Fossil Diatom Assemblages and Pyrite Formation of the Post Glacial Stage and the Holocene Epoch in Fujii Area, Okayama Plain, Japan

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INTRODUCTION

- Diatoms belong to a class of microscopic unicellular algae living either in freshwater or in seawater or brackish water.

- Diatom assemblage analysis provides accurate data on salinity gradients.

- Diatoms will deposit in sediment when the sea level rises, and by examining the fossil diatom assemblage we could get an accurate idea about the past environmental condition of a particular area.

- Similarly, the pyrite concentration of the sediment samples also provides information on paleo-environmental changes.

- By coupling pyrite concentration and the C-14 dating with this fossil diatom data it is possible to comprehend the changes in the sedimentary environment brought on by sea level changes.

- The objective of this study was to use the diatom assemblage and the pyrite formation to examine the sedimentary environment of Fujii, Okayama Plain in Japan.

METHODOLOGY

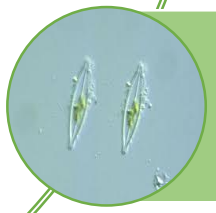

Takahashi River
Takahashi 高梁
Aioi 相生
Akaiwa 赤磐
Yoshii River
Ako 赤穂
Bizen 備前
Takahashi River
Asahi River
Fujii
SAMPLE SITE
Kuze Basin
Soja 総社
Takahashi River
Okayama 岡山
Setouchi 瀬戸内
Yakage 矢掛町
Asahi River
Ibara 井原
Kurashiki 倉敷
Kasaoka 笠岡
Shōdo Island
Fukuyama 福山
Tamano 玉野
Naoshima 直島町
Setonaikai Museum of History and Folklore
Takamatsu 高松
Sanuki さぬき
Marugame 丸亀
27 km
Image Landsat / Copernicus
Miki 三木町

SAMPLING AND METHODOLOGY

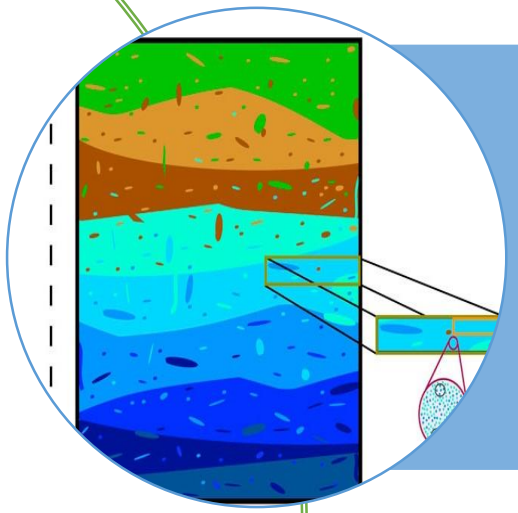
Manual core drilling instrument was used to take the soil samples (Bore hole)

Four meter core sample (n=3)

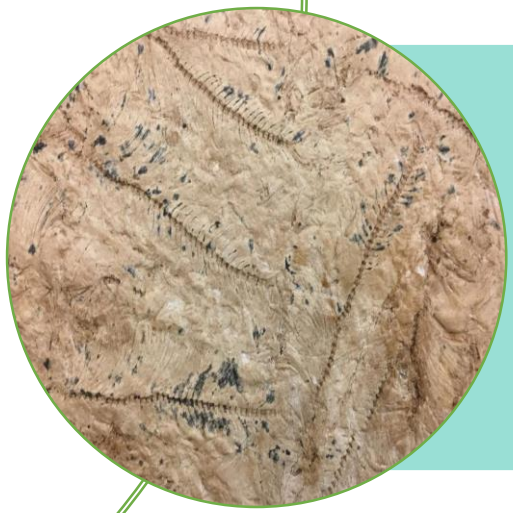
C-14 dating (1.78 – 1.95 m & 2.20 – 2.40 m)



