

hour to 1 hour or more. Briefer stops, or stops when the tide was above half, were made at several other places. Much of the shore was observed from the travelling launch, the region thus covered (Text-fig. 1) being the length of Malaspina Sound, around Bauza Island and the Shelter Islands, Hall Arm and Crooked Arm. Black-and-white and coloured photographs were taken extensively. Salinities were measured roughly with a Twaddell hydrometer during trip 2; somewhat more accurately during trip 3 with a Baird and Tatlock 12in shot-poised hydrometer, range 1.000 to 1.030, water temperatures being taken at the same time. Sub-surface water samples were taken during trip 2 by diving with a corked plastic cylinder, filled and re-corked at an estimated depth (M. Rudwick); and during trip 3 by sending down on a line a weighted half-litre glass measuring cylinder, air-filled and with its opening downwards on its descent, which was jerked upright and allowed to fill at a measured depth, and then rapidly brought to the surface.

Nomenclature of most algae follows Naylor (1954), of barnacles, Moore (1944), of molluscs, Powell (1961), and of flowering plants, Allen (1961). Name changes since my earlier rocky shore papers (Batham, 1956, 1958) are: *Mytilus planulatus* becomes *Mytilus edulis aoteanus*; *Melarhapha* becomes *Melarhapha*; *Pomatoceros coeruleus* becomes *P. cariniferus*, and *Asterina* becomes *Patiriella*.

#### PHYSICAL ENVIRONMENT

The mountainous west coast of the southern part of the South Island, New Zealand, is deeply dissected by a number of long, narrow fiords. Of these, Doubtful Sound is about 22 miles long, and in most parts approximately 1 mile wide (Text-fig. 1). Three narrow side-arms run off it to the south-west; and to the N.E., inland of Secretary Island, it forms a continuous waterway with Thompson Sound and Bradshaw Sound. Offshore from the fiordland coast there is virtually no continental shelf, and within Doubtful Sound itself the often precipitous mountain-sides (Plate 1, figs. 1, 3) run steeply into deep water. Depths in most parts of the sound are over 40 fathoms and in several places over 100 fathoms. No obvious sill occurs near the entrance, except for a rock coming within about 5 fathoms of the surface WNW of the outer end of Bauza Island (H.M.S. "Acheron" Survey, 1851; unpublished report of survey of Doubtful Sound by G. L. Haskins, R.N.Z.N., 1961). Thus the rocky shoreline is almost without sandy beaches; exceptions being at the heads of Deep Cove and Crooked Arm. Local portions of the shore are pebbly (head of Hall Arm), or with stones or boulders where creeks enter. But most of it is continuous, rather hard rock, consisting of high-grade schists and gneisses.

#### Rainfall

Prevailing moisture-laden winds coming eastwards across the Tasman Sea cause heavy precipitation along the mountain backbone of the west of the South Island. Rainfall in inches, measured usually daily by staff at the hostel at the head of Doubtful Sound, was 198.17 for the year of 1956, 192.40 for a six-month period (year not recorded), 246.46 for a full-year period (year not recorded), 176.74 for 1961, approximately 155 for 1962. This gives an average rainfall of 232in per annum, or of 0.64in per day. In certain individual years, some months