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A SHORT NOTE ON QUATERNARY GEOLOGY OF THE HAAD YAI - SONGKHLA AREA, SOUTHERN THAILAND

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ABSTRACT Land and fresh water shells from one limestone cave deposit on the west coast of Songkhla Lagoon, marine shells from a bed 7 m below present ground surface of the Songkhla Great Spit and a piece of half-carbonized wood from an open pit tin mine west of Haad Yai city were collected and dated by ^{14}C method. Shells were identified of their genera and species and their living environments were suggested. These samples range in their age from 4,860 + 270 yr B.P. to 6,720 + 130 yr B.P. Old maps of the area prepared during the time from 1,638 to 1,896 A.D. were collected and studied together with present maps, airphotographs and satellite imagery. Conclusively it is presumed that the Songkhla Great Spit did not exist at its present location approximately 5,000 years ago but already existed in or before 1638 nearly at present location.

INTRODUCTION AND ACKNOWLEDGEMENTS

The Geological Research Project of Prince of Songkhla University, Thailand started Quaternary geological study in southern Thailand since the very beginning of its work in 1976. Rather sporadical study in this field has been made from time to time whenever chance had come to the Project to do so.

In March 1982, at an invitation of the Thai Department of Mineral resources (DMR) (Geological Survey Division - Quaternary geology unit), the

Project joined field work with DMR for net 13 days. DMR continued their field work further into April of the same year to prepare the preliminary report (in Thai) of the Quaternary geological map and profiles of the Haad Yai district with later revised maps and profiles that were given to the authors.

Sawata, Tanchotikul and Darnsawasdi did the supplementary field study in October 1982. They were joined partly by Trebuil. Trebuil also continued to collect samples and information from local people and publications. Miss Vimolrat KASEMSUPAYA and Mr. Niphon PHONGSUWAN of Prince of Songkhla University joined partly the field work of the authors. Tanchotikul prepared a short note and a preliminary map of Haad Yai area after the report of DMR. Based on these materials, Sawata prepared "A hypothetical idea on the formation of the Haad Yai basin and the Songkhla Lagoon" to be presented by Darnsawasdi to the "1982 Annual Technical Meeting, 1-2 February 1983, Chiang Mai, Thailand."

The molluscan samples collected by the authors were identified of their genera and species and their living environments were interpreted by Prof. Dr. Tadashige HABE through the introduction of Prof. Dr. Teiichi KOBAYASHI, Honorary Advisor of the Geological Research Project, Prince of Songkhla University. Among the samples collected, land and fresh water snails from a limestone cave deposit, marine shells from clay bed under the Songkhla Great Spit and half-carbonized wood from an open pit tin mine west of the Haad Yai city were dated in a specially expedited way by ^{14}C method by the New Zealand Institute of Nuclear Sciences through the arrangement of the New Zealand Geological Survey. The expense was paid by Sawata.

This paper was prepared by Sawata on the basis of all the available data to supply the most recent information obtained by the authors on Quaternary geology of Haad Yai - Songkhla area, southern Thailand to the people interested.

Great appreciation is expressed by the authors to all the individuals and institutes concerned including those above-mentioned for their kind support to the authors.

MAIN TEXT

^{14}C - Dated Samples from the Area

Three sampels of shells and half-carbonized wood were collected and dated by ^{14}C method. Their description and results are given below (Figs. 1 and 2).

Land and fresh water snails from cave deposit

Locality: Nam Jen cave, Hill of Khao Chai Son, Ban (village), Khao Chai Son, Amphoe (district) Khao Chai Son, Changwat (province) Phatthalung, Thailand: 07°27'09"N-100°07'49"E

