

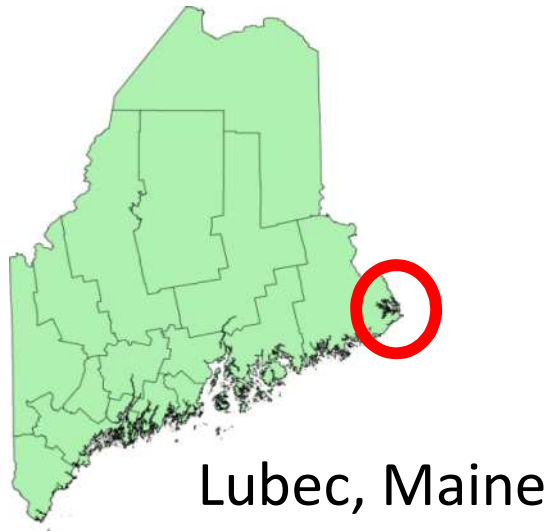
Meso-Tidal Interpretation of Hartselle Sandstone (Lower Carboniferous, Alabama) by Analogy with Bay of Fundy Macro-Tidal Ichnocoenoses



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Study Area



**Tidal flat in
protected bay**

- Fetch limited
- Tidal range 6-7 meters
- Heterogeneous ichnofacies



Upper Shoreface
Facies

Chiridotea Facies

Mud Facies

Mya Facies

Gravel Facies

Ichnocoenoses

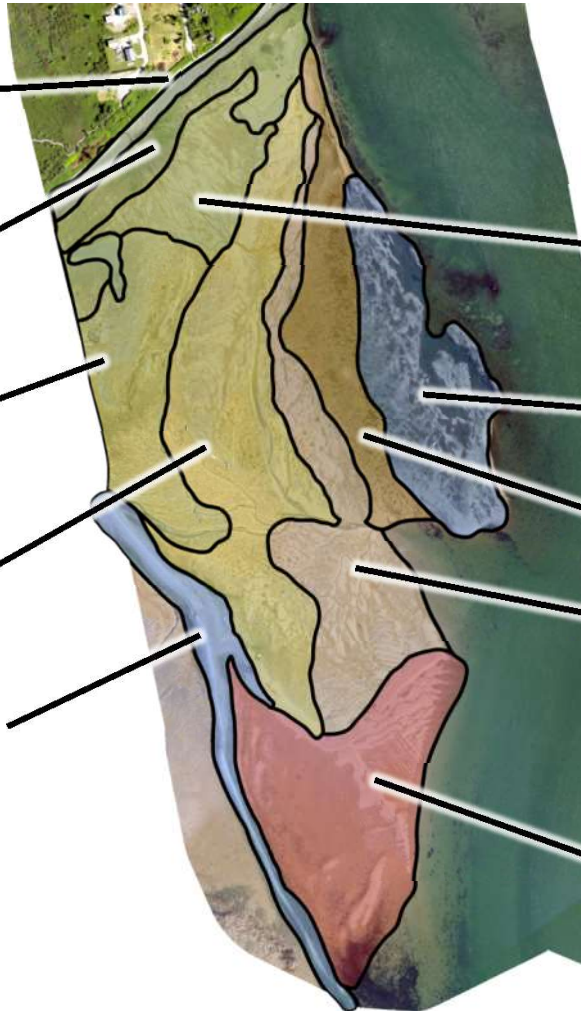
Corophium Facies

Gravel Facies

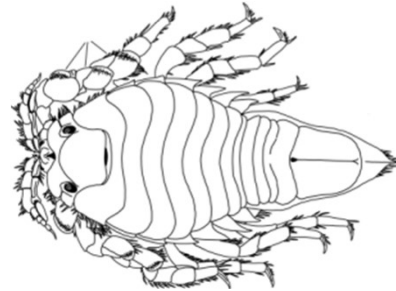
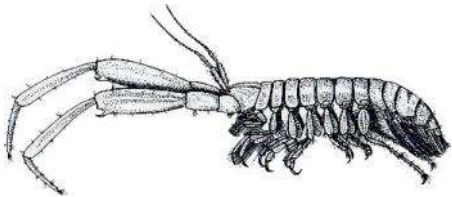
Mytilus Facies

