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THE KUMA-GAWA



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GEOLOGICAL OBSERVATIONS ALONG THE KUMA-GAWA, FROM HITOYOSHI TO YATSUSHIRO.

BY HISAO OHTANI.

The Hitoyoshi Basin is about 27 km. long from E to W, with a maximum width of about 6 km., and covers an area of about 90 sq. km. In this basin, near its western corner, there is a small town called Hitoyoshi, with a population of about 7,000. It lies about 100 m. above sea-level, and stands on both banks of the river Kuma, which flows down from the center of the southern Kyûshû mountain range. The town is the starting-point for travelers who intend to shoot the rapids in the summer season to Shiroishi, about 22 km. from the town downstream. The Kyûshû main-line coming up northward from Kagoshima turns westward at Hitoyoshi, and then runs along the river Kuma.

In the Hitoyoshi Basin, non-fossiliferous shale and sandstone (probably of Pliocene age) are exposed here and there, or are covered by volcanic ashes or ejecta consisting almost exclusively of pyroxene andesites, which in turn are overlaid by Diluvial gravels. The gravels form an excellent terrace (Fig. 1), which may be seen from the train. The southern border of the basin is evidently a fault scarp.

Just after leaving Watari station, the train runs on a steel bridge over the Kuma-gawa, and the route passes abruptly from the open valley into the narrow V-shaped gorge cut through the great range of the Kuma mountains (Fig. 2). Precipitous, craggy slopes rise on both sides, and the scenery is varied and impressive. This mountain land is no doubt a part of the "Kuma-Kii Mountain Land."¹⁾

1) The Kuma-Kii mountains, which have a general NE-SW trend, constitute the principal range in the Outer Zone. Although very complex in structure, the range may be briefly described as a great block of the earth's crust, which was once peneplaned and considerably elevated at its northern margin by tilting. Later, the elevated part of the block was eroded, so that now its surface is complicated, consisting of mountains with steep slopes and more or less rounded tops. The northwestern face of the range, corresponding to the northern margin of the tilted block, is nearly straight and very precipitous, forming what is known as the Sobosan Fault Scarp.

It is composed of steeply inclined beds of shale, sandstone, chert, quartzite and limestone, and subordinate schalstein, conglomerate and breccia ranging in age from Cretaceous to Carboniferous. They strike generally NEE-SWW, and dip about 70° toward the N or S, making a "Unilateral zonal arrangement."

Slightly north of Isshōchi station, the Upper Jurassic beds of shale, sandstone and breccia give place to an alternation of Carboniferous rocks, such as massive gray limestone, shale, sandstone, and subordinate schalstein. The boundary plane between the Jurassic beds and the limestone is a fault. The limestone contains Moscovian *Fusulina*, *Fusulinella bocki* Möller.

Just before reaching Shiroishi station, the famous limestone cave called *Kōnose-iwado* is seen on the opposite bank. It is not very large, but is the greatest in this vicinity. Before the train comes to the next large strike fault running NEE-SWW, it traverses three tunnels. At Ebirase a small outcrop of the gray limestone is observed to the left. The limestone contains fossils, such as *Chaetetopsis crinita* Neumayr, and spines of *Cidaris*; etc., which are common in the so-called "Torinosu Limestone," a characteristic bed developed here and there in the Outer Zone of southwestern Japan. The formation intercalating the Torinosu limestone consists of chert, quartzite, sandstone, shale and subordinate sandstone breccia, and it extends to the next fault near Setoishi station.