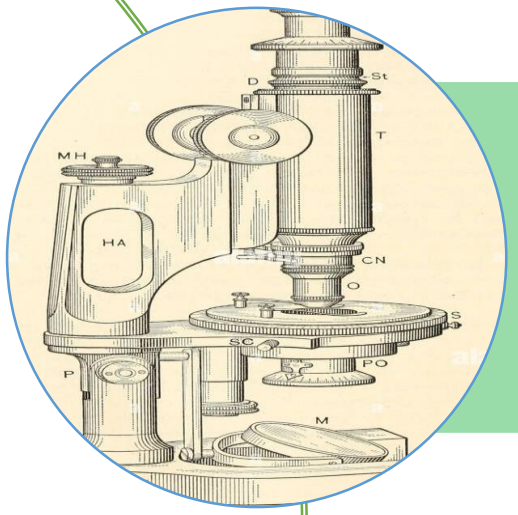
Diatom Analysis and Pyrite Sulfur Analysis



Radiocarbon age measurements were carried out at the Department of Geography, Hiroshima University Radiocarbon Laboratory. The dates were obtained by liquid scintillation counting of methods using lobotomy procedure (Fujiwara & Nakata 1984).



Laboratory work for soil samples to identify diatom analysis were undertaken at the Department of Botany, Hiroshima University.

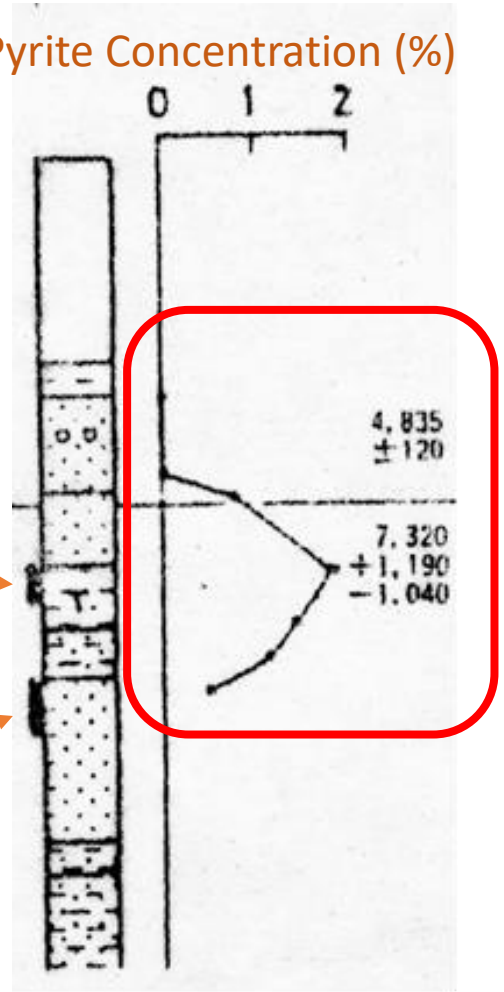


Mounted diatom samples checked by polarizing microscope, samples were enlarged to X 1000 -1500.

The laboratory procedure for FeS_2-S analysis was modified by Katupotha following the procedures described by Berner (1979).

