Morphological Characteristics of Ammonoids at Ban Phai Ngam, Mueang Mai Subdistrict, Chae Hom District, Lampang Province

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Introduction

Ammonoids are ancient marine animals. In terms of systematics and taxonomy, they are classified within Domain Eukaryota, Kingdom Animalia, Phylum Mollusca, Class Cephalopoda, and Subclass Ammonoidea, and they share a common ancestor at the family level with nautiloids. Ammonoids first appeared in the Devonian Period, approximately 410 million years ago, before becoming extinct—together with dinosaurs and many other organisms—during the Late Cretaceous, around 66 million years ago. In addition, the species diversity of ammonoids is clearly reflected by the classification of certain distinct external morphological characters, which evolved to enable them to survive in a range of environments.

In Thailand, ammonoid fossils have been reported from many localities. However, according to a report by the Office of Mineral Resources Region 1 (Lampang), Department of Mineral Resources, on the discovery of ammonoids at Ban Phai Ngam, Mueang Mai Subdistrict, Chae Hom District, Lampang Province, the fossils in this area occur as ammonoid “imprints” and represent one of the most densely concentrated ammonoid imprint occurrences in Thailand.

Therefore, studying the morphology of ammonoids will help improve understanding of paleogeographic conditions. The results will also provide information useful for research and development to support geotourism in the Lampang Geopark area.

Objective

To classify imprint ammonoids based on their morphological characteristics and interpret paleogeography from ammonoids imprint fossil.

Geologucal setting

Triassic Rock · Permo-Triassic Igneous Rock · Permian Rock · Quternary sediment · Study site

Ammonoid specimens were recovered from two sites within the sandstone and shale successions of the Triassic Hong Hoi Formation (Fig. 1).

Medthodology

- Fieldwork was conducted to collect morphological data by selecting the most well-preserved specimens. Specimen codes were assigned, dimensions were measured, imprints were replicated using polyepoxide, and the specimens were photographed (Fig. 2).
- Measurement of morphometric parameters of the conch (Fig. 3), it consists of maximum conch diameter, umbilical width index, whorl expansion rate, and imprint zone rate.
- Compare and classify ribs patterns and suture line patterns (Fig. 4) of imprint fossil.

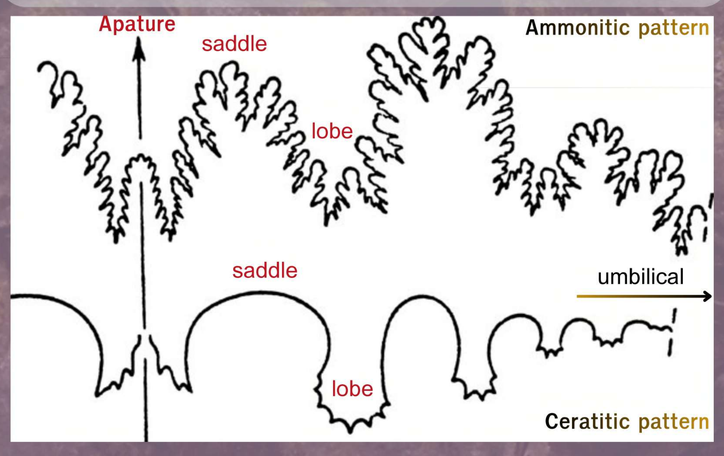


Fig. 4 Ceratitic suture types of ammonoids (C. Klug et al., 2002)

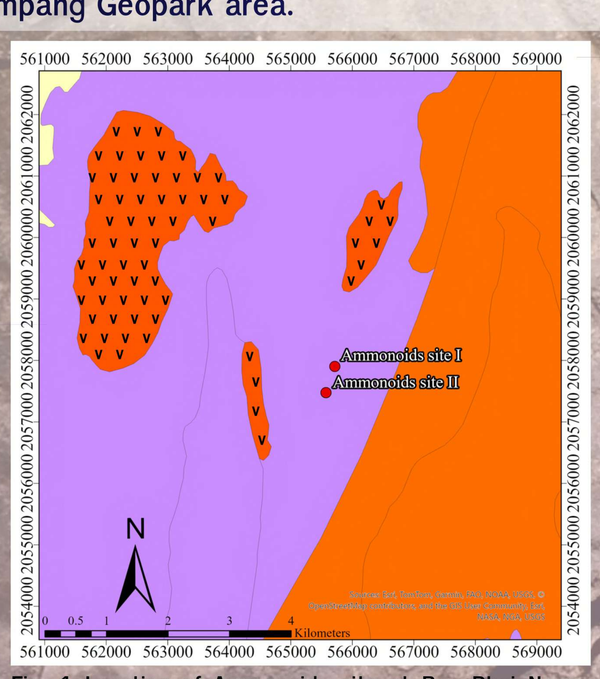


Fig. 1 Location of Ammonoids site at Ban Phai Ngam, Lampang province.

