

Palynological report on samples from successions at Khu Tuong N (Phu Quoc Island), SW Vietnam and Phnom Bokor and Veal Rinh, S Cambodia

Analysis of geological samples collected during
a Shell sponsored GEUS-VPI-CNPA
reconnaissance field campaign
in September 2012

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A total number of thirty-one samples collected from presumed Cretaceous localities in Southwest Vietnam (Phu Quoc Island) and South Cambodia during a Shell sponsored GEUS-VPI-CNPA reconnaissance field campaign in September 2012 were selected for palynological analyses (Fig. 1). The studied outcrop in Vietnam (location 1) belongs to the Phu Quoc Formation and the outcrops in Cambodia belong to the Bokor Formation (locations 2 & 3). The samples were processed at the Palynological Laboratory, the Stratigraphy Department at the Geological Survey of Denmark and Greenland, according to standard palynological methods. A brief report is provided below. The report forms part of a comprehensive reporting to Shell.

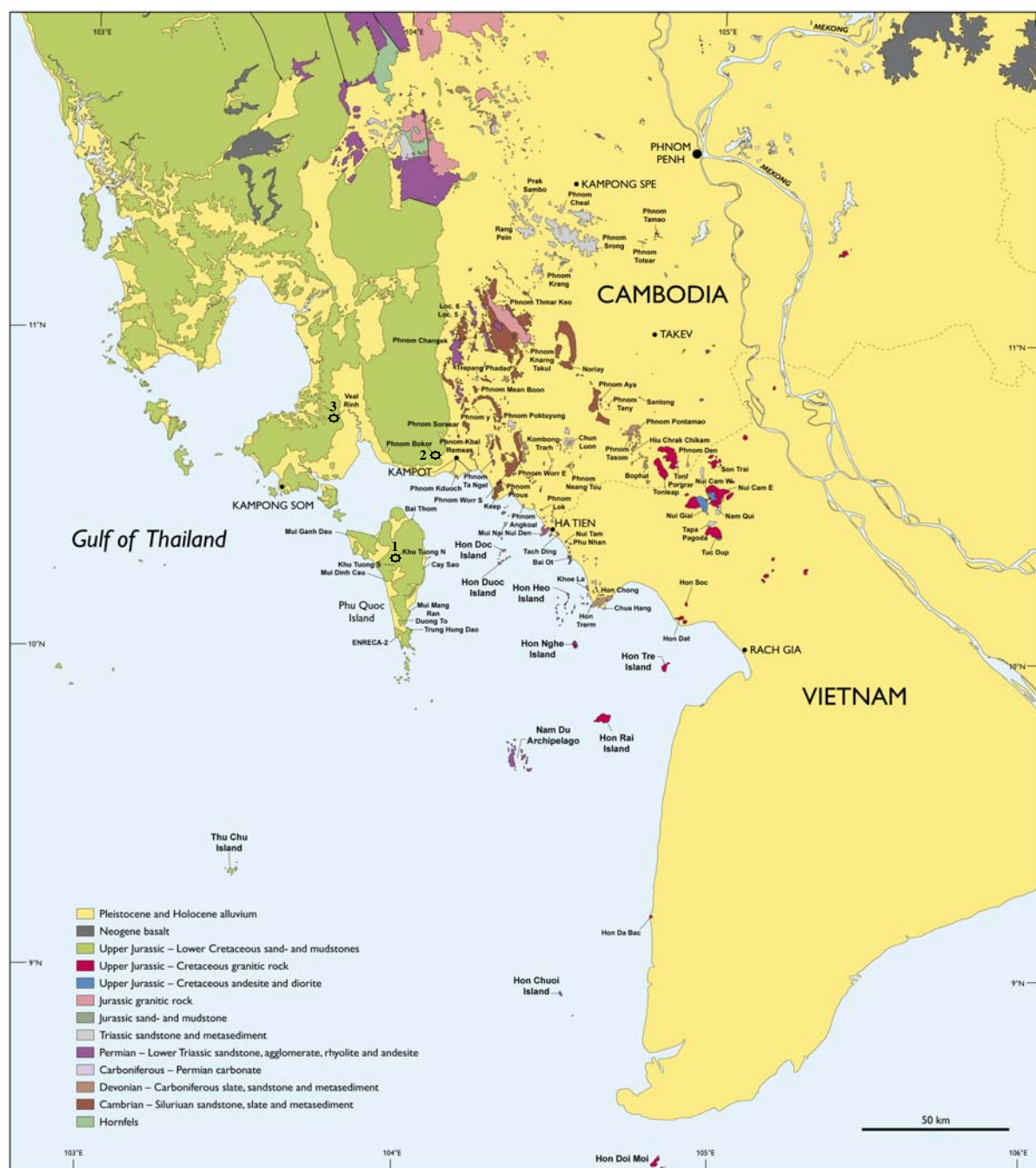


Fig. 1 Regional outline of the study area. Cretaceous deposits are restricted to the western part of the area.