RESULTS AND DISCUSSION

PYRITE SULFUR ANALYSIS AND C-14 DATING RESULTS

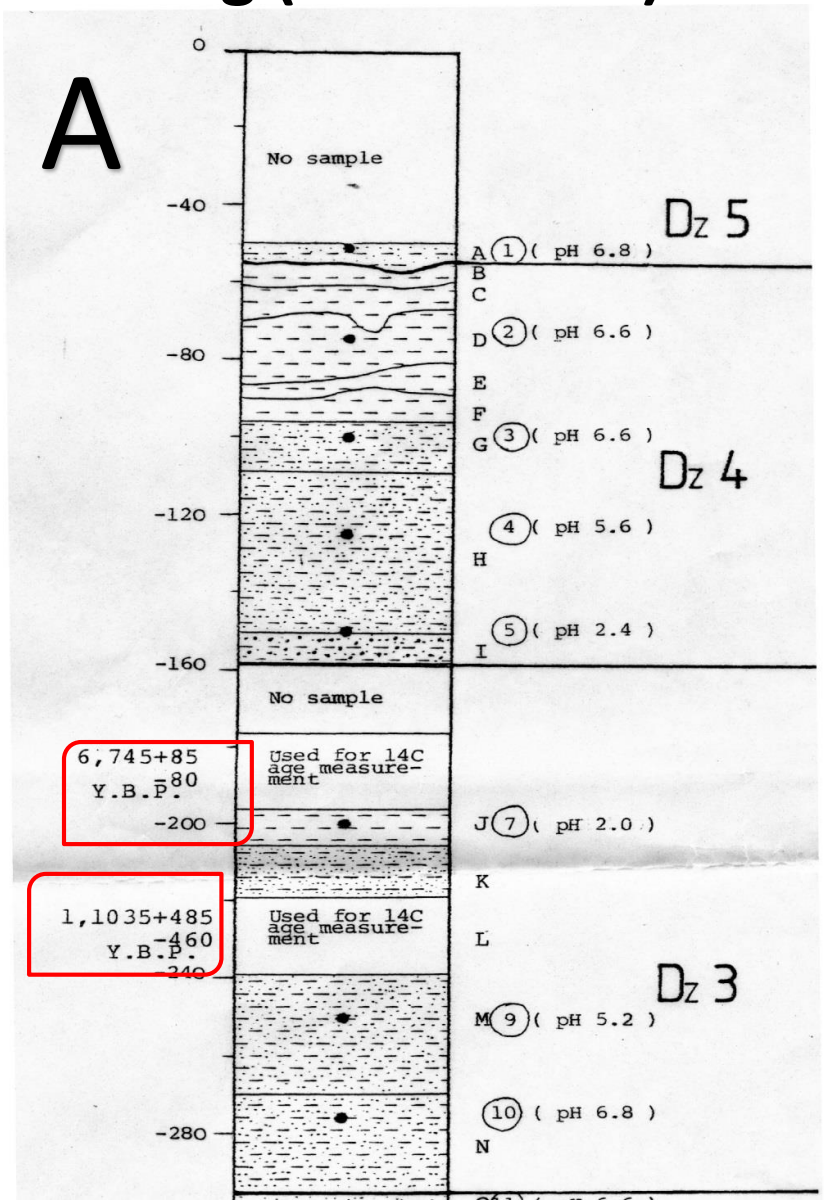


6,745±80 BP

11,035±460 BP

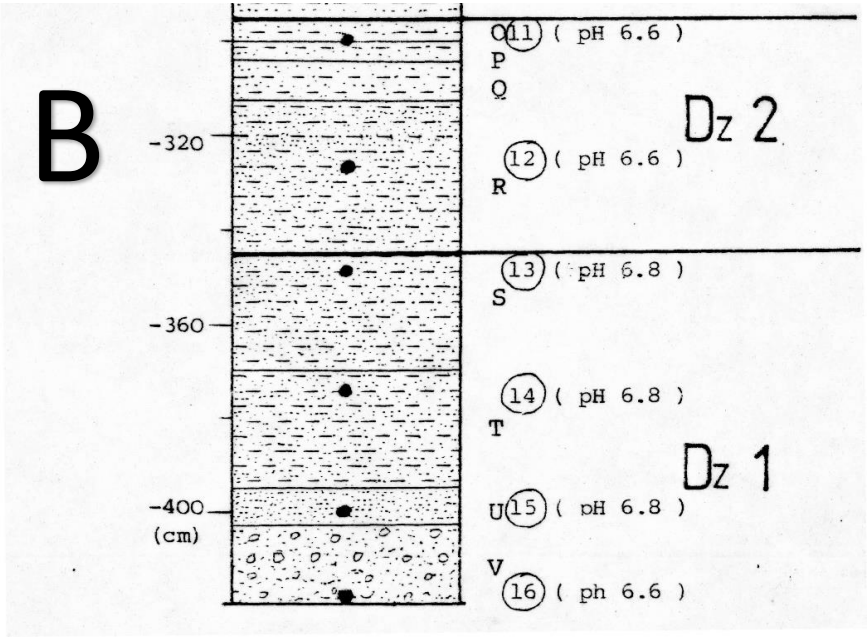
- High pyrite concentration (%) was shown at (1.78 m – 1.95 m depth).
- High pyrite concentration in this sampling depth suggests that the area has been submerged in saline water.
- To confirm this theory, most marine diatoms were also found in this depth.

Stratigraphic profile of the boring (Core No. 1.)