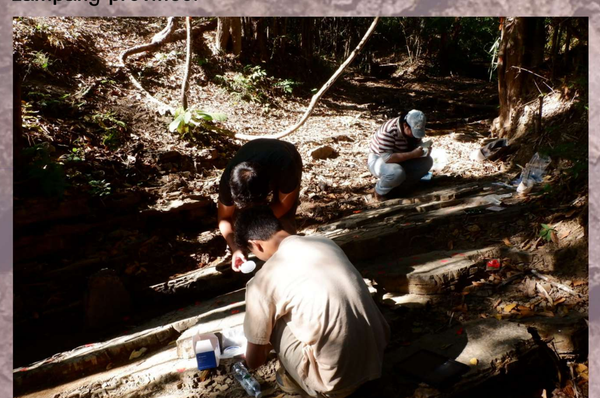


Fig. 2 Fieldwork at ammonoid sites

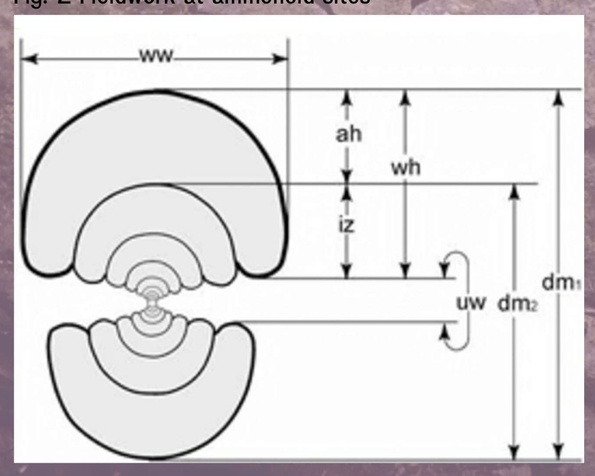


Fig. 3 Conch parameter (C. Klug et al., 2015)

ah	aperture high	uw	umbilical width
dm	maximum conch diameter	ww	whorl width
wh	whorl height	iz	imprint zone width

Discussion & Conclusion

Analysis of 117 specimens reveals a distinct morphological profile dominated by small-to-moderate and highly evolute forms, suggesting that these ammonoids primarily occupied a drift-dwelling (planktonic) lifestyle, rather than actively swimming. The prominent shell ribbing would have created significant hydrodynamic drag, likely hindering active, high-speed swimming. Furthermore, the co-occurrence with bivalve fossils indicates a marine environment ranging from the inner seafloor to the continental shelf.

The presence of ceratitic sutures in select specimens confirms their classification within the order Ceratitida. One of them shows diagnostic ribbing patterns—including rectiradiate, convex, and bifurcate forms—that resemble those of *Euflemingites* sp., (Brühwiler T. et al, 2011) suggesting an Early–Middle Triassic age (251–247 Ma).

Acknowledgment

The independent study entitled “Morphological Characteristics of Ammonoids from Ban Phai Ngam, Mueang Mai Subdistrict, Chae Hom District, Lampang Province” has been successfully completed through determination, perseverance, and the physical and moral support provided by many individuals and organizations. These include my parents, who have continuously supported me; my friends; and my lecturers, who provided guidance and imparted knowledge. I would also like to acknowledge the support of the 50th Anniversary Fund, Department of Geology, Chiang Mai University, the Lampang Province Geological Museum, and the Mueang Mai Subdistrict Administrative Organization, all of which supported the implementation of this project.