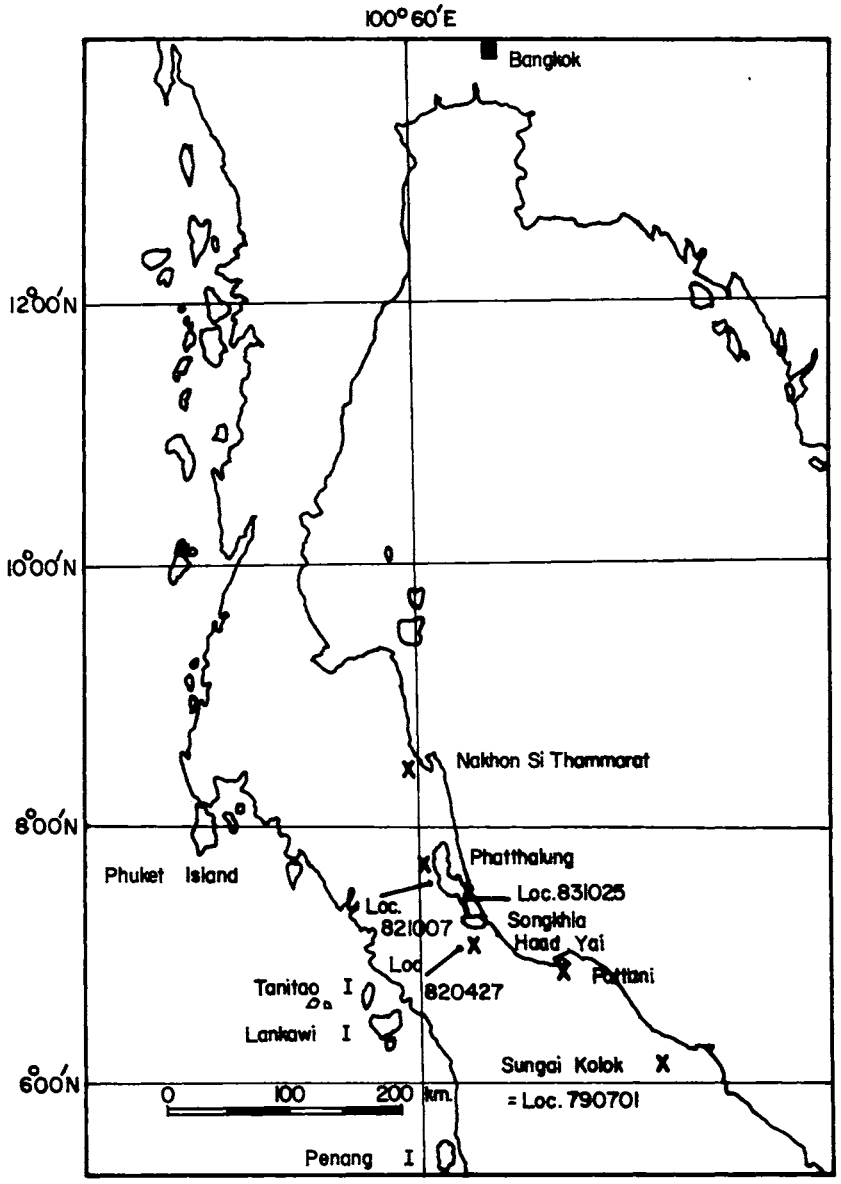

Fig. 1 Index map of ^{14}C-dated sample localities (ref. Fig. 2)