A. Brownish black clay with sand (10YR 2/1)
B. Brownish black clay (5YR 2/1)
C. Brownish gray clay (10YR 3/2)
D. Brownish gray clay (10YR 3/2)
E. Brownish black clay (5YR 2/1)
F. Greyish olive clay with silt (7.5YR 2/1)
G. Olive gray sand with silt (10YR 4/2)
H. Olive gray to dark olive sand with silt
I. Olive black silt with coarse sand (10YR 3/2)
J. Brownish black to black silt (2.5YR 3/2, 2.5Y2/1)
K. Black silt with fine sand (2.5Y 2/1)
L. Gray silt with fine sand (10Y 5/1)
M. Greenish gray sand with silt (5GR 4/1)
N. Dark greenish sand with silt (5YR 2/1)

Stratigraphic profile of the boring (Core No. 1.)



O. Black sand with silt (2.5Y 2/1)

P. Dark greenish-gray sand with silt (7.5GR 4/1)

Q. Olive black sand with silt (10Y 3/1)

R. Dark olive gray silt with fine sand (2.5GR 4/1)

S. Dark greenish-gray fine sand with silt (10GR 3/1)

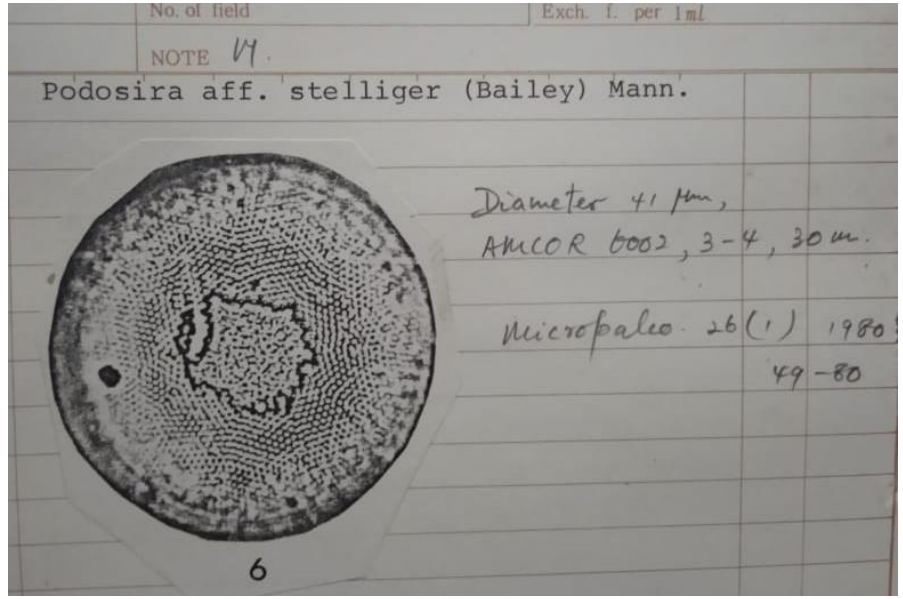
T. Olive gray silt with fine sand (5GR 5/1)

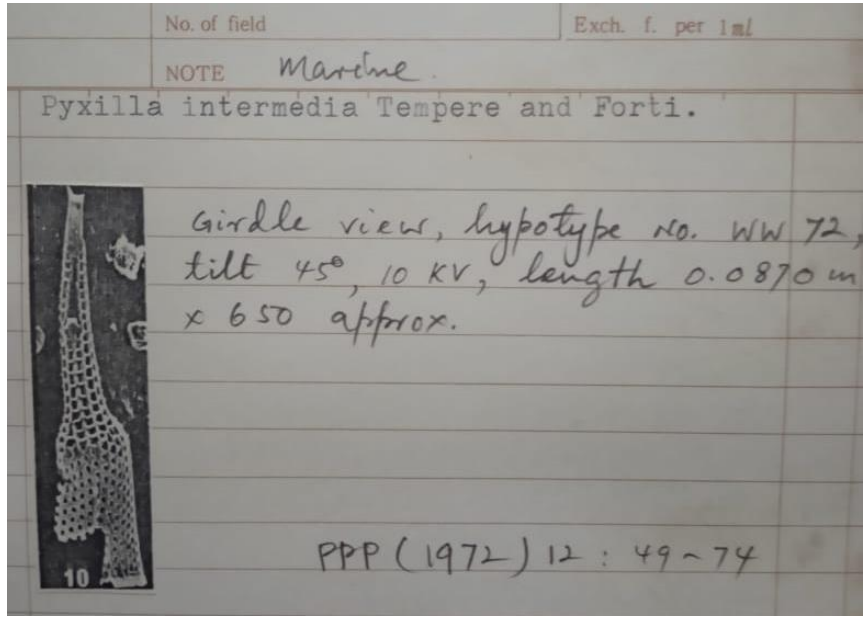
U. Olive brown fine sand (2.5Y 4/6)