Littorina Facies

Sand Wave Facies



Chiridotea coeca



Corophium volutator

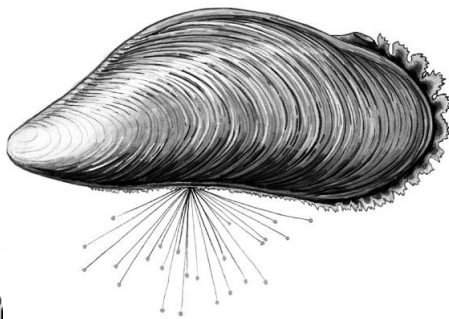
Arenicola marina



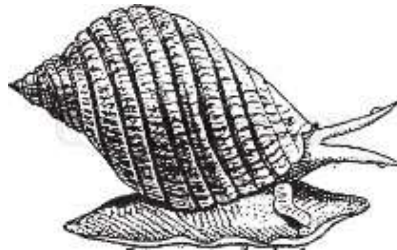
Clymenella torquata



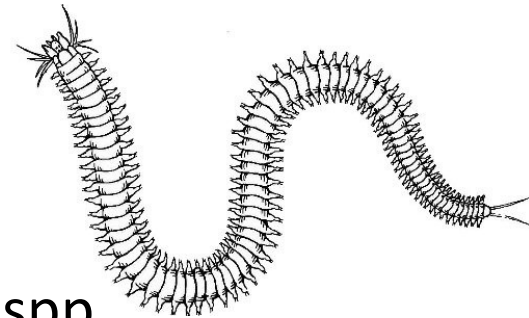
Mytilus edulis



Littorina littorea



Nereis spp.

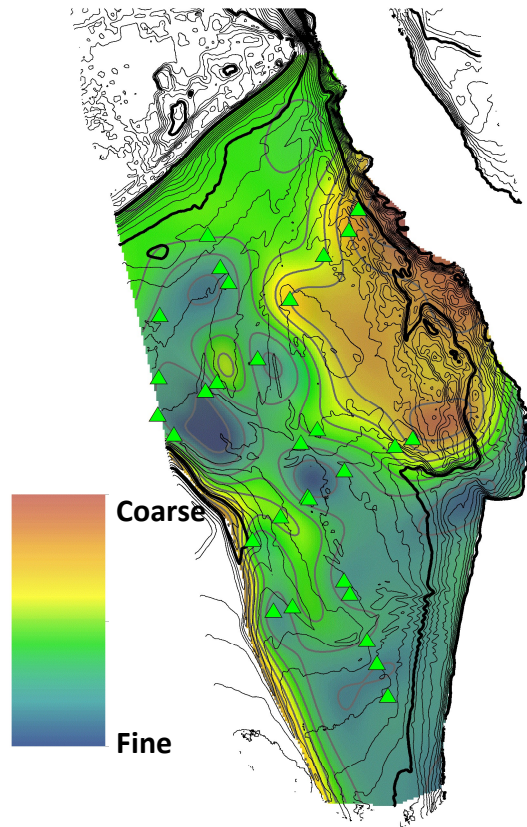


Mya arenaria



Identification keys from Pollock (1998)

Mean Grain Size



Sediment grain
size ranges from
silt to fine gravel

Tidal Exposure

Up to 12 hours
of exposure
each tidal cycle
(high tide to
high tide)



Ichnocoenoses: A function of tidal exposure and substrate grain size

The tidal flat environment is characterized by surface traces (Epichnia)

