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HANDBOOK OF RECENT GEOLOGICAL STUDIES OF
MORETON BAY, BRISBANE RIVER AND
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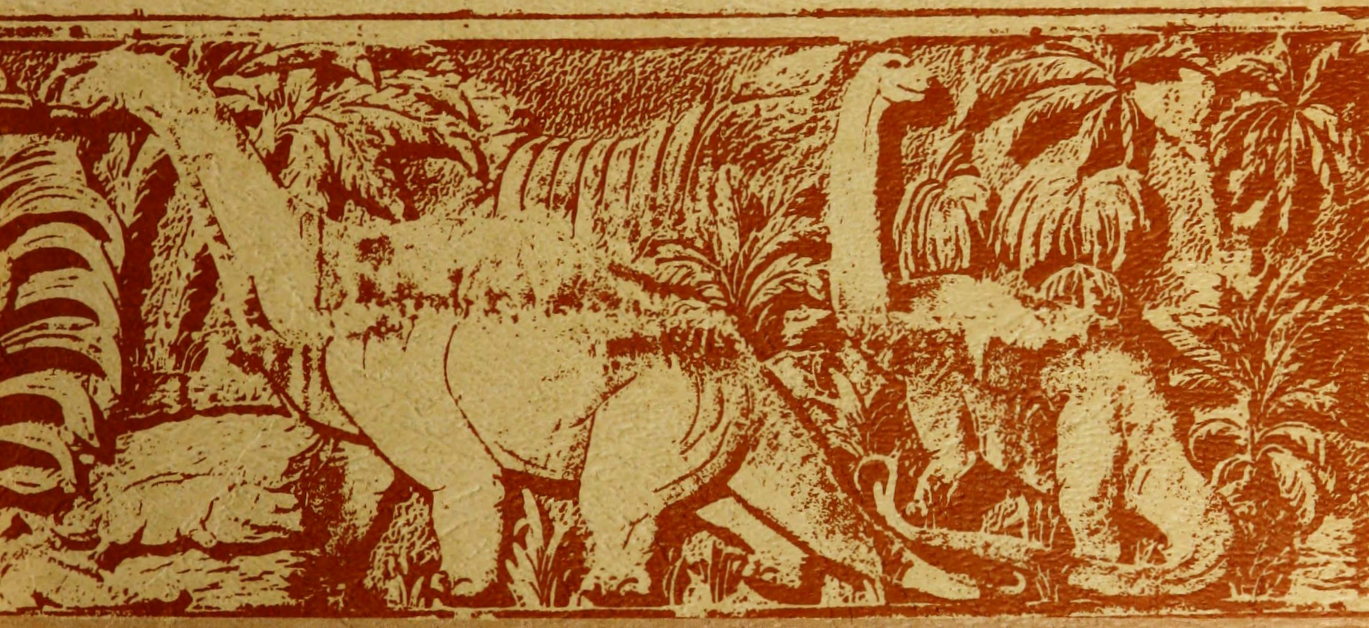