References

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Klug C., Naglik C., Korn D., Landman N. H., Tanabe K., and De Baets K., (2015), Ammonoid Paleobiology: From Anatomy to Ecology, Topics in Geobiology 43, DOI 10.1007/978-94-017-9630-9_1

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Result

Morphometric analysis of 117 imprint specimens yielded the following data: (1) maximum conch diameter for 77 specimens, were categorized as moderate (39%), small (32%), very small (21%), and large (8%) (Fig. 5a); (2) umbilical width index (UWI), calculated for 71 specimens, revealed a predominantly very evolute (93%), with minor occurences of evolute (6%), and subevolute (1%) forms (Fig. 5b); and (3) whorl expansion rate (WER) and the imprint zone rate (IZR) were determined for four specimens.

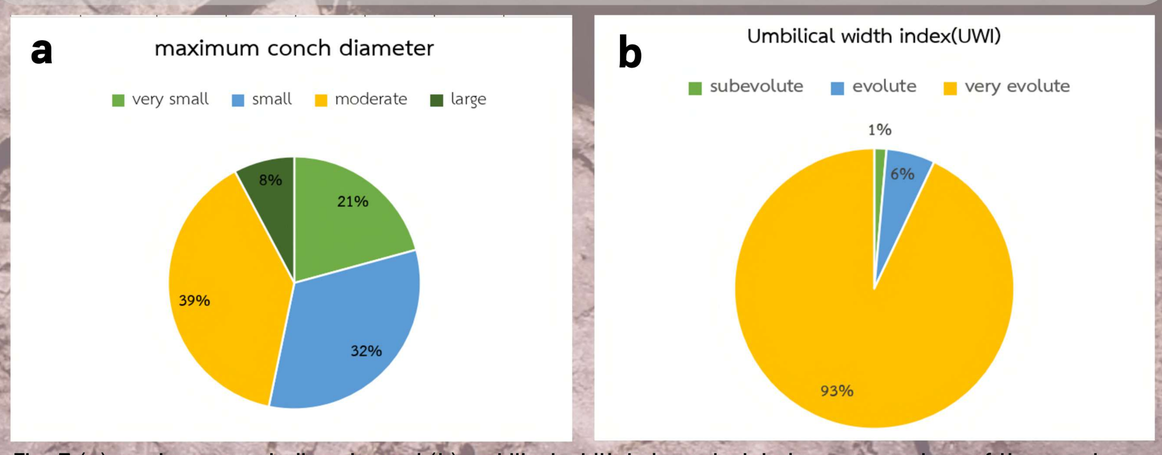


Fig. 5 (a) maximum conch diameter and (b) umbilical width index calculated as a percentage of the sample

Ornamentation is dominated by ribbing, including simple rectiradiate (Fig. 6b), convex, concave (Fig. 6c), and biforcate (Fig. 6d); locally, subparallel rib sets (Fig. 6a) along the whorls resemble the diagnostic ornament of *Euflemingites* sp., suggesting an Early–Middle Triassic age (251–247 Ma).

