82. Post-Poronai and Pre-Kawabata Crustal Deformation in the Isikari Coalfield

By Hisakatsu YABE, M.J.A.

(Comm. June 13, 1955)

In the former occasion, treating the major geological structure of the Isikari coalfield, the writer was unable to obtain positive evidence confirming the post-Poronai and pre-Kawabata crustal deformation of the coalfield once maintained by the late T. Nagao. At that time, geological details were but little known of the area extending from the coalfield eastward to Yūbari-dake (mountain), some 10 km broad, west to east. Since then a geological map of Hokkaidō, 1:50,000, the Sheet Ōyūbari was issued in 1954 from the Hokkaidō Development Agency of the Government, and thus the vacancy of geological knowledge of the area is now filled by the map and its “Explanatory Text”, a valuable contribution by S. Nagao and his associates of the Geological Survey of Hokkaidō under the auspices of the Agency.

The most important geological accounts of the area surveyed lying to the east of the Isikari coalfield and extending to Yūbari-dake are as summarized below:

I. The geological formations building the foundation of this area are, in ascending order:

Yūbari-dake metamorphics of Yūbari-dake, comprising dynamometamorphosed schalstein, diabase, phyllite, and quartz-schist; thought to be equivalent to the Kamuikotan metamorphics of Central Hokkaidō; also having large masses of serpentinite in intimate relation.

Sorati group, mainly of schalstein, graywacke sandstone, chert often with radiolarian remains, and slate; representing the middle and upper parts of the Sorati group better developed in the adjoining district to the east of Yūbari-dake.

Yezo group, mostly of shale and sandstone, divisible into Lower, Middle, and Upper Yezo subgroups; Orbitolina limestone interbedded in the lower division; ammonites, Inoceramus, and many other fossils common in several horizons of the middle and upper divisions; Lower to Upper Cretaceous ages indicated by these fossils, especially ammonites.

Hakobuti group, of sandstone and conglomerate, with subordinate shale; Nilssonia bed with Nilssonia serotina Heer and several other plant fossils in its lower division; also rarely with marine fossils in certain horizons; Uppermost Cretaceous.

Totally lacking in this area are (1) the Isikari group with many coal formations, aside marine and brackish-water ones, as well as (2) the marine Poronai group which overlaps the former group and yet thought by the writer that its lower part may be contemporaneous with the upper part of the former group; instead of these two Paleogene groups, there exists in the present area

- Itagakizawa formation of conglomerate, sandstone, and shale; correlated with the Takinoue horizon of the Kawabata group by means of molluscan fossils;
- Lower Miocene.

The Isikari and Poronai groups are well developed in the annexed Isikari coalfield and most important participants, essential to its construction, while the Kawabata group has an extended distribution farther west beyond the coalfield.

II. The geological map shows that in the area now in concern, all the formations cited above are arranged almost meridionally in narrow parallel zones, and especially, with the exception of the last mentioned one, in inverted monocline, always with varied eastward dip, but usually with steep angles; thus the oldest formation of the Lower Cretaceous lies close to Yūbari-dake and the youngest one, Uppermost Cretaceous in age, on the eastern border of the Isikari coalfield, where the last formation and the next older one form a syncline.

This inverted monoclinal structure of the Cretaceous formations continues to the southern Isikari coalfield, where the Yezo, Isikari, and Poronai groups are intensely folded, overfolded westward and give rise to several overthrust-sheets; the crustal deformation is of the same type and in good harmony in these two adjoining areas.

The area of the inverted monocline is bordered at the east by Yūbari-dake which is built of two overthrust sheets lying one upon the other. S. Nagao named the western overthrust the Yūbari-dake overthrust and the eastern one the Mae-dake; by the Yūbari-dake overthrust, the Lowest Cretaceous formation of the inverted monoclinal area is overridden from the east by the older, Jurasso-Cretaceous Sorati group, of Yūbari-dake, and by the Mae-dake overthrust, the Sorati group is overridden in the same sense by the Yūbari-dake metamorphics of Mae-dake. These two overthrusts belong, in the writer's opinion, to one and the same crustal deformation with the inverted monocline of the next western area and also the overfolds and overthrusts of the Isikari coalfield farther west, all being products of repeated crustal movement in succession, roughly speaking in an orogenic period, which is certainly later than the deposition of the Poronai group.

III. Another geological features characterizing the area of
inverted monocline is a system of many subparallel faults traversing it in meridional direction with slight deviation either to east or to west; they run almost parallel or more or less oblique to the formation-boundaries on the geological map.

The amount of displacement of strata on the two sides of each of these faults is in general not very great, excepting only one case, in which the Neogene Itagakizawa formation occupies a narrow zone elongated N-S, subsided between two faults amid the Middle Yezo group. It is stated by S. Nagao that the Neogene formation probably forms there a steep syncline.

This occurrence of a member of the Kawabata group amid all inverted monoclinal Mesozoic formations is, indeed, very unique, similar Neogene deposits being nowhere found in the wide tract embracing the Isikari coalfield at the west, Yūbari-dake at the east and the space intervening them; it stands there quite isolated, without any tectonic relation with the inverted monocline of the older formations. There the correct interpretation of these geological features is that the marine Kawabata invasion took place there long after the intense folding process acted from the east upon the older formations.

The geological events of this wide area experienced in succession are most probably as follows:

1. Successive deposition of the Jurasso-Cretaceous Sorati, Cretaceous Yezo, Paleogene Isikari, and Poronai groups, though with frequent intervention by emergence and orogeny.
2. Post-Poronai crustal deformation; inversion of strata in grand scale, overfolding and even the building of overthrust sheets, as well as similarly westward overthrust of the Yūbari-dake metamorphics plus large serpentinite masses upon the Mesozoic formations.
3. Abrasion of the land-surface thus uplifted, followed by the marine invasion of the Neogene Kawabata sea.
4. Formation of the post-Kawabata system of subparallel faults of the area intervening the Isikari coalfield and Yūbari-dake.

The post-Poronai and pre-Kawabata phase\(^2\) of orogeny seems now to be well established, and in this respect, the former view of the writer expressed in Part II is here revised.

\(^2\) II, i.e., p. 665.