

New ages from radiolarian cherts of the Chert-Spilite Formation, Sabah

K.M. LEONG

Geological Survey of Malaysia, Sabah

A Lower Cretaceous age obtained from a radiolarian chert of the Chert-Spilite Formation indicates that the Upper Cretaceous lower age limit of the formation, at least in Eastern Sabah, should be reviewed and revised.

The age of the Chert-Spilite Formation was, on palaeontological evidence, believed to range from Upper Cretaceous to Early Eocene (Fitch, 1955), Upper Cretaceous to Eocene (Kirk, 1962) and Upper Cretaceous to probably Eocene (Leong, 1973 ms). The Upper Cretaceous ages were mainly determined from foraminiferal calcareous beds of the Chert-Spilite Formation, from various parts of the Upper Segama area, which contain several 'index' species of *Globotruncana*, restricted respectively to the Lower Senonian, probably the lower part of the Santonian, Turonian to Senonian and Campanian stages. Wilson (1963) in assessing all age determinations available at the time, considered that the formation is mainly Cretaceous to Palaeocene and that it extends well into the Eocene.

Radiolarians in cherts, due to subsequent alteration, are commonly not determinable, so that datings are less reliable than from foraminifera in calcareous rocks. However some success has been obtained from less altered, radiolarian cherts in the Upper Segama area (Leong 1973 ms, table 12). *Thin sections* of sixty-one radiolarian cherts samples from the above area were examined by G.R. Elliott, who obtained the following results:— Mesozoic, probably Cretaceous (from 16 samples); Upper Cretaceous (12); probably Upper Cretaceous (4); Upper Cretaceous?Tertiary (1); Cretaceous or later (1); Cretaceous-Eocene level (2); Eocene (2); no age determination (23).

Nine samples of the above, better preserved radiolarian cherts were recently examined by W.R. Riedel and colleagues, who isolated the radiolarians by treating the chert samples (each about 3 cu. inches in size) with HF acid and determined the species from 'whole' specimens. More precise datings from recognizable species or genera of radiolarians from three samples were obtained by this method (see Table 1). The Lower Cretaceous age (Valanginian to Barremian) for the chert sample J7250 is highly significant as this is the first definite Lower Cretaceous age for the Chert-Spilite Formation in Sabah. The lower age limit for the formation, i.e. Upper Cretaceous, would now seem to require review and revision.

The precise and narrow range of age assignments now possible, as a result of recent advances in Mesozoic radiolarian stratigraphy, show that the better preserved radiolarian cherts of the Chert-Spilite Formation should be systematically collected from various parts of Sabah for the radiolarians to be extracted and examined 'whole', so that, considered together with the ages indicated from foraminifera and other fossil assem-

blages, the time-stratigraphic position of the Chert-Spilite Formation could be better defined.

Table 1
Radiolarian assemblage in selected chert samples, Upper Segama area, Eastern Sabah

RADIOLARIAN ASSEMBLAGE AND AGE		
SAMPLE NUMBER	Determination by G.F. Elliot from thin sections of chert sample	Determination by W.R. Riedel and A. Sanfilippo from 'whole', isolated and three-dimensional specimens of radiolarian
J7250	<i>Adelocyrtis</i> sp., <i>Cenosphaera</i> sp., <i>Dicolocapsa</i> sp., <i>Diplactura</i> sp., <i>Holocryptocapsa</i> sp., <i>Meyenella meyeri</i> , <i>Rhodeosphaera</i> sp., <i>Tricolocapsa</i> sp. Upper Cretaceous	<i>Staurosphaera septemporata</i> , <i>Sphaerostylus lanceola</i> , and probably <i>Dictyomitra boesii</i> and <i>Acaeniotyle umbilicata</i> . <i>Eucyrtis tenuis</i> Zone or <i>Sethocapsa trachyostraca</i> Zone (Valanginian to Barremian, Lower Cretaceous)
J7985	<i>Cenosphaera</i> sp., <i>Dictyomitra</i> sp., <i>Melitosphaera</i> sp., <i>Meyenella meyeri</i> , <i>Meyenella</i> sp., <i>Theocyrtis</i> sp., <i>Xiphostylus</i> sp. Upper Cretaceous	Many fragments of <i>Saturnalis</i> spp. and other radiolarians but no species that can be recognized Apparently Upper Cretaceous
J7989	<i>Cenosphaera</i> sp., <i>Cyrtocapsa</i> sp., <i>Dicolocapsa</i> sp., <i>Dictyomitra</i> sp., <i>Melitosphaera</i> sp., <i>Meyenella meyeri</i> . Upper Cretaceous	<i>Saturnalis</i> spp. <i>Artostrobium urna</i> , and <i>Dictyomitra duodecimcostata</i> <i>Artostrobium urna</i> Zone (Coniacian to Maestrichtian, Upper Cretaceous)
Note: G.F. Elliott remarked that the samples indicated as Upper Cretaceous contain radiolarians which range from Cretaceous to Recent, but no genera exclusively Tertiary has been recognized.		

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REFERENCES

- FITCH, F.H., 1955. The Geology and Mineral Resources of the Segama Valley and Darvel Bay Area, Colony of North Borneo. *Brit. Borneo Geol. Survey Mem.* 4.
- KIRK, H.J.C., 1962. The Geology and Mineral Resources of the Semporna Peninsula, North Borneo. *Brit. Borneo Geol. Survey Mem.* 14
- LEONG, K.M., 1973 ms. The Geology and Mineral Resources of the Upper Segama Valley and Darvel Bay Area, Sabah *Geol. Survey Malaysia Mem.* 4 (Revised), *in press*
- WILSON, R.A.M., 1963. The Chert-Spilitic Formation of North Borneo *Brit. Borneo Geol. Survey Bull.* 4, p. 61–78.