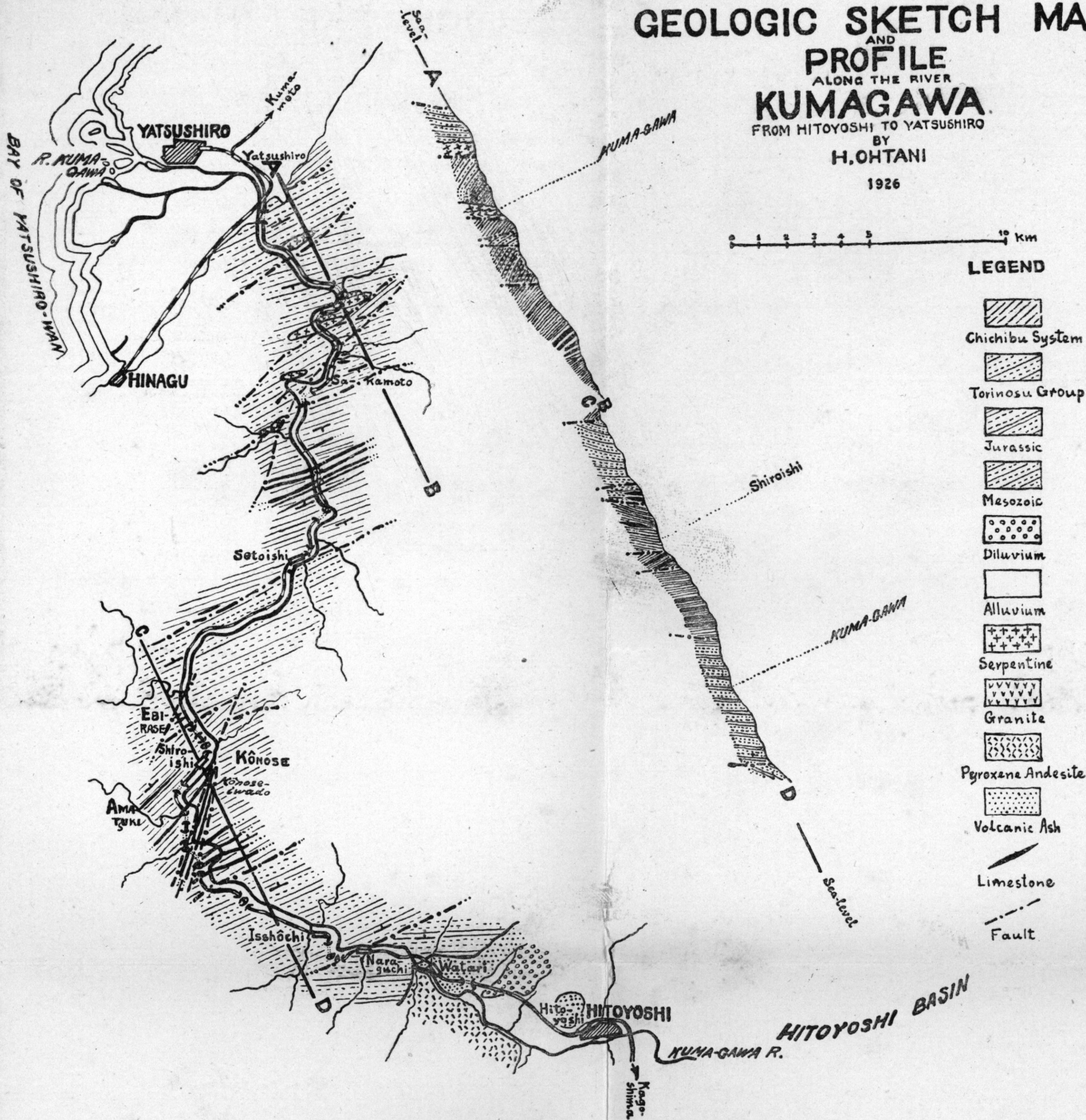
As soon as the train crosses the river again to the right side, we see a huge outcrop of a gray *Fusulina* limestone at the northern wall of a valley through which a tributary stream flows down from the east. The limestone contains abundant *Neoschwagerina craticulifera* (Schwager) and *Verbeekina verbeeki* (Geinitz), etc. of the Permian age. Within the distance of two km. to the north from here, the *Fusulina* limestone outcrops several times, the formation containing it being the same as that developed in the vicinity of Kōnose.

A pretty large tributary which runs down from the west joins the Kuma-gawa at the end of the above-mentioned tract, where a fault runs from NE to SW. All the strata developed north of this fault belong to Mesozoic formations ranging in age from Upper Triassic to Lower Cretaceous. Slightly north of Sakamoto station, the oolitic Torinosu limestone is quarried. Overlying the Torinosu limestone, the Lower Cretaceous formation, consisting of an alternation of shale and sandstone with a characteristic basal conglomerate, is well de-

GEOLOGIC SKETCH MAP

AND PROFILE ALONG THE RIVER KUMAGAWA FROM HITOYOSHI TO YATSUSHIRO BY H. OHTANI

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veloped. In the above-stated Mesozoics, intrude numerous dikes of serpentine, which, according to Prof. T. Ogawa, bear a close relation to the imbricated structure¹⁾ of the area.