Results

Khu Tuong N, Phu Quoc Island offshore SW Vietnam

From a new road cut at Khu Tuong N on Phu Quoc Island (location 1) three samples collected by Lars Henrik Nielsen with reference to a sedimentary log were investigated (Fig. 2A & 2B). One of the samples was barren of *in situ* palynomorphs but contained abundant fungal remains and rare angiosperm pollen that appear to be contaminations from extant vegetation. The remaining two samples contain fairly well preserved assemblages dominated by *Classopollis*. Fern spores are less abundant than in some of the Veal Rin (South Cambodia) assemblages, but the floral composition is similar to the latter, with common *Leptolepidites tumulosus* and *Dicheiropollis etruscus*.

Thin-walled, irregular shaped dinoflagellate cysts are common, and are most probably freshwater representatives. Also present is the freshwater alga *Circulisporites* sp.



Fig. 2A

The central part of the succession at Khu Tuong, Phu Quoc Island showing flood-plain mudstones with crevasse splay sand erosively overlain by thick cross-bedded, medium-grained fluvial sandstones.



Fig. 2B

The upper part of the Khu Tuong succession exposing cross-bedded, medium-grained fluvial sandstones showing a fining upward trend and topped by alternating fine-grained sandstones and mudstones deposited in a flood plain environment.

Phnom Bokor, South Cambodia

Twenty samples collected by Lars Henrik Nielsen from outcrops along a newly established road at Phnom Bokor in Cambodia (location 2) were investigated (Fig. 3A & 3B). The samples are referred to a sedimentary log that will be reported separately.

Almost half of the samples were found to contain only very rare *in situ* palynomorphs or to be palynologically barren of *in situ* palynomorphs.

Eleven of the samples contain fungal remains and/or a diverse angiosperm and fern dominated microflora which is regarded as representing the extant vegetation in the area (contamination).



Fig. 3A

Phnom Bokor. Road cuts exposing the Bokor Formation consisting of cross-bedded, medium-grained fluvial sandstones with thin mudstones presumably overbank deposits.



Fig. 3B

Phnom Bokor. Road cuts exposing the Bokor Formation consisting of cross-bedded, medium-grained fluvial sandstones; notice the two point bar units at top displaying diverging bedding dips.

Veal Rinh, Cambodia

Eight samples collected by Michael Fyhn from a small road cut at Veal Rinh in Cambodia (location 3) were investigated (Fig. 4A & 4B). Two of the samples contain only plant and fungal remains that appear to be contamination from present day vegetation. Six of these samples contain fairly well preserved terrestrial palynomorphs, with varying diversity.

The assemblages are predominantly consisting of *Classopollis* sp. cf. *C. meyeriana*. Fern spores are common in some samples, with such representatives as *Deltoidospora toralis*, *D. minor*, *D. australis*, *Gleicheniidites senonicus*, *Ischyosporites variegatus*, *Punctatisporites globosus*, *Foraminisporis* spp. and *Antulsporites* spp. *Leptolepidites tumulosus* and *Dicheiropollis etruscus* are usually common, but bisaccate gymnosperm pollen grains are rare.

The presence of *Circulisporites* sp. in one of the samples indicate a freshwater environment. No marine palynomorphs were encountered.



Fig. 4A

Cross-bedded fluvial sandstones at Veal Rinh. Up to tens of centimetres thick fluvial mud- and siltstones make up ca. 5 % of the section. The fine-grained intervals were sampled for biostratigraphic analysis.



Fig. 4B

Finning upwards fluvial overbank sand- and mudstones at Veal Rinh. The fine-grained intervals were sampled for biostratigraphic analysis.

Age indication of the palynofloras from Khu Tuong N (Phu Quoc Island), Vietnam and Veal Rinh, South Cambodia

The presence of *Cicatricosporites hallei* along with *Dicheiropollis etruscus* in the assemblages from Veal Rinh, indicate a Berriasian to lower Barremian age (Racey & Goodall, 2009).

The assemblages confirm that Cambodia and Vietnam were part of the pre-Albian Early Cretaceous *Dicheiropollis/Afropollis* Province, which has previously been recognized from the northern parts of Africa, South America and Israel (Herngreen et al. 1996), Thailand (Racey and Goodall, 2009) and China (Li 1990).

The sedimentary rock successions at Veal Rinh and PQ Khu Tuong N were deposited in a freshwater environment under a warm, probably seasonally dry subtropical climate.

References

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