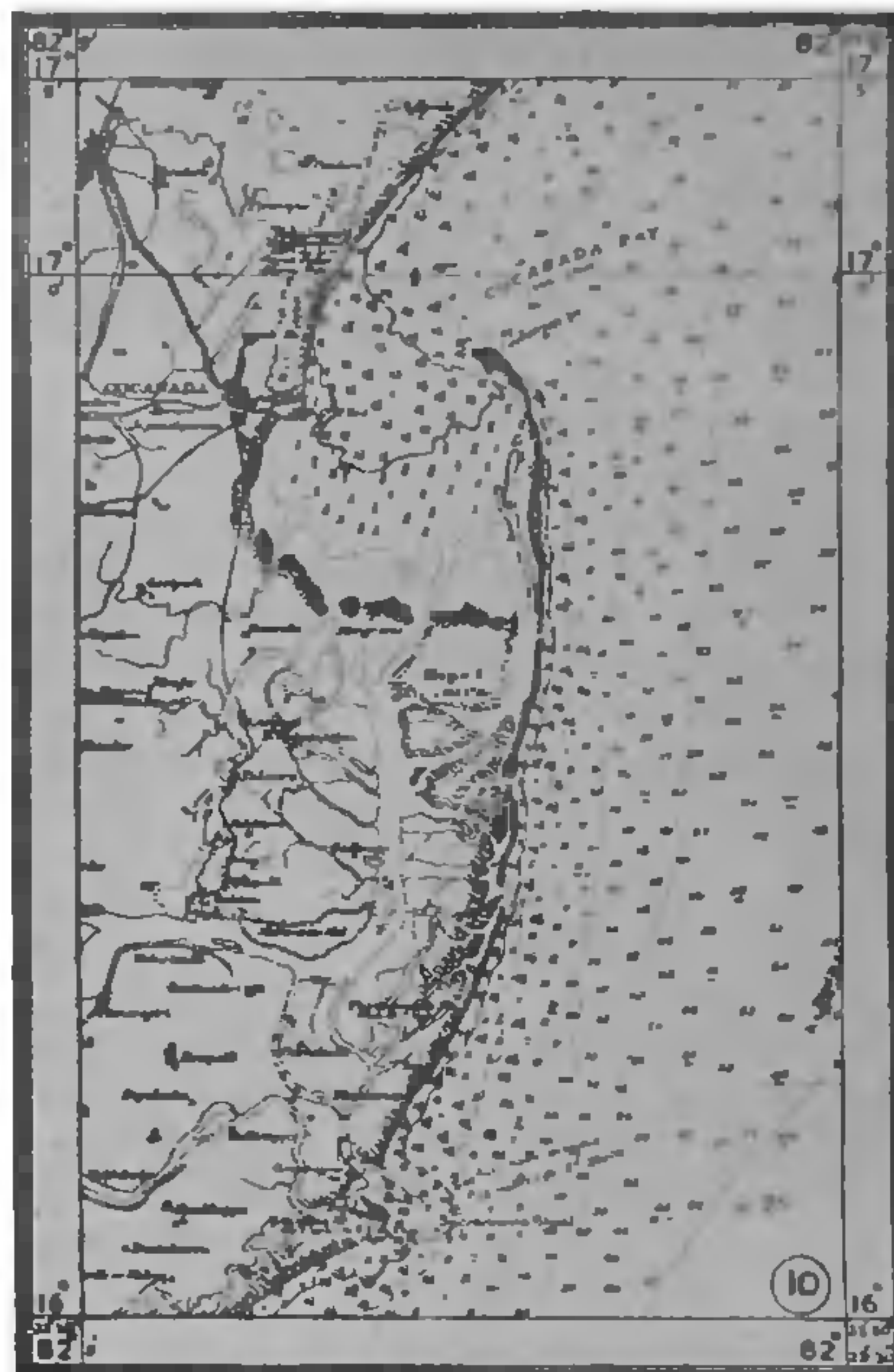


PLATE III. Chart of the survey made in 1929.

were to be built, a surplus sediment exceeding the normal limits ought to be supplied to the coast by the river.