Volume 8 Number 2

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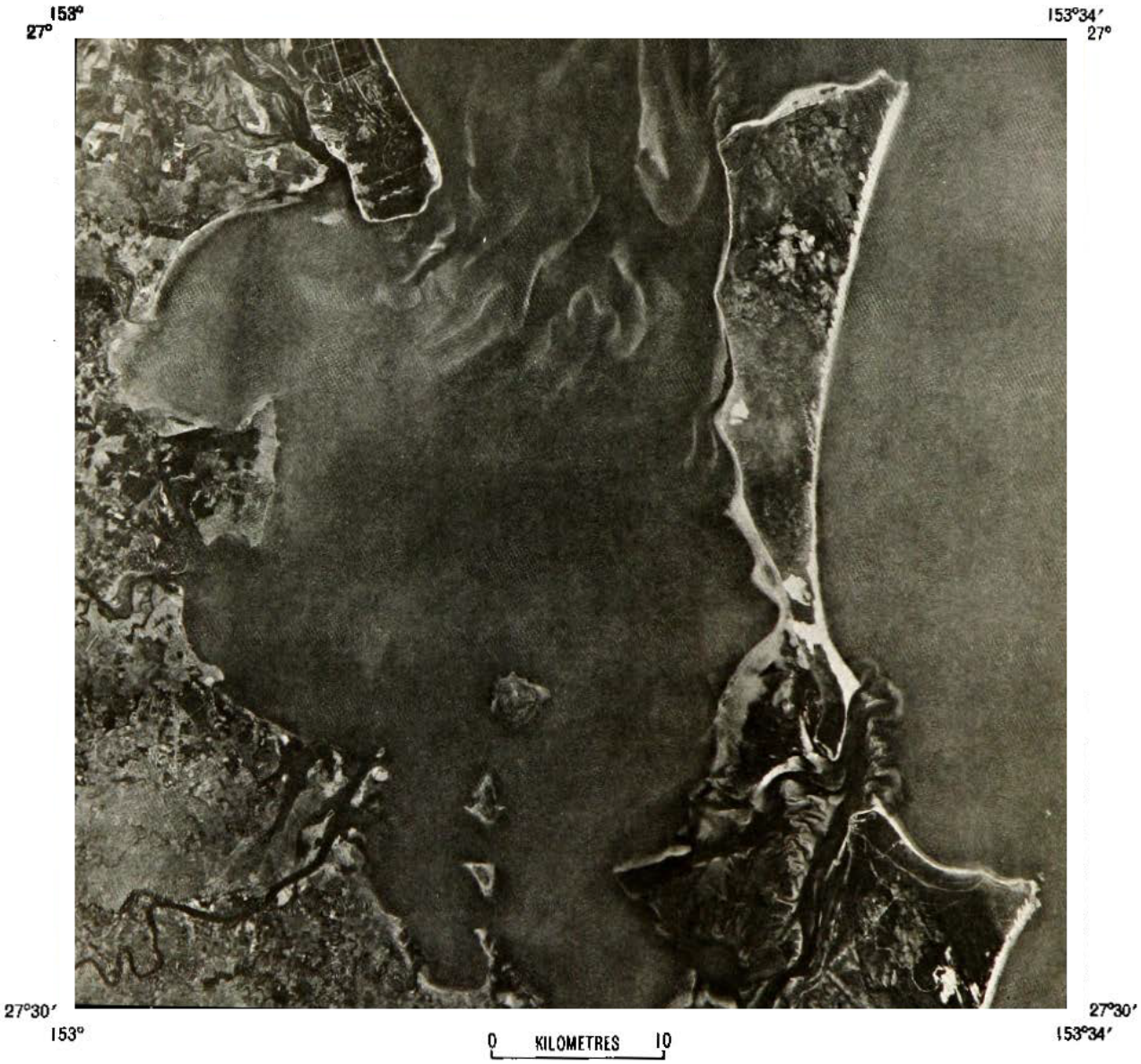

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Frontispiece : THE MORETON BAY REGION

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Department of Geology • University of Queensland

VOLUME 8 NUMBER 2

HANDBOOK OF RECENT GEOLOGICAL STUDIES OF MORETON BAY, BRISBANE RIVER AND NORTH STRADBROKE ISLAND

Edited by G.R. Orme & R.W. Day

AUSTRALASIAN SEDIMENTOLOGISTS GROUP

First Queensland Meeting

(August, 1977)

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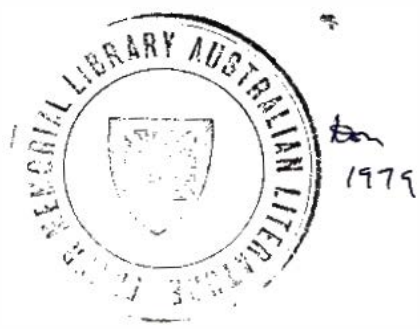
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PREFACE

In Queensland the growing interest in Quaternary sediments and sedimentation is not due merely to an increase in academic curiosity, but also to an urgent need for basic information regarding sediments, sedimentary environments, and sedimentary processes, prompted, in part, by recent and continuing debate of controversial conservation and commercial issues, and by coastal erosion and engineering problems. The large sand islands and the mainland beaches, for example, have become a focus of attention of geologists and geomorphologists from both academic institutions, and government departments including the Geological Survey of Queensland, C.S.I.R.O., and the Beach Protection Authority. For the effective control of the Great Barrier Reef Marine Parks, the province of the recently established "Great Barrier Reef Marine Parks Authority", information is sought regarding the coral reef environment, the factors effecting and affecting the development and stability of coral reefs, and the sedimentary processes involved.