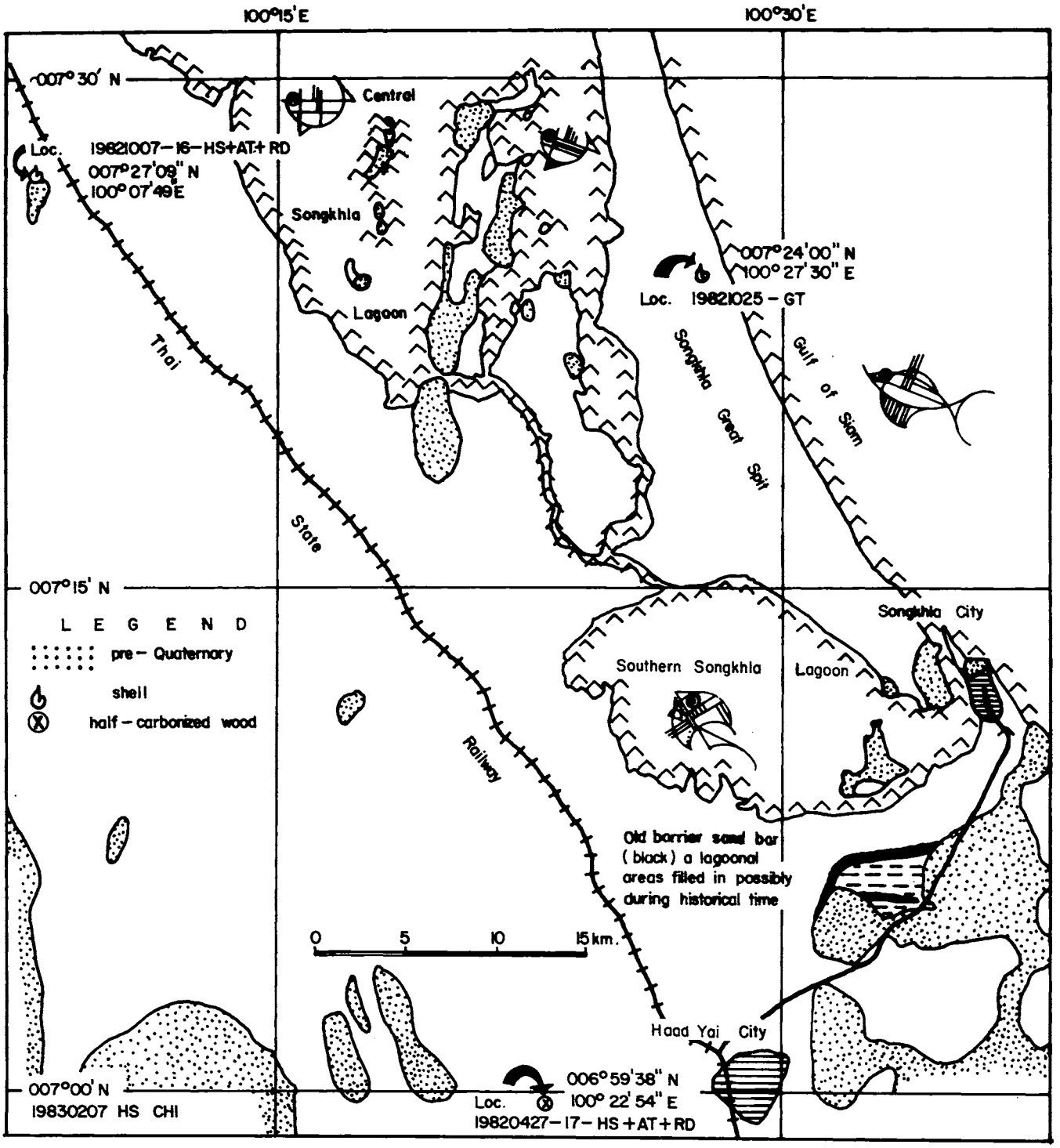

Fig. 2 : Locality map of ^{14}C - dated samples

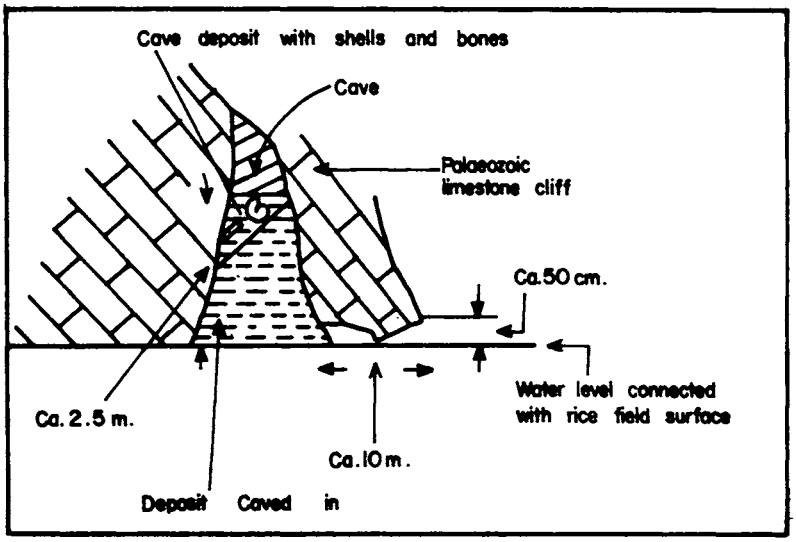

Fig. 3 Cave deposit at Nam Jen cave, Khao Chai Son (not to scale)

The locality was visited by Sawata, Tanchotikul and Darnsawasdi on 7 October, 1982. At this locality, Palaeozoic limestone forms a hill ca. 300 m high, 2.5 km long and 1 km wide. The hill is elongated in north-south direction. Ground surface at the foot of the hill is presumably 15 - 20 m above the sea level but no accurately levelled height is available in large area including that of this hill.

