AMURI SUBDIVISION.

(By H. E. Fyfe.)

Field work was resumed in the Amuri Subdivision in mid-January and continued till the end of May. From March to the end of the season Dr. Marwick collected from several fossiliferous localities and assisted with the field-work. The 175 square miles mapped are within a strip north of the Hurunui from its mouth to the Kaiwara junction, and east of a line from this point to the Oaro Mouth.

Structure.

The main highland mass within the area is the Hawkswood Range of which Mount Wilson (3,725 ft.) is the highest point. A fault extends along the greater part of the west side of this elongated rectangular greywacke block. This fault, which has been traced from the Oaro Mouth to a point east of Parnassus, is well exposed in the Te Kahika and Hundalee Streams and in the Conway Valley. A few chains along the road to Kaikoura from the Okarahia Bridge the greywacke is thrust eastward over Pliocene conglomerates and sandstones. The block pitches northward between the Oaro and Amuri Bluff, where the greywacke forms the core of an anticlinal fold in Cretaceous and Tertiary rocks.

Cretaceous and Tertiary rocks flank the western base of the Hawkswood block from a point east of Parnassus, and are exposed along the valley of the Jed where they wrap round the greywacke core in a south-west plunging anticlinal fold. South-east of this anticline lies the Gore Bay syncline. The rocks forming the south-east limb of the syncline rest on the greywacke block of Mount Seddon as shown in the sections upstream from the lower Hurunui Bridge, but to what amount faulting has determined their boundary to the north-east is not clear.

The fault along the west side of the Pendle Hill block enters the subdivision two and a quarter miles east of Tormore, but it has not been located within the Cheviot basin. It may be continuous with the fault west of the Hawkswood Range.

The majority of the fractures in the highly brecciated greywacke along the coast between the Jed and the Waiau River are oblique to the coast-line. Pliocene rocks are involved in this fault-zone immediately south of Waiau Mouth and to the north of Hawkswood Bluff where the faulting is also oblique to the coast-line.

Geology.

Pre-Cretaceous Rocks.—Greywacke and argillite are the oldest rocks of the district. In a few isolated boulders from a stream-bed a mile and a half south of Waiau mouth Dr. Marwick identified numerous specimens of *Buchia* and *Inoceramus* fragments. An igneous conglomerate apparently identical with those noted in earlier annual reports crops out in the Hawkswood Range south of the Waiau where pillow lavas, in one locality associated with marble, are not uncommon. Pillow lavas and tuffaceous beds occur at many places between Waiau Mouth and the Jed, and in the hills west of Tormore.

Cretaceous Rocks.—These consist of conglomerate, calcareous sandstone, glauconitic sandstone, quartz sand, and purplish carbonaceous mudstone that at many outcrops show a "sulphur" efflorescence. Hugh concretions up to 15 ft. diameter occur in the sandstones and some contain saurian and cetacean bone fragments. The basal calcareous sandstone is fossiliferous at Amuri Bluff, and about 100 ft. from the base is a conglomerate consisting of well rounded pebbles apparently of Cretaceous sandstone. These rocks, which belong to the Piripauan stage, include the Lower Greensand and the Waipara groups of McKay's classification, to the base of the Teredo limestone.*

The break between the Cretaceous and Tertiary rocks appears to be at the base of the glauconitic sandstone or greensand which at many localities grades upward into the shaly or marly beds that underlie and merge into the Amuri Limestone. On the south bank of the Hurunui 10 chains upstream from the bridge, near the mouth, this glauconitic sandstone rests on the greywacke. A phosphatic band crops out at several localities at this horizon and contains derived pebbles and a few fossils including some resembling *Tancredia*, apparently identical with one from the glauconitic greensand overlying the Brighton limestone, Otago. Below this phosphatic band which at Amuri Bluff underlies McKay's Lower Teredo limestone are the sandstone and carbonaceous mudstone usually considered typical of the Cretaceous. Belemnites occur 3 ft. below the phosphatic band in a sandstone at the mouth of the Pariwhakatau Stream where there is a thickness of about 30 ft. of glauconitic calcareous sandstone between the definitely Cretaceous sandstone and the Amuri limestone.

Tertiary Rocks.—These include the Teredo limestone and the younger rocks of the Waipara group and the succeeding Tertiary rocks of McKay's classification. The Teredo limestone is a calcareous slightly glauconitic sandstone that contains nests of worm tubes at Amuri Bluff and the Conway River.†

The glauconitic sandstone that at places grades downward into the marls and shaly limestone usually grouped with the typical Amuri limestone are possibly the equivalent of the Teredo limestone horizon of the Amuri Bluff section where the contact with the limestone is sharp. The marl and shaly limestone are at many localities intruded with sandstone dykes and sills, which range from 1 in.

* McKay, A., 1890: "On the Geology of Marlborough and the Amuri District of Nelson," Rep. Geol. Explor. during 1888–89, pp. 85–185.

† McKay, A., *Id.* 1890.