V. Olive brown sand with gravel (2.5Y 4/6)

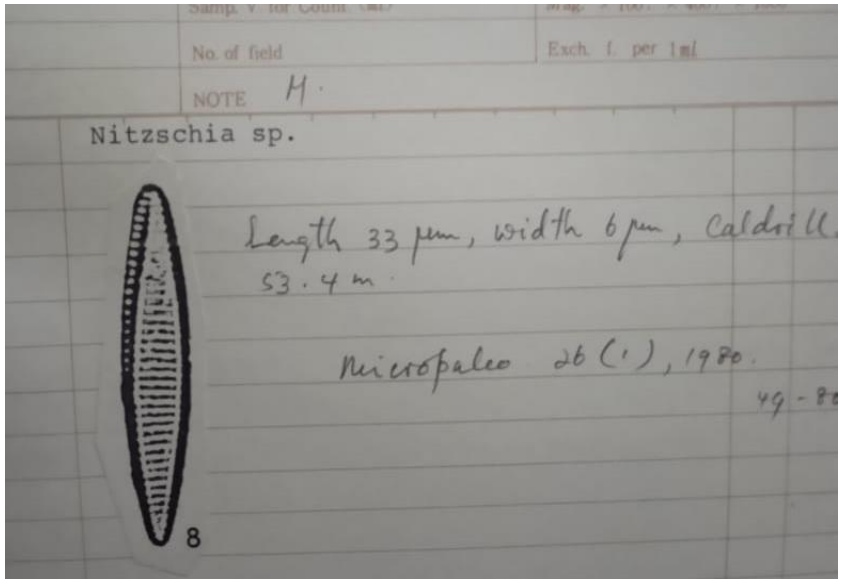
DIATOM ASSEMBLAGE

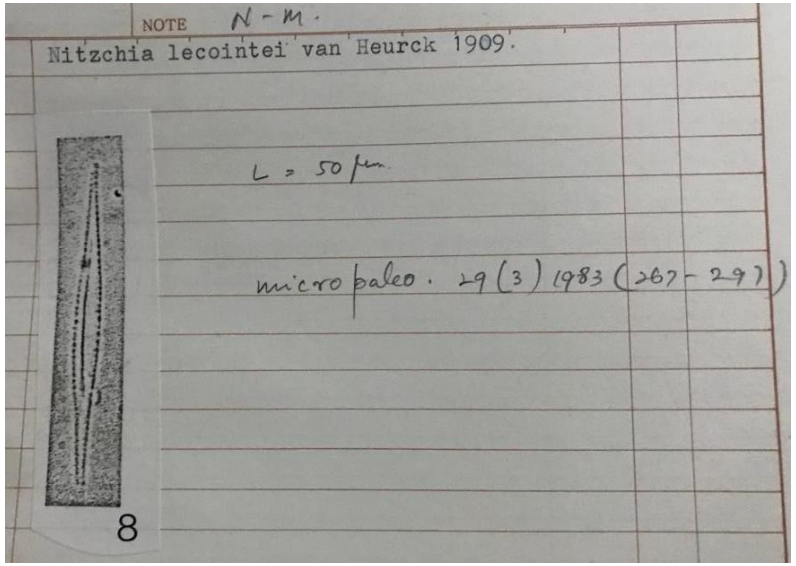
Species name	Notes
Omphalotheca californica	
Trinacria aries	Marine
Ptertheca danica	Marine
Pyxilla intermedia	Marine
Thalassiosira antiqua	Marine
Melosira polaris	
Navicula marina	
Navicula acceptata	Freshwater
Navicula scutelloides	
Podosira stelligera	Marine
Xanthiopyxis oblonga Ehrenberg	Marine