The cave is formed between cracks in limstone and filled with mud which contains land and fresh water snails, and animal (possibly mammarian) bones. No artificial material was found. The lower part of the cave deposit seems to have collapsed downward.The top of the cave deposit is approximately 2.5 m above the surrounding ground surface of the rice field (Fig. 3). The molluscan remains were determined by Prof. HABE as follows:

(1) *Cyclophorus speciosus* (PHILIPPI)
(2) *Pila ampullaria* (LINNE)

According to Prof. HABE, (1) is forest land snail and (2) is fresh water snail, air-breathing and gill-breating, normally lives in dirty water. When oxygen in the water becomes unavailable, it comes to the water surface to breath air.

The Institute of Nuclear Sciences dated these specimens by ^{14}C method and the results are as follows:

The terrestial snail shells showed an equal amount of calcite and aragonite when examined with X-ray diffraction. The outer and inner fractions of the shells were processed and counted separately. After removal of the outer surface, the remainer showed all aragonite on re-examination, so all calcite was in the outer portion.

The outer portion gave ^{14}C age of 5,830 + 150 yr B.P. A remark is added that there are cases where land snails have taken up to 12% of their carbon from old limestone. This would make the age 1,000 years too old. Local conditions should decide. In this case, the matter is possibly not applicable to the fresh water snail and it is still unknown whether this acquisition of carbon from old limestone is applicable or not to the land snail in this area.

The inner portion gave ^{14}C age of 6,720 + 130 yr B.P. The remarks say secular age is beyond calibration and extrapolation suggests 7,600 yr B.P.

Marine shells under the ground surface of Songkhla Great Spit

Locality: Ban Wat Phikun, Sathing Phra district, Songkhla province, Thailand: 07°24'00"N-100°27'30"E

The sample was collected by Trebuil through the local people on 25 October 1982. It was from the horizon 7 m below the ground surface. The top layer is of sand 1 m thick, the next is very dark gray clay 6 m thick and then very dark grey clay of unknown thickness from which the sample came. The amount of shells increases with depth.

Trebuil was told further by local old farmers and fishermen that this shell-bearing bed is found at nearly 5 - 6 m below the ground surface on old sand beach ridges colse to the sea and can also be seen everywhere close to the logoonal coast at less than 2 m depth. The shells are mainly *Ostrea*.

The molluscan remains collected by Trebuil were identified by Prof. HABE and their living environment was interpreted as follows:

(1) *Placuna placenta* (LINNE, 1758)
(2) *Anomia chinensis* (PHILIPPI)
(3) *Architectonica trochlearis* (HINDS); juvenile ?
(4) *Crassostrea gigas* (THUNBERG, 1793)
(5) *Veremolpa scabra* (HANLEY); small, abundant
(6) *Tectonatica (Paratectonatica) tigrina* (ROEDING, 1798)
(7) *Paphia (paratapes) undulata* (BORN)
(8) *Calyptraea morbida* (REEVE, 1859)
(9) *Anadara (Tegillarca) nodifera* (v. MARTENS)
(10) *Diplomeriza spectabilis* (HINDS, 1844) ?

General environment shown by the shells above indicated high degree of embayment. They lived in mixed mud and sand deep in the bay of rather big dimension.

Of these, *(1) Placuna placenta* and *(5) Veremolpa scabra* are in big number.

The ^{14}C dating of the samples were done by the Institute of Nuclear Sciences of New Zealand and the results are as follows. The samples are separated into two parts: rounded shells and flat shells *Placuna placenta*. The rounded shells (other than *Placuna placenta*) were found by XRD to have a crystal structure of aragonite. *Placuna placenta* was wholly of calcite. These two groups were dated separately, and the two ages are within two standard deviations of each other.

Placuna placenta gave ^{14}C age of 5,370 + 100 yr B.P. All samples excluding *Placuna placenta* gave ^{14}C age of 4,860 + 270 yr B.P.

Half-carbonized wood piece from an open tin pit near Haad Yai

Locality: A flooded open pit of tin placer deposit ca. 10 km west of the Haad Yai railway station, Ban Rai Oi (1), Amphoe Haad Yai, Changwat Songkhla, Thailand: 06°59'38"N-100°22'54"E

The wood samples was collected by Sawata, Tanchotikul and Darnsawasdi when they visited the site on 27 April 1982. It was on the water margin of the flooded pit and Sawata believed confidently that it had come from the horizon of wood accumulation ca. 2 m below the ground surface and ca. 3 m above the tin-bearing gravel bed of the submerged profile of the pit which was visited before by him when the pit was not yet flooded but deep mud prevented him from studying it in detail.