A dam constructed a century back at Dowlaishwaram on the river actually ought to have reduced the supply of sediment towards sea. At California, the construction of a number of dams for flood control across the rivers resulted in an inhibition of the supply of sediment to the sea, as a consequence of which the beaches became narrower.³ At any rate the birth of the Godavari Point a hundred years ago can be ascribed to a surplus sediment made available during a flood time probably owing to heavy rainfall. The growth of the Point later, however, cannot be attributed entirely to repeated floods. The extensive deforestation that has been carried out during the last hundred years and more particularly from the beginning of the century resulted in an increase of soil erosion in the river basin and a net rise in the rate of transport of sediment to the sea. The excessive supply of sediment resulted in the overloading of the littoral drift which already was of the order of a million tons. This surplus sediment was forcibly

deposited north of the river mouth, since the currents are not capable enough to carry it farther up, thus affecting the rapid growth of the sand spit which culminates in the Godavari Point.

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1. La Fond, E. C. and Prasada Rao, R., *The Port Engineer*, 1956, 5(2), 4-9.
2. Poornachandra Rao, M. and Mahadevan, C., *International Geological Congress*, 1956, XX Session, Sec. 14.
3. Caldwell, M. J., *Tech. Mem. 68, Dept. of the Army, Corps of Eng. Beach Erosion Board (U.S.A.)*, 1956.

NOBEL AWARD FOR CHEMISTRY—1956

THE Nobel Prize for Chemistry for 1956 has been awarded jointly to Sir Cyril Hinshelwood, President of the Royal Society, and Dr. Lee's Professor of Chemistry in the University of Oxford, and Professor Nikolas Semenov, Director of the Institute of Chemical Physics of the Soviet Academy of Sciences. The prize was awarded for their researches on the mechanism of chemical reactions

Sir Cyril Hinshelwood has done pioneering work in the modern approach to chemical kinetics based on statistical mechanics and theory of absolute reaction rates—the study of rates at which chemical reactions proceed. The concept of molecules breaking into atoms which take part in successive reactions is largely due to Hinshelwood, and by this concept it is possible to explain the kinetics of many chemical reactions which otherwise would be incomprehensible. To cite a very simple example, Hinshelwood in his Bakerian lecture (1946) propounded the thesis that the reaction between hydrogen and oxygen molecules involve elementary steps with hydrogen atoms, and hydroxyl and perhydroxyl radicals as intermediates. Much of this work has become important not only in the rapid advances in the free radical and theoretical chemistry but also in its bearing on chemical industries. Hinshelwood has also exerted an enormous influence on chemical teaching as well as research in the Universities in his own country as well as outside through his profound writings such as "Kinetics of Chemical Change", "Structure of Physical Chemistry", etc. In recent years he has applied the methods of chemical kinetics to the metabolism of the bacterial cell and provided possible explanations of apparent adaptations.

Sir Cyril Hinshelwood has been a recipient of many honours from Chemical Societies in Europe as well as America and has been a member of the advisory council on scientific policy since 1953 in his own country. He is 59, unmarried and had his education in Westminster City School and Balliol College, Oxford. He was elected Fellow of the Royal Society in 1929 when he was thirty-two.

Professor N. Semenov, an outstanding figure among Soviet physicists and physical chemists, is famous for his investigations on the speeds of chemical reactions, chain and non-chain reactions, branching reactions, gas combustion, etc. The discovery of branched chemical chain reactions has helped a great deal in the development of a rational theory of the nature and mechanism of many complicated chain reactions involving hydrocarbons, oxygen, halogens, etc. Semenov's monumental work on "Chemical Kinetics and Chain Reactions" reveals not only the erudition of a scholar but the clarity and lucidity of exposition of a master, and this book has formed the basis of numerous investigations in oxidation, combustion, polymerization, etc. Professor Semenov has been the Head of the Institute of Chemical Physics of the U.S.S.R. Academy of Sciences for over a quarter of century.

That the Nobel Prize in Chemistry for 1956 has been awarded jointly to Hinshelwood and Semenov immediately after the award in 1954 to Staudinger implies a tribute not only to the brilliant achievements of the recipients but also no less to the kinetics of chemical reactions and the importance of chain reactions, both in the pure and applied fields.

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