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A comment on stratigraphical relationships in the Indarung Area, Padang District, West Sumatra

N.S. HAILE
Department of Geology University of Malaya Kuala Lumpur

T.E. Yancey and Syaroel A. Alif record some significant new observations from the Indarung area, Padang District, West Sumatra in their recent paper (1977). In particular they record Upper Mesozoic fossils from five localities, presumeably all from limestone.

In the same area, unconformably beneath Tertiary volcanic rocks, the authors record chert and shale with limestone and suggest that together these can be classified as a new formation, the Indarung Formation, over 1000 m thick, including two limestone members.

I very briefly examined parts of this area during a palaeomagnetic reconnaissance with Mr. Colin Holcombe of Riotinto Bethlehem Indonesia on 12 August 1975. A few observations which I made, and which add to and in some cases differ from the account under discussion, are recorded here; I suggest they indicate the desirability of more detailed mapping in this interesting and accessible area.

Karang Putih Quarry

The limestone there is extremely massive, has vertical joints, and, as the authors' state, the bedding is difficult to determine. I found it impossible to find a reliable indication of the attitude (and for this reason collected no samples of the limestone for palaeomagnetic work). On the north side of the quarry the limestone is cut by an andesitic dyke 2 m thick, strike 335 dip 50° to ENE. (Specimen UM8455: this and other specimens referred to are in the museum collection of the Department of Geology, University of Malaya).

Bukit Ngalau Quarry

At Bukit Ngalau quarry, bedded weathered rocks are seen. I was unable to find the crescentic outcrop of limestone shown on Figure 3 of Yancey and Alif; the hill at Ngalau Quarry and the quarry itself are not in limestone; possibly the exposure described by Yancey and Alif has become obscured. Chert forms low cliffs much overgrown to the north of the quarry, about 50 m south of the Lubuk Paraku River, possibly originally clastic sediments or tuffs, and includes bedded red radiolarite (UM 8428); my impression was that these cherts may be large blocks (20 m or more) rather than *in situ* exposures. Chert boulders are not seen in the Lubuk Paraku River above the hydroelectric water intake (about $\frac{1}{2}$ km upstream from Ngalau Quarry), and I saw no outcrops of any kind in the river up to 2 km up stream from Ngalau Quarry, only boulders, mainly of volcanic rocks. The mapped extent of "Silicified sediments (Chert)" on Figure 3 appears therefore to be too great.

Lubuk Paraku River below bridge

Yancey and Alif show limestone cropping out in the Lubuk Paraku River down-

stream of the bridge (Golok highway). They indicate that the limestone overlies shale, with a conglomerate at the base of the limestone.

I could not see any limestone conglomerate or shell downstream of the bridge. This part of the valley is a small steep gorge composed of greyish green tuff, containing sand-grade beds; the rocks strike from 065 to 125 and dip 45 to 67° southwards. In one bed, 2 cm thick, small-scale cross-bedding indicates that the rocks young to the south i.e. are not overturned. Samples from there (UM8456, 8457) are calcareous crystal-vitreous tuff; the crystal fragments are altered, but include plagioclase.

I observed limestone in the river downstream of the bridge only as boulders. Limestone is however exposed upstream of the bridge, and is there interbedded with conglomeratic limestone and thin beds of dark shale, slightly disrupted tectonically.

In the cutting on the north side of the road just west of the bridge, the top of the limestone is exposed as a limestone breccia with clasts of limestone and a rare oolitic calcarenite (UM8459), which contains some altered crystal clasts, possibly of volcanic origin. The breccia is overlain by tuff along a steep irregular contact, possibly faulted. The tuff is intruded by a cross-cutting light-coloured altered dyke at least 2 m thick.

Structural considerations

The type section of the proposed Indarung Formation is from Karang Putih east along the Padang Idas to Bukit Ngalau Quarry continuing up the Lubuk Paraku River (east) for 2 km. However, only strike attitudes are shown in the Karang Putih area, no dips are shown in the Padang Iras river, and the only dips shown in the supposed chert section are southerly.

I do not think that the relationships postulated in the authors' Figures 4 and 5 have been established. They depend on an easterly younging section with a northerly strike, which is not as shown on the map.

Environment of deposition

The authors interpret the environment of deposition of the Karang Putih limestone as shallow marine and this is well-founded. However, it is hard to believe that the bedded radiolarian chert northwest of Bukit Ngalau is a shallow marine deposit; it is more likely deep marine. The tuff in the upper Lubuk Paraku was probably water laid, and could have been deposited in water of shallow to moderate depth.

CONCLUSIONS

1. It has been established by Yancey and Alif that shallow-marine limestone of U. Jurassic to Cretaceous age occurs at three localities near Indarung, namely Karang Putih, Ngalau and above the highway bridge over the Lubuk Paraku.

2. Chert along the Lubuk Paraku near Ngalau quarry is radiolarian; its relationship to the limestone is not clear, and it may occur as large blocks. Chert does not crop out, and appears to be absent even as float in the Lubuk Paraku river above the hydroelectric intake about $\frac{1}{8}$ km upstream from Bukit Ngalau. Thus the area shown by Yancey and Alif as "silicified sediments" seems too large. Strata adjacent to the limestone near the bridge over the Lubuk Paraku are crystal-vitreous

tuff, and dip and young to the south away from the limestone. The tuff appears to overlie the limestone along a brecciated zone, and may be faulted against it. As the limestone there contains some tuffaceous admixture, it is probable that the tuff succeeds the limestone without a major break.

4. The strata exposed at Ngalau quarry are not chert, but weathered stratified rock which may be tuff.

5. The relationship of the three contrasting lithological types—shallow-marine limestone, radiolarian chert, and crystal tuff—has not been established. As these rocks types do not resemble each other lithologically, they have not been shown to be interbedded, and the age of the chert and tuff has not been established, it does not make for clarity to classify them together as a single formation.

6. The Indarung Formation could be redefined to include only the limestones and interbedded and immediately adjacent shales, but it probably would be better to refer to the lithological units informally until detailed mapping could settle the controversial points.

REFERENCE

Yancey, T.E. & S.A. Alif, 1977. Upper Mesozoic strata near Padang, West Sumatra: *Bull. Geol. Soc. Malaysia,* 8, 61-74

IN PREPARATION

BULLETIN 11 — a collection of papers presented at the International Symposium on "Geology of Tin Deposits" held in Kuala Lumpur from 23–25 March 1978, and other papers on tin geology.

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