Faunal Facies



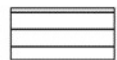
Upper Shoreface



Chiridotea Facies



Corophium Facies



Mud Facies



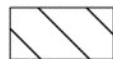
Mya Facies



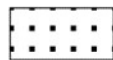
Littorina Facies



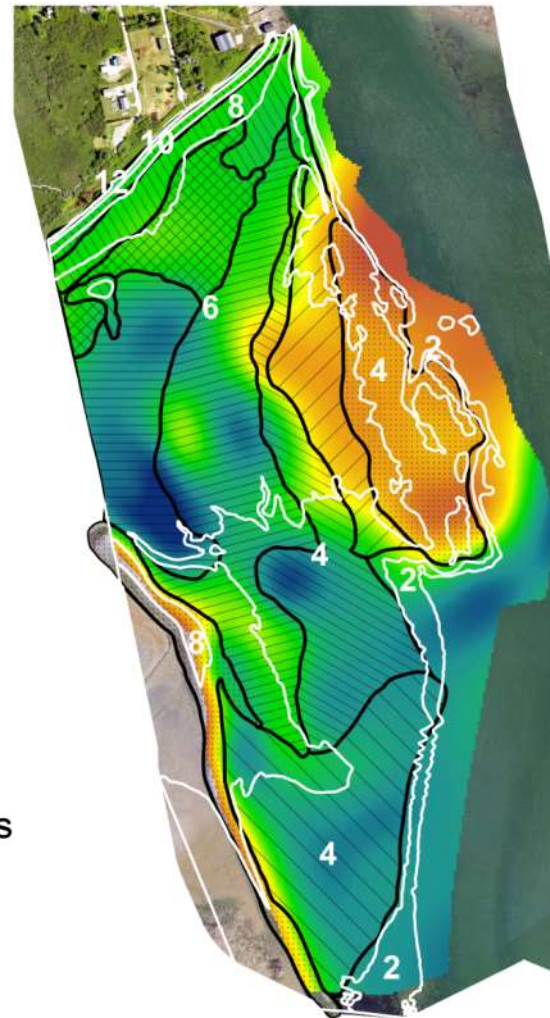
