

*Highfield Beds.*—The equivalent of these beds in the Cheviot depression consists of a considerable thickness of massive gravels or conglomerate bands with minor sandstone bands which unconformably overlie the sandstones succeeding the Bourne conglomerate in a tributary of the Leader, a mile and a half west-north-west of One Tree Hill. Here the beds are folded and occupy the centre of the structural basin three miles west of One Tree Hill. They are in part fault-involved along a narrow strip south of the southernmost bend of the Conway. The same or similar fault-involved gravels unconformably overlie Cretaceous rocks at Trig. A, Lowry Peaks Survey District.

#### ECONOMIC GEOLOGY.

There is an abundant supply of agricultural limestone in the subdivision.

A gummy, apparently oily, coating covers some of the Cretaceous glauconitic sandstone in the Gower River, north-west of Mount Ellen, but in the area so far examined there is no evidence to suggest the presence of oil in other than minute quantities, and there is an almost complete absence of all the conditions essential for a productive field.

#### NASEBY SUBDIVISION.

(By J. H. WILLIAMSON.)

The geological examination of an area in Otago Central for the most part within the upper basin of the Taieri River was begun in November, 1932, and was continued to May, 1933. During the past field season an area of 330 square miles, which includes the goldfields of Naseby, Kyeburn, Mount Buster and Hyde, was mapped. In addition, the Golden Progress Quartz Mine, near Oturehua, was visited.

#### PHYSIOGRAPHY AND STRUCTURE.

The rocks of Otago Central fall naturally into two divisions, older metamorphic and semi-metamorphic rocks that form the undermass, and younger unaltered sediments, the overmass, that were deposited on the planed surface of the older rocks. The various theories advanced to explain the origin of the relief of this area are reviewed by Cotton (1917). His explanation, here followed, is that the deposition of the younger sediments was followed by a period of deformation, involving block movements on a large scale, which resulted in a chain of broad tectonic depressions separated by mountain blocks, large areas of the planed undermass of which were re-exposed by the stripping of the cover during a subsequent period of erosion.

One of the largest of the depressions, the Maniototo Plain, some 250 square miles in area, forms the northern portion of this subdivision. Its height ranges from 1,100 ft. at the lowest part to about 2,000 ft. at the highest, there being a fairly even up-slope from the Taieri River, which drains it, to the foot of the bounding ranges. In places schist appears above the floor of the plain, which is largely covered by post-deformational gravels resting on early and mid-tertiary quartz conglomerate, sand, and clay. In the south-east part of the plain the surface is broken by hills capped with lava, which has protected the soft Tertiary sediments from erosion.

Delimiting the depression on the north is an elevated block with a general elevation of 4,000 ft. to 5,000 ft., the southern fault-scarp edge of which is known as the Ida Range. This block is tilted to the north-east and on its eastern margin still retains a portion of the cover of Tertiary conglomerate, which is auriferous and is worked at Clarke's or Mount Buster Diggings. The western edge of the block forms the Hawkdun Range. At the junction of this and the Ida Range is Mount Ida (5,548 ft.), which rises a few hundred feet above the level of the fault block. It is described by Park as a monadnock.

On the east side of the basin the scarp of the easterly-tilted Kakanui fault-block rises steeply to form the Kakanui Range, with an elevation in Mount Pisgah of 5,394 ft. The range continues in a south-easterly direction along the north side of the Shag or Waihemo River as the Horse Range, which gives its name to the fault in this locality.

South of the Maniototo basin is the large schist highland which in its southern part forms the Lammerlaw and Lammermoor Ranges. That part of it which lies within this subdivision is broken by north-trending faults, on which the interfracture blocks have rotated and formed a series of sub-parallel fault-angles in the southern portion of the basin. The Taieri River flows along the most easterly fault-angle from Kokonga, on the edge of the Maniototo basin, to the Strath-Taieri plain at Middlemarch. The block between the river and the next depression to the west, known as the Rock and Pillar Range, has a downwarp to the north and dips beneath the Tertiary rocks at Kokonga. There has been faulting along the western side of this block with a decreasing throw southwards, and the adjacent arm, the Patearoa Valley, is V-shaped. The fault on its western side has splintered, forming a small arm known as the White Sow Valley, the elevated block being Rough Ridge, which forms the western boundary of the subdivision. Between the northern edge of this block and Mount Ida the Maniototo basin is separated from the adjoining Manuherikia basin by a low watershed, composed mainly of younger rocks.

The drainage of the depression is by the Taieri River to the south-east corner, whence the river flows south through a gorge to the Taieri Plain. The main stream rises in the high country south of the subdivision and flows north to Waipiata, then east for some six or seven miles to Kokonga, thence south. The largest of its tributaries are the Pigburn and the Sowburn, draining the west side of the Rock and Pillar Range, the Gimmerburn and the Wetherburn, from the east side of Rough Ridge, Eden Creek, the Eweburn, Hogburn, and Kyeburn flowing south from the Ida Range, and the Swinburn, which rises on the south-west side of the Kakanui Range. The south-east part of the subdivision is drained by the headwaters of the Shag or Waihemo River.

The chief settlements in the district are Ranfurly on the Otago Central Railway, in the centre of the basin, and Naseby near its northern edge.