The recent application of continuous seismic profiling techniques and side scan sonar to both marine and fluvial investigations has already yielded a considerable increase in our knowledge of subaqueous Quaternary geology, particularly in the Moreton Bay area and in parts of the Great Barrier Reef Province.

Quaternary sediments and sedimentation was therefore an appropriate theme for the first Queensland meeting (August, 1977) of the "Australasian Sedimentologists Group", and this handbook is one of two volumes produced for this occasion. The volumes, "Handbook of Recent Geological Studies of Moreton Bay, Brisbane River and North Stradbroke Island", and "Guide to the geology of reefs of the Capricorn and Bunker Groups, Great Barrier Reef Province, with special reference to Heron Reef", were originally issued in xeroxed form and now constitute volume 8, numbers 2 and 3 respectively, of the Papers of the Department of Geology, University of Queensland.

The co-operation of Mr J.T. Woods, the Under-Secretary for Mines, Queensland, who granted permission for the publication of the paper by Jones *et al.* on "Late Quaternary Sedimentation in Moreton Bay" and Laycock on "North Stradbroke Island", is gratefully acknowledged.

G.R. Orme
Chairman, Australasian
Sedimentologists Group.
December 1977
Brisbane

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INTRODUCTION

by **R.W. Day**

(with 1 Text-figure)

Unable to ride owing to "a disorganization of the skin", with his "carts, harness &c." in need of repairs, Samuel Stutchbury "took the opportunity of filling up the time by visiting the islands of Moreton Bay, by means of a boat" (Stutchbury 1854a). Geological studies of Moreton Bay were thereby initiated.

Stutchbury (1854a, b), the first government geologist of the colony of New South Wales, which then included Queensland, presented numerous pertinent observations on Moreton Bay and on the country traversed by the Brisbane River. He pragmatically observed that the dune sands of the large islands of the bay were so pure and suitable for glass manufacture as to make shipment as ballast profitable. His evidence of coastal upraising, based on an occurrence of dead coral "*in situ naturalis*" above low water mark on the eastern side of Peel Island, continues to evoke interest. At about the same time as Stutchbury's inspections, the doyen of Australian early pioneer geologists, the Rev. W.B. Clarke, also visited the Moreton Bay district and remarked on its geology (Clarke 1853).

The intervening 125 years witnessed a proliferation in geological knowledge of the region, particularly in the post-World War II period. Cranfield *et al.* (1976) reviewed the contributions which initially resulted from the search for economic mineral deposits, notably coal. After 1910, studies by staff and students of the University of Queensland supplemented such investigations. The first Queensland meeting of the Australasian Sedimentologists Group supplied the catalyst for the present collection of papers on Moreton Bay, the Brisbane River, and North Stradbroke Island (Text-fig. 1).

From its source in the Brisbane Range, in countryside formed by Triassic volcanics of the Esk Trough, the Brisbane River flows south-southeast along and diagonally across an ancient rift valley to near Ipswich, where the river turns sharply to flow east-northeast to enter Moreton Bay.

The high ground flanking the upper Brisbane Valley and the Esk Trough is formed by the Yarraman Block in the west and the D'Aguilar Block in the east. These north-northwest trending structural blocks consist of folded and metamorphosed Palaeozoic marine sediments and volcanics, in places intruded by Permian and Triassic granitic plutons and overlain by Triassic and Tertiary volcanics. Another elevated structural block, the Beenleigh Block, geologically similar but lacking granitic intrusions, occurs southeast of the D'Aguilar Block and south of the Brisbane River mouth.