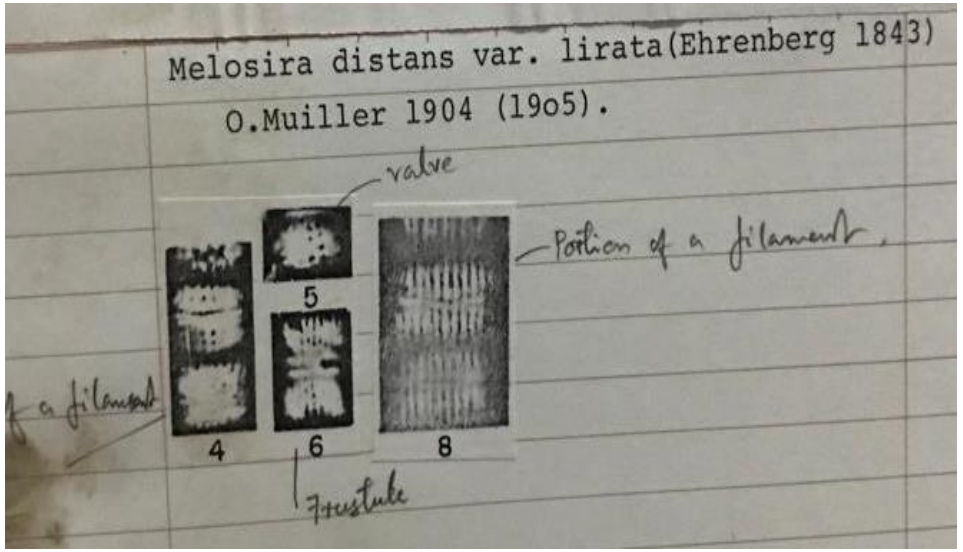


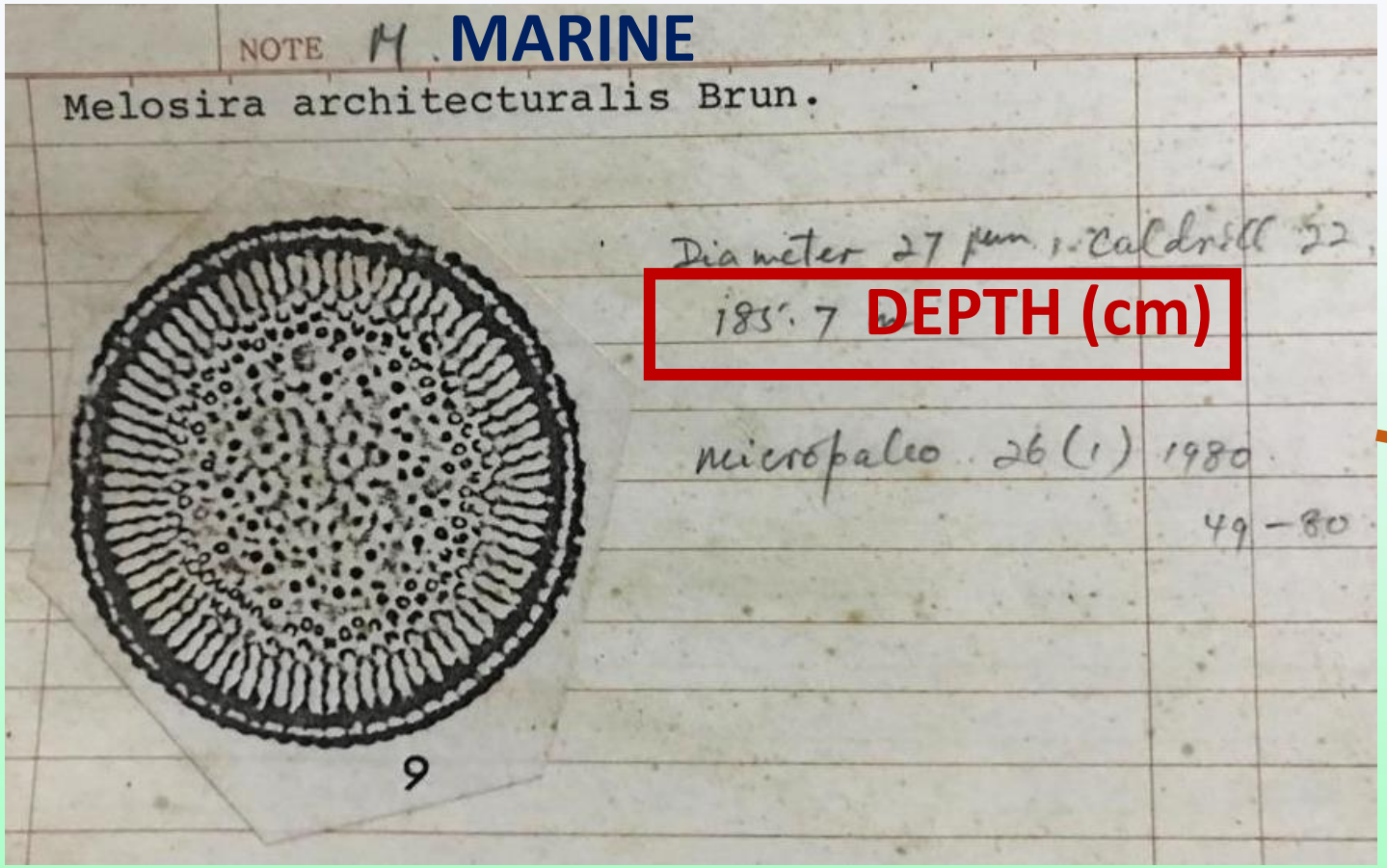
Species name	Notes
Tetracyclus celatom	
Navicula amphibola	
Navicula bacillum	
Tabellaria fenestrata	Very common
Melosira italica	
Nitzschia fonticola	Non-marine
Tetracyclus lacustris	Very common
Nitzschia amphibia	Very common
Melosira granulata	