Mytilus Facies



Sand Wave Facies



Gravel



Numbers
indicate hours
of exposure
per tidal cycle

Lower Shoreface
Chiridotea facies
>8 hrs Exposure



Chiridotea facies
6-8 hrs Exposure



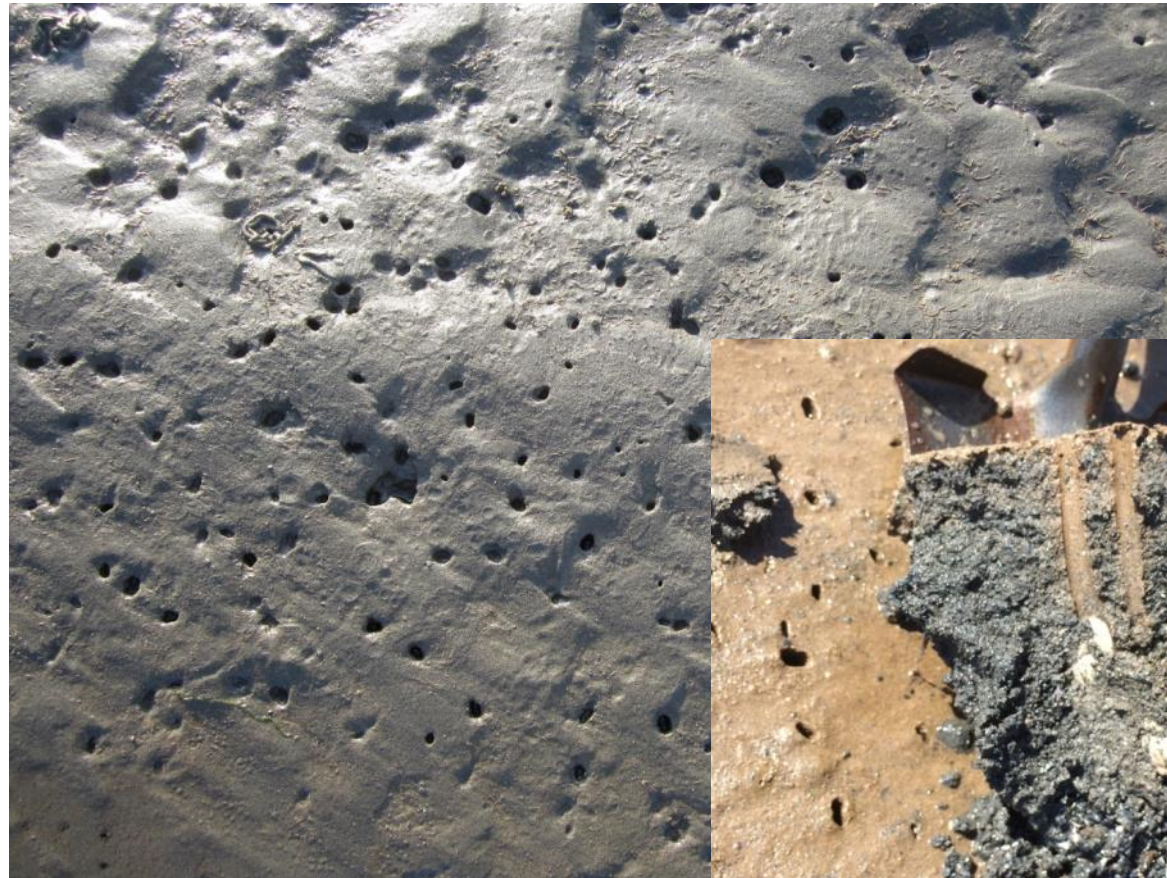
Corophium facies
6-8 hrs Exposure



Mud facies
