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Recent Sediment Studies

Recent Sedimentation at the Mouth of Rustico Harbour,
Prince Edward Island¹

by J.W. ROWLING

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Rustico is a small fishing village approximately thirty miles north-west of Charlottetown on the north coast of Prince Edward Island. This coastline is characterized by long, gently curving beaches backed by a narrow belt of sand dunes. These are occasionally interrupted by bed-rock headlands of red beds of Pennsylvanian or Permian age.

Rustico Island is a three mile long sand dune ridge across the mouth of Rustico Bay. A few years ago a tourist road was planned to encircle Prince Edward Island's coastline. The west end of Rustico was therefore joined to the mainland by a causeway, and the road construction commenced towards the western end of the island. Unfortunately the blocking of the eastern exit altered the flow through the western exit, the tip of the island began to be rapidly eroded, and work was halted until further surveys were made. As a result of these surveys, there is available a large amount of information on the changing topography of the area in recent years.

In October 1963 I undertook a survey of the sediments inside the harbour, in the harbour entrance (the western exit), and offshore, using a Dietz-Lafonde grab sampler from a boat.

Samples were treated in the laboratory using standard sedimentological techniques: analysis for organic content and carbonate content, and then sieving using quarter phi sieves. U.N.B.'s IBM 1620-II computer was used to derive textural parameters. Folk and Wards' (1957) mean, sorting and skewness were plotted on maps of the region. The sediments are strongly bimodal, some are polymodal, and all are extremely well sorted sands. Without exception the modes occur at 2.15 phi and 2.60 phi with a deep trough between them. The coarser (2.15) mode is dominant in the dune sands, whereas the finer (2.60) mode becomes increasingly dominant seaward.

¹ Presented at the ATLANTIC UNIVERSITIES GEOLOGICAL CONFERENCE held at ACADIA UNIVERSITY in November, 1964

well as a reconnaissance study of Bay of Fundy intertidal zone sedimentary deposits. Klein plans to return to Nova Scotia during the summer of 1965 and study bedform hydraulics and the orientation of sand waves and current directions in the Minas Basin of the Bay of Fundy.

The following papers have resulted from Klein's work:

- KLEIN, G.deV., 1959a, Sedimentary structures in the Blomidon Formation, a Triassic lake deposit, Nova Scotia (Abs): Geol. Soc. America Bull., v. 70, p. 1630
- _____, 1959b, Stratigraphy of Triassic rocks of Nova Scotia (Abs): Geol. Soc. America Bull., v. 70, p. 1631
- _____, 1960, Sandstone petrogenesis of the Wolfville Formation (Upper Triassic), Maritime Provinces, Canada (Abs): Geol. Soc. America Bull., v. 71, p. 1905-1906
- _____, 1961, Depositional environments and sandstone petrogenesis of Triassic redbeds, Western Nova Scotia: Tulsa Geol. Soc. Digest, v. 29, p. 221-222
- _____, 1962, Triassic sedimentation, Maritime Provinces, Canada: Geol. Soc. America Bull., v. 73, p. 1127-1146
- _____, 1963a, Boulder surface markings in Quaco Formation (Upper Triassic), St. Martin's, New Brunswick, Canada: Jour. Sedimentary Petrology, v. 33, p. 49-52
- _____, 1963b, Regional implications of Triassic paleocurrents, Maritime Provinces, Canada: Jour. Geology, v. 71, p. 801-808
- _____, 1963c, Analysis and review of sandstone classifications in the North American Geological Literature, 1940-1960: Geol. Soc. America Bull., v. 74, p. 555-576
- _____, 1963d, Bay of Fundy intertidal zone sediments: Jour. Sedimentary Petrology, v. 33, p. 844-854
- _____, 1964, Sedimentary facies in Bay of Fundy intertidal zone, Nova Scotia, Canada, p. 193-199: in Van Straaten, L.M.J.U., editor, 1964, Deltaic and shallow marine deposits: Developments in sedimentology, v. 1: Amsterdam, Elsevier, 464 p.
- KLEIN, G.deV., and SANDERS, J.E., 1964, Comparison of sediments in tidal flats in the Bay of Fundy and the Dutch Wadden Sea: Jour. Sedimentary Petrology, v. 34, p. 18-24
- KLEIN, G.deV., In Press, Comparison of ancient and Recent tidal flat and estuarine sediments: in Lauff, G.H., editor, In Press: Proceedings of the Conference on Estuaries: Washington, Am. Assoc. Advancement of Science

FRANCIS P. SHEPARD and T.J.H. van ANDEL of SCRIPPS INSTITUTION OF OCEANOGRAPHY, UNIVERSITY OF CALIFORNIA at San Diego have recently sent letter résumés of their recent activities which are of special interest to marine geologists and sedimentologists.

DR. SHEPARD writes: "We actually expect to make dives into the submarine canyons here and off Baja California and some other areas along the southern California Coast during a six months period in 1964-1965. Part of that time the operations will be special Navy projects, but scientific studies of the shelf and various parts of the slope will be made by some of my colleagues. We have some sampling apparatus on the saucer, but our chief results will come from the photographs which we take as stills and moving pictures. I am planning to return for second dives in the Bahama canyons. In September of 1964, I made collections in Monterey Submarine Canyon and took extensive soundings in the outer valley cut into the fan beyond Monterey Canyon. In the spring of 1964 I worked with Harris Stewart and Robert Dietz on a U.S. Coast and Geodetic ship in the Bay of Bengal surveying and sampling the submarine valleys that extend down south of the Ganges Delta. We also made some studies of the submarine canyons off the east side of Ceylon. These are reported in abstracts in the Geological Society of America meeting." This meeting was held in Miami Beach in November 1964 and was reported upon in the January 1965 issue of MARITIME SEDIMENTS.