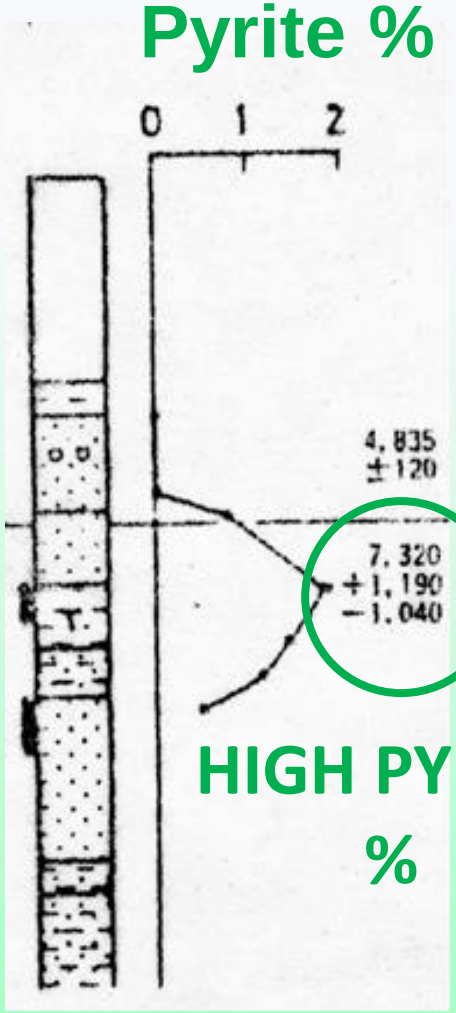


Species name	Notes
Melosira distans	
Melosira undulata	
Opephora martyi	Non-marine
Pinnularia borialis	
Navicula near insulsa	
Navicula laterostrara	
Synedra vaucheriae	
Synedra parasitica	Non-marine
Navicula pseudoscutiformis	FW origin from Hokkaido
Melosira distans	




NOTE H
MARINE
Melosira architecturalis Brun.
Diameter 27 μm. : Caldrill 22.
185.7
DEPTH (cm)
micropaleo. 26 (1) 1980.
49 – 80.
9

1.78-1.95 m


Pyrite %
0
1
2
4,835
±120
7,320
+1,190
−1,040
HIGH PYRITE %

CONCLUSIONS

- The Flandrian interglacial or stage regionally used to the period from around 12,000 years ago, at the end of the last glacial period to the present day. As such, it is in practice identical in span to the Holocene (the present geological epoch).
- 11,035±485 BP C14 data coincides with last glacial period and 6,745±85 BP C14 data coincides with the Holocene.
- High pyrite concentration in this sampling depth suggests that the area has been submerged in saline water from the Early Holocene to mid-Holocene.
- This study recognized that the indicators such as FeS_2-S and micro fossil diatom are important as sea level indicators to study sea level changes in coastal areas.
- Application of C14 dates is useful to confirm the results obtained with other data.

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- Thanks are extended Head, Department of Botany and Department's assistants.

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