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Geologi Johor Timur

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INTRODUCTION

Some controversies on Palaeozoic stratigraphy in east Johor: lithostratigraphic order and age of Metamorphic rock, Murau conglomerate as well as volcanic rocks.

The Palaeozoic stratigraphy of East Johor is still obviously poorly understood (thus needed a revision)

A comprehensive study on stratigraphic correlation of Palaeozoic rocks of east Johor in relation with the whole eastern belt of Peninsular Malaysia is needed.
OBJECTIVES:

To review lithostratigraphy of Palaeozoic rocks in eastern Johor

To re-establish the stratigraphic order of Palaeozoic rocks in eastern Johor

To understand the depositional mechanism of each Palaeozoic rocks unit in eastern Johor in the scale of basin

To relate the depositional mechanism with basin setting

To understand the basin development in eastern Johor during the Palaeozoic

Geological map of east Johor:

### Some stratigraphic column of eastern Johor

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>EASTERN ZONE (after Foo, 1983)</th>
<th>GUNUNG BELUMUT AREA (after Bijah, 1986)</th>
<th>HULU SEDILI AREA (after Suntharalingam, 1991)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRETACEOUS</td>
<td></td>
<td>Tonkail Granite</td>
<td>Panti Sandstone: Predominantly massive cross-beded sandstone, minor mudstone and shale.</td>
</tr>
<tr>
<td>JURASSIC</td>
<td></td>
<td></td>
<td>Maratu Conglomerate: Predominantly fine-grained sandstone and shale.</td>
</tr>
<tr>
<td>TRIASSIC</td>
<td></td>
<td></td>
<td>Jenaluang Granite</td>
</tr>
<tr>
<td>PERMIAN</td>
<td></td>
<td></td>
<td>Mersing group: Phyllite, slate, schist, hornfels and quartzite.</td>
</tr>
<tr>
<td>CARBONIFEROUS</td>
<td>Kuantan Group Volcanic Series</td>
<td>“Sedili Volcanic Formation”: Acid to intermediate pyroclastic and lavas.</td>
<td>“Linggiu Formation” (i) shale, sandstone, tuff &amp; lava.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Dohol Formation”: Shale, phyllite, slate, sandstone, tuff, limestone.</td>
<td>(Sumelayang Limestone Member).</td>
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<tr>
<td></td>
<td>DOHOL FORMATION</td>
<td>(Calymmata Group Volcanic Series)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SUNGAI PERLIS BED</td>
<td>(Abbecue Series)</td>
<td></td>
</tr>
</tbody>
</table>

**The distribution of Palaeozoic rocks in east Johor:**

![Map of the distribution of Palaeozoic rocks in east Johor](image)
Mersing Formation:
- Widely distributed in eastern Johor and southeastern Pahang
  - The oldest rock in eastern Johor, overlain unconformably by all other sedimentary rocks formations
  - Composed by metamorphic rocks such as schist, phyllite and quartzite, some interbedding of slate and metaquarzite
  - Folded, faulted and intruded by granite; quartz vein is common as crack filling

The depositional environment:
- shallow marine to mixed condition (Foo, 1983)
- this study: shallow marine environment.

Age:
- Carboniferous-Permian (Drummond, 1962)
- Permian (Suntharalingam, 1991).
- Pre-Permian (this study)

Previous denomination:
- Mersing beds (Cook and Suntharalingam, 1970)
- Mersing Group (Suntharalingam, 1991)
Post Mersing rocks/Formation

Unconformable deposited above the Mersing Formation are clastic sediment (Murau Conglomerate Formation, Dohol Formation) and volcanic rocks (Sedili, Jasin and Pengerang volcanics).

Murau Conglomerate Formation

- Formerly included as member of the Tembeling Formation (Koopmans, 1968). Burton (1973) and Khoo (1977) excluded Murau Conglomerate from Tembeling Formation because of its geographic isolation. Ahmad Jantan et al., (1988) supposed to upgrade as a Formation.

- Distributed along the east coast from Tg Sekakap- Tg Tenggaroh, and at Pulau Batu Chawang, Mersing (Ibrahim Abdullah, et al, 1991) and Tg Leman (Suntharalingam, 1991).