DR. van ANDEL sends the following information: "My principal field of interest until recently has been the distribution of sedimentary facies in recent sediments of the continental margins, including the continental shelf and marginal basins. Recent results have been published in the form of an AAPG Symposium on the Gulf of California; a major paper on the bathymetry, oceanography and sedimentation of the carbonate sediments of the Sahul Shelf and Timor Trough is almost complete. Increasingly, however, my interest has gone to open ocean marine geology, and work of the last two years and hopefully for several years in the future, is devoted to detailed studies of the structure, morphology and sediments of very small, selected areas. One just completed at sea is a detailed study of a square degree of the Mid-Atlantic ridge.

In addition, I am completing a sediment dispersal study of the Adriatic, and a sparker survey of the northern Gulf of California. One student recently completed a Ph.D. thesis on the genesis of laminated diatomites in the Gulf of California, one is working on a facies and structural study of a portion of the Mid-American Trench, a third has almost finished a facies study of the tidal flats of the Colorado river. One more is starting on a detailed study of sediments and morphology of a small portion of abyssal hill terrain in the central Pacific.

Methods of study are the conventional ones in sedimentary petrology, including my faithful microscope, X-ray, automatic continuous sedimentation equipment and simple chemistry. At sea I use whatever is handy, piston core (always with piston wire release),

recently very successfully free corers without wire, sparker, dredges, etc., and, whenever possible supplementary gravity and magnetic data.

Recent bibliography includes:

- van ANDEL, and POSTMA, H., 1954, Recent sediments of the Gulf of Paria: Verhand. Royal Acad. Sci. Netherlands, 20, 5.
- van ANDEL, 1965, Sediments of the Rhone Delta: Verhand Kon. Nederl. Geol. Mijnbouwkundig Gen., vol. 15, 3
- SHEPARD, F.P., PHLEGER, F.B., and van ANDEL, Tj.H., 1960, Recent Sediments, Northwest Gulf of Mexico: Spec. Publ. AAPG, and various papers therein
- van ANDEL, and SHOR, G.G., 1964, Marine Geology of the Gulf of California: Mem. 3, AAPG and papers therein
- _____, and LABOREL, J., 1964, Recent High relative sea level stands near Recife, Brasil: Science, vol. 145, p. 580-581
- _____, and SACHS, P.L., 1964, Sedimentation in the Gulf of Paria during the Holocene transgression; a subsurface acoustic study: J. Marine Res. 21, 1.
- _____, and IMBRIE, J., 1964, Vector analysis of heavy mineral data: Bull. Geol. Soc. America, vol. 75, p. 1131-1156

JOHN R. CONOLLY, presently visiting scientist in sedimentology at the LAMONT GEOLOGICAL OBSERVATORY OF COLUMBIA UNIVERSITY at Palisades, New York is currently working with diverse research projects. Investigations in the Atlantic and eastern seaboard include:

A study of sediment cores from the Gulf of St. Lawrence, Cabot Strait and Grand Banks. The origin of red/green sediment boundary in the Pleistocene, approx. 25,000 years B.P. is being examined.

A study of recent carbonate sedimentation on the northeastern Puerto Rico Shelf. This includes a textural and mineralogical analysis, and delineation of environmental provinces on the basis of 80 grab samples collected from the Puerto Rico Shelf.

The following is a partial list of papers dealing with recent sediments presented at the AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS - SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS Annual Meeting in New Orleans, Louisiana on April 26-29, 1965. The abstracts of these and other papers presented are published in the March 1965 Bulletin of the American Association of Petroleum Geologists, p. 332-365:

BERNARD, H.A., A resume of river delta types, p. 334

- EWING, M., and EWING, J., Distribution of sediments in the world ocean, p. 339
- FERAY, D.E., Factors influencing sedimentation in the shallow neritic environment, p. 340
- GOODELL, H.G., Environmental geometry: its effect on and interaction with sedimentation, p. 341
- GORSLINE, D.S., VERNON, J.W., and SCHIFFMAN, A., Processes of sand transport in the inner margins of the continental shelf, p. 341
- HATHAWAY, J.C., SCHLEE, J.S., TRUMBULL, J.V.A., and HULSEMAN, J., Sediments of the Gulf of Maine, p. 343
- HEEZEN, B.C., Abussal basin sedimentation, p. 344
- KLEIN, G.deV., Paleocurrents and oceanography, p. 346
- MIDDLETON, G.V., Density current experiments, p. 351
- PELLETIER, B.R., Sedimentation in Arctic waters, p. 355
- SANDERS, J.E., Nearshore sands off southeastern Virginia, p. 357
- STANLEY, D.J., Locating the source of sands in flysch troughs, p. 359
- TANNER, W.F., The surf-break: key of paleogeography? p. 360
- TELEKI, P.G., The use and detection of fluorescent sand tracers, p. 360