No botanical study has been made yet on the wood. Institute of Nuclear

Sciences made ^{14}C dating of it and the following result was obtained.

The wood showed ^{14}C age of 6,070 + 80 yr B.P.

This age is nearly the same as that of half-carbonized wood close to the ground surface of UNO canal near the city of Sungai Kolok, Narathiwat province on the southeastern border between Thailand and Malaysia, which was collected by the Geological Research Project, Prince of Songkhla University on 1 July 1979 and was kindly ^{14}C-dated by the New Zealand Geological Survey.

Old Maps of the Area

Several old maps were collected by Trebuil.

It is noted that all these maps treated the Songkhla Great Spit as an island naming it such as Ligor island, Island of Coete Inficos and Tantalum island.

The maps of 1638 (JANSSONIUS), 1713-19 (GUEDEVILLE) and 1714 (PLACIDE) show the "island" clearly in island-form whereas the maps of 1751 and the later times do not reveal the island-shape. Even in the former group (1638-1719) of maps, northern margin of the island has narrower, canal-like form. In the map of 1828 (John WALKER), the area from the present Songkhla Lagoon to Talung(=Patalung or Phatthalung), was shown as a rather wide river or channel. It is possible that when a foreign visitor comes to such place during the rainy season and especially during high tide, he may see a large body of water but the area could be a small channel in the dry season. If this case can be applied to these old maps, possibly at least the water channel at the northern end of the "island" was a narrow channel or canal since the middle of seventeenth century.

The two maps of 1881-93 (J. McCarthy, director) and 1891-96 (H. Warington SMYTH) show two channels (Khlongs), one in north-south direction and another in east-west. The former channel is named in both maps as Khlong Ranot which is still existing today. The latter probably correspond to the Khlong U Taphao (ca. 07°46'-47'N - 100°18'-22'E) at present. Considering old beach ridges crossing the U Taphao canal, it may be possible that the canal was dug some time before 1881. Whether the canal existed in 1638 - 1881 time or not is unknown because it is not shown on the maps of this period. Future historical and field study should be made on this subject.

Note of Presumption and Other Observation

From the description above and other information collected by the authors (SAWATA et al., 1983), it may be presumed that:

(1) The Songkhla Great Spit did not exist at its present site around 5,000 years ago.

(2)It is possible that the island of Ligor or Coete Inficos or Tantalum island which corresponds to the present Songkhla Great Spit had already its

northwestern margin separated from the mainland by a narrow channel (corresponding to the present Khlong Ranot) since or before 1638.

(3) The position of the southern end of Great Spit is not clear in its configuration in these ca. 350 years but there is artificial remains reported by local people to suggest filling up in historical time of the small lagoonal area between two sand bars on southeastern end of the Songkhla Lagoon close to the city of Songkhla (Fig. 2).

CONCLUSION AND FUTURE WORK

Two cases of molluscan remain groups and two cases of half-carbonized wood from southern Thailand (between 6° - $7^{\circ}30'$N) were dated by ^{14}C method yielding the age ranging from 4,860 + 270 to 6,720 + 130 yr B.P.

The Songkhla Great Spit presumably did not exist at its present position approximately 5,000 years ago and existed possibly nearly in the same position in or before 1638.

As very little field and laboratory work has been done on Quaternary geology of southern Thailand including the area studied here, much patience and honest field and laboratory work should be required to make any solid conclusion. The work is expected not only to be interesting and meaningful academically but also surely will contribute much to harmonious development of the community in this part of the world.

REFERENCES

DONNER, Wolf 1978: The five faces of Thailand, Institute of Asia Affairs, Hamburg.

Prince of Songkhla University-Geological Research Project 1979: Short notes on fossil locality of crabs and cuttlefish bones of Pleistocene at Sungai Kolok, southeastern-most Thailand, Geological Research Project, Prince of Songkhla University, Haad Yai, Thailand.

SAWATA, Hideho and others (1983, in press) : A hypothetical idea on formation of the Haad Yai basin and the Songkhla Lagoon, 1982 Annual Technical Meeting, 1-2 February 1983, Chiang Mai University, Chiang Mai, Thailand.

WYATT, David K. 1975: The crystal sands: the chronicles of Nagara Sri Dharmaraja, P. XVII