- Composed of disorganized thick bedded breccia, gravelstone and sandstone series forming a sequence deposited by fan-delta system (Surjono et al, 2003).

- Unconformably overlying the Mersing Formation with the provenance from Mersing Formation itself.

- The volcanic elements was absence.
**Geological map of Murau area:**

Basal conglomerate with clasts of slate and metaquartzite of Merisng Formation

**Lithological logs of Murau Conglomerate Formation**

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Dohol Formation

- Distributed in eastern part of G Sumalayang, mainly in the upper reaches of Sungai Sedili, associated with Sedili volcanic.

- Composed of shale-siltstone-fine sandstone interbedding, thickly bedded claystone and thin bed of tuffaceous sandstone

- In the middle part limestone unit named as the Sumalayang limestone member is deposited

- Dohol Formation and Sedili Volcanic are interpreted as a shallow marine origin

- In Gunung Belumut, Kon’no et al., (1970) and Rajah, (1986) confirmed that Linggiu Formation was unconformably deposited above the Dohol Formation

- Dohol Formation was grouped together with Linggiu Formation into Mersing Group by Suntharalingam, (1991)
Sungai Sedili traverse:

- Bedded limestone as member of Dohol Formation
- Thick bed of volcanic rocks forming Sedili Volcanic in Sumalayang area
- Thick claystone of Dohol Formation
- Shale-fine sandstone of Dohol Formation

G. Sumalayang traverse

- Cross-bedded sandstone of Tebak Formation
- Weathered gravely sandstone (Tebak Formation) overlying the thin beds shale (Dohol Formation)
- Stalactite, resulted by precipitation of limestone member of Dohol Formation

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G. Sumalayang traverse

Sedili Volcanic

Thick and massive tuff in the upper part of Sedili volcanic

Pyroclastic flow structure of Sedili Volcanic

Tuffaceous sandstone and tuff interbed of Sedili volcanic

Lithic clasts in pyroclastic rock

Lithological columns from several traverses of G. Sumalayang
Stratigraphic correlation of G. Sumalayang area

Tebak Formation (Mesozoic)

Dohol Formation

Sedili volcanic

Limestone member

Jasin Volcanic

Bomb as pyroclastic fall product at Tg. Arong Baharu

Pyroclastic rocks (volcanogenic) of tuffaceous shale and clasystone.
Upper part of Tg Penyabung
Rocks show pyroclastic flows, forming thick bed succession. The clasts composed of lapili, lithic and re-sedimented of pyroclastic rocks.

Rocks is produced by several volcanic activities such as intrusions, lava flows as well as pyroclastic flows.
Age of the formations

1. The age of Dohol Formation is determined by the presence of fusulinid in the Sumalayang limestone. Suntharalingam (1991) determined the age of Dohol Formation as Early to Middle Permian. Igo et al., (1979) inferred as upper Lower Permian to early Middle Permian.

2. Sedili volcanic which has interfingering contact with Dohol Formation, thus was interpreted as Middle Permian in age.

3. Linggiu Formation was interpreted as a Late Permian age based on Linggiu floral assemblege (Kon’no et al., 1970).

4. Jasin volcanic is also interpreted as Permian (Cook And Suntharalingam, 1971); Late Permian to Early Triassic (Suntharalingam, 1991).

5. Pengerang volcanic is interpreted being deposited at Carboniferous-Triassic (Grubb, 1968); Early Triassic (Foo, 1983).

6. Murau Conglomerate Formation is interpreted Palaeozoic of Early Permian or older which is deposited before volcanic rocks.

7. Mersing Formation is interpreted to be deposited before Murau Conglomerate Formation (Pre Early Permian). This formation served as basement rocks for all Permian Formations.

8. All of formation with Permian of age and older was intruded by Mesozoic granite and was unconformably overlain by Tebak and Panti Formations (Late Jurassic to Early Cretaceous).
Conclusions

1. A new stratigraphic chart for the Palaeozoic of east Johor is introduced in order to understand more about the basin evolution.

2. The new stratigraphic chart is important for correlation with Palaeozoic rocks of the eastern belt of Peninsular Malaysia.

3. Several stratigraphic denomination were revised according to the standard suggested by the Malaysian Stratigraphic Code.

4. Further study is needed to established some stratigraphic units that have caused much of past uncertainties and debatable input.
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