In its lower, dominantly east-northeast course, the Brisbane River and its minor tributaries flow across highly deformed rocks of the D'Aguilar

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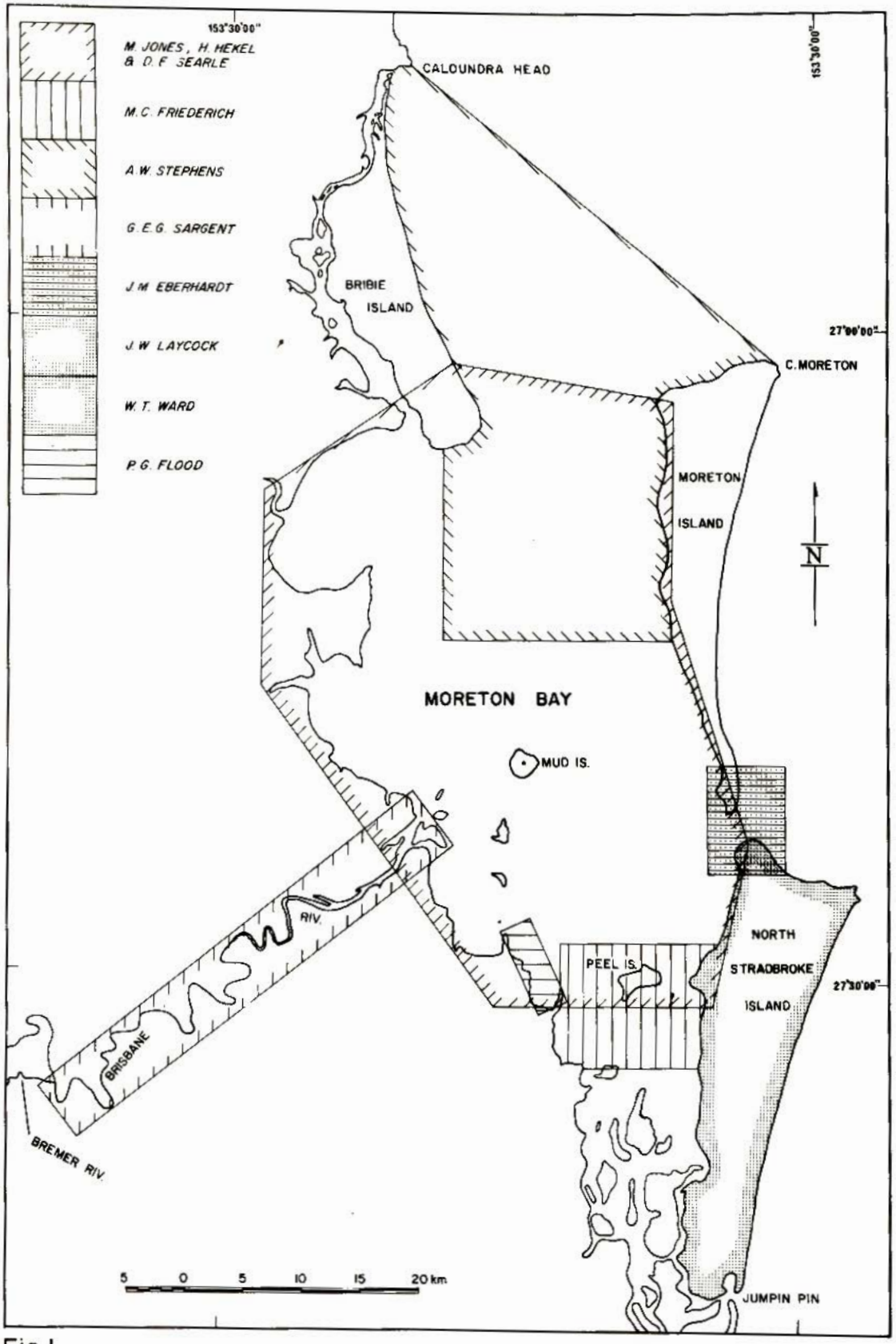

Fig. 1

Text-fig. 1 Sketch map showing the areas discussed in this handbook.