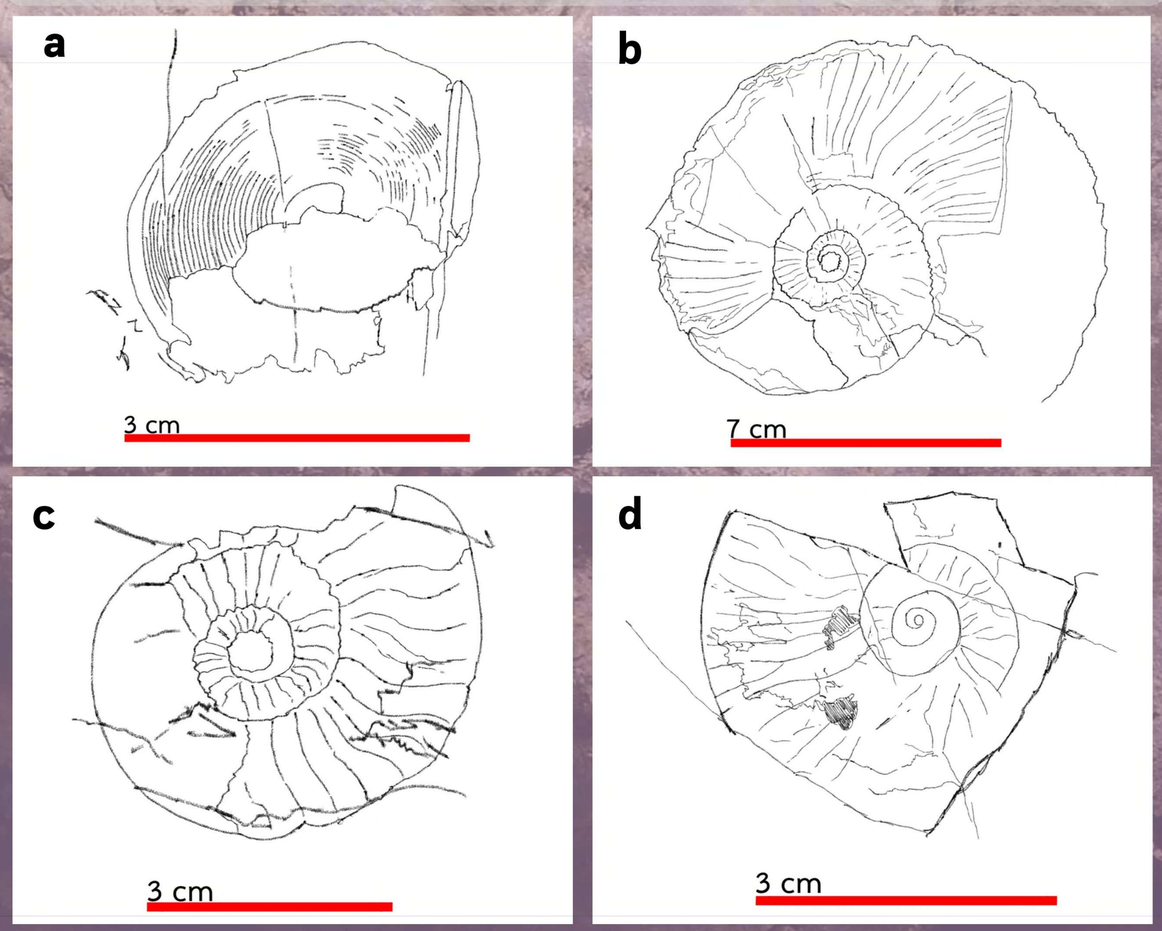


Fig. 6 (a) Subparallel rib (b) Intercalated rectiradiate rib (c) Concave rib (d) Biforcate rib

Septal features are commonly poorly preserved in the imprints. However, in areas where they are visible, approximately five specimens show ceratitic sutures (Fig. 7), which is consistent with ammonoids of the order Ceratitida, a group that ranged from the Permian to the Triassic.

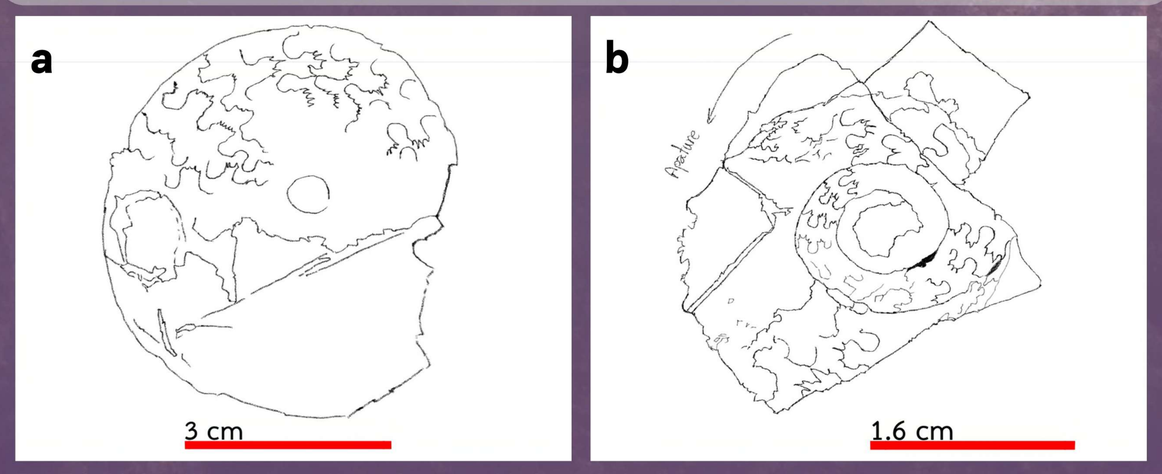


Fig. 7 (a,b) Ceratitic suture pattern of ammonoids form study site.