The gorge comes to an end at the Sobosan fault scarp, from which the river Kuma flows out into the plain of Yatsushiro. The Usuki-Yatsushiro tectonic line of Prof. H. Yabe is deeply hidden beneath the alluvial aprons, i.e., the delta deposits formed by the river Kuma.

The complicated geologic structure and the relations connecting the various formations developed in the district are shown in the annexed geological map and ideal profile.

1) At the close of the Mesozoic age, this area was intensely folded and faulted and the formation of imbricated strata resulted, which were afterwards subjected to more or less important disturbances, the exact age of which has not yet been determined. It is now generally accepted that at least once in Neogene times, after the disturbances above described, a peneplanation took place all over Japan. This hypothesis is confirmed geologically as well as topographically. The present meandering course of the Kuma river represents that of the ancient river on the peneplain which was later tilted, giving rise to the present Kuma-Kii mountains. The upward movement of the block went on slowly for ages, so slowly that the river kept its position by cutting down its ever rising bed, carving a deep and narrow canyon.

In no other way can we account for the flowing of the river across the mountain range. The movement of the Kuma-Kii mountain block continued at least to the end of the Diluvial age.

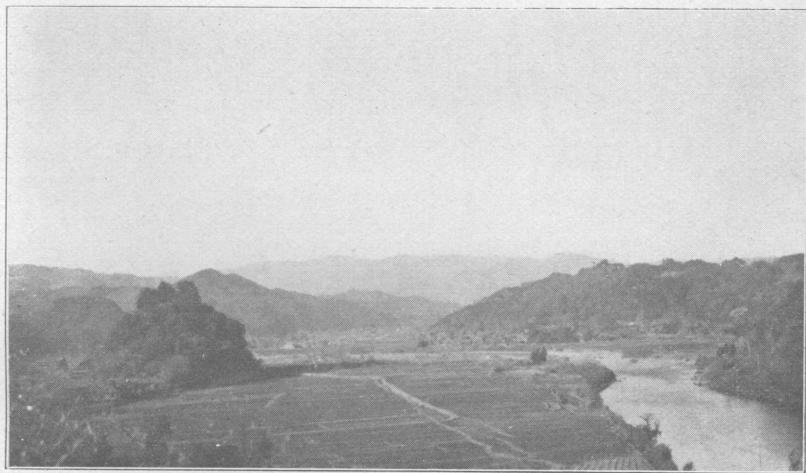


Fig. 1. General view of the Hitoyoshi Basin.

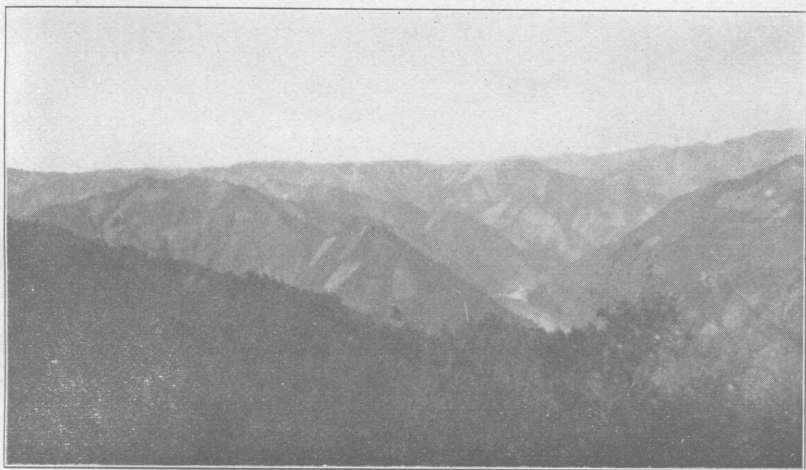


Fig. 2. The Kuma Mountain, deeply cut by the Kumagawa.

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