Block, and little disturbed ancient river and lake deposits of the Triassic Ipswich Basin, Triassic to Jurassic Moreton Basin, and the early Tertiary Booval, Oxley and Petrie Basins. The marked change in course near Ipswich occurs in the southwestern extremity of the D'Aguilar Block and near the presumably faulted junction between the Esk Trough and the Ipswich Basin. With the exception of the Stanley River, tributary streams from the east are only minor. By contrast, western tributaries which include the Bremer River and Lockyer Creek drainage systems, are more numerous and important. These streams rise in the Tertiary basalt-capped Main Range of the Great Dividing Range and run approximately northeast. The Bremer River, Lockyer Creek and their tributaries flow across much older fluviatile and lacustrine sediments of the Moreton Basin.

Evidently the Brisbane River system became established in a lateritised planation surface (the "Upper Erosion Surface" of Watkins 1967) which formed during the early Tertiary. In places the Brisbane and Stanley Rivers have eroded into hard rocks, which could have been avoided had they formed part of the original land surface. Clearly, the drainage network is superimposed. In the upper Brisbane Valley the river's course is influenced and perhaps controlled by renewed movements along old fault lines (Sussmilch 1933; Marks 1933).

The alluvial tract of the Brisbane River is generally much larger than could be deposited by present day stream action. Three levels of alluvial terraces occur; two now receive floodplain deposits; the highest is undergoing erosion. The alluvial deposits are important sources of gravel, sand and clay for the building industry. During low sea level stands of Pleistocene glacial intervals the river cut more deeply into bedrock, and its mouth probably lay east of Moreton Island. Higher sea levels of interglacial intervals undoubtedly affected the river's development. The post-glacial (Holocene) transgression which brought sea level to its present height, finally drowned the lower Brisbane River about 6 000 years ago. G.E.G. Sargent's application of side scan sonar profiling adds a new dimension to studies of the river's history.

The Brisbane River discharges into Moreton Bay through a poorly developed "bird's foot" delta. Other important but much smaller streams entering the bay are the Pine and Caboolture Rivers in the north and the Logan River in the south.

Western shores of the wedge shaped embayment of Moreton Bay are bordered by extensive estuarine areas interspersed between low headlands and peninsulas mainly formed by lateritised Tertiary sediment and basalt. The southern extremity of Bribie Island projects into the northwestern corner of the bay. Ward (1977) described the geology of this large, low lying island of Quaternary sand.

Maxwell (1970) presented the first comprehensive account of the sediments on the floor of Moreton Bay. This work is extended herein by the results of the Geological Survey of Queensland's programme of bottom sampling, seismic profiling and shallow drilling, outlined by M. Jones, H. Hekel and D.E. Searle. Complementary studies of the northern and southern parts of the bay, both utilising side scan sonar profiling, are

supplied by A.W. Stephens and M.C. Friederich, respectively.

The living and fossil coral reefs of Moreton Bay have long attracted scientific attention (Saville-Kent 1893; Fairbridge 1950; Wells 1955; Slack-Smith 1960). Some of these Quaternary fossil reefs, which supply the bulk of limestone used for local cement manufacture, are the subject of a further study by P.G. Flood.

The giant Quaternary sand islands of Moreton and North Stradbroke form the eastern limits of Moreton Bay. These islands have a core of vegetated parabolic dunes which are generally in excess of 80 m elevation and reach as high as the claimed world record height of 280 m at Mount Tempest on Moreton Island. The high dunes are aligned north-northwest parallel to the dominant strong wind direction. A system of younger beach ridges parallels the eastern and northern coastlines of the islands.

North Stradbroke Island, which has been studied the most (Stevens and Monroe 1975), produces heavy minerals (rutile, zircon, monazite and ilmenite) in addition to silica sand, and also has been considered as a potential water supplier for Brisbane. Present geological knowledge of the island is reviewed by J.W. Laycock. J.M. Eberhardt traces the rapid migration of the shoreline at Amity Point on the northwestern tip of the island. This collection of papers concludes with an article by W.T. Ward in which he challenges previous notions of the island's genesis.

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