6-8 hrs Exposure



Mya facies
4-6 hrs Exposure



Littorina facies
4-6 hrs Exposure

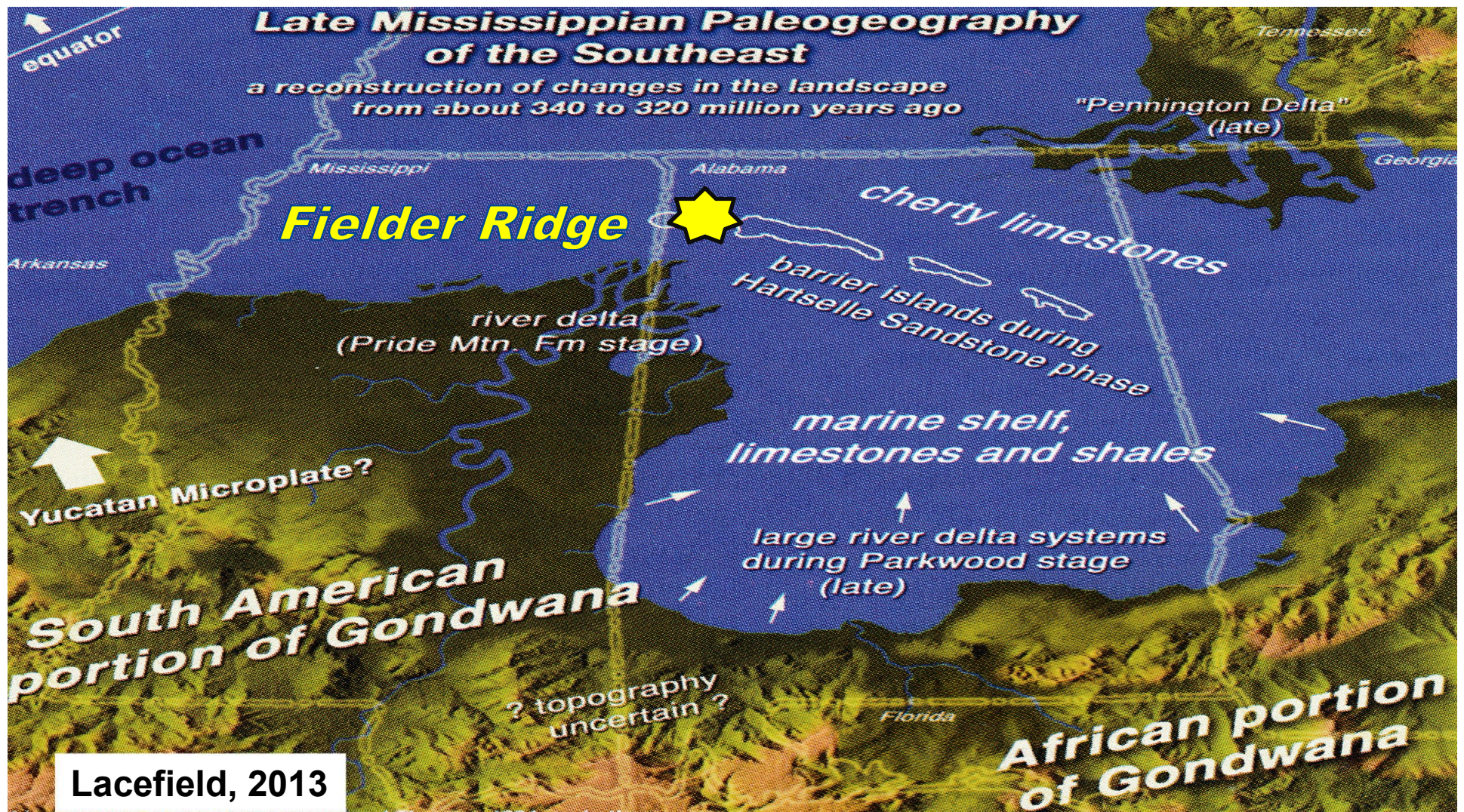


Mytilus facies
4-6 hrs Exposure



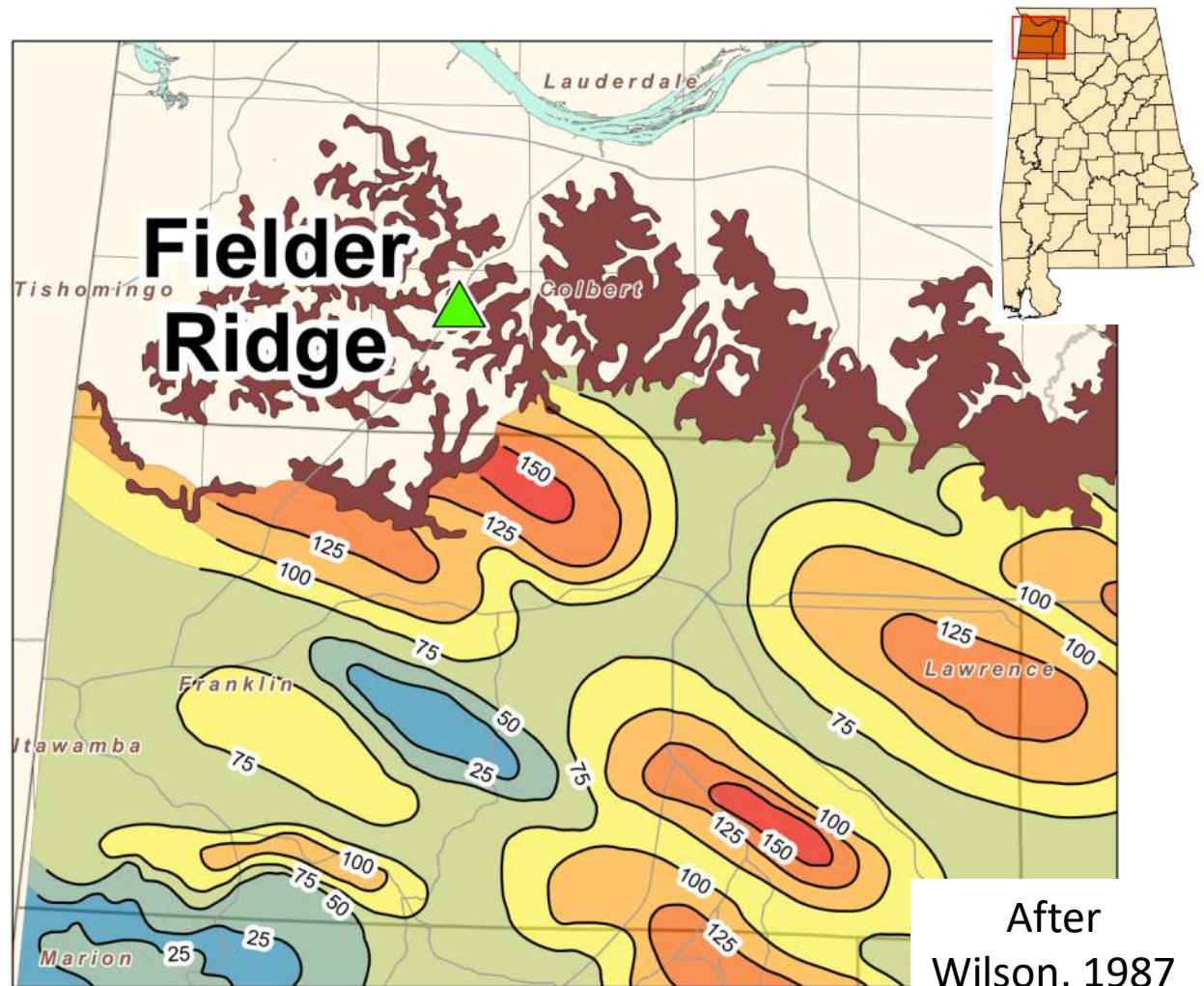
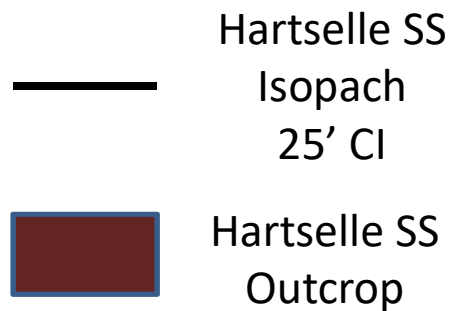
Sand wave facies
1-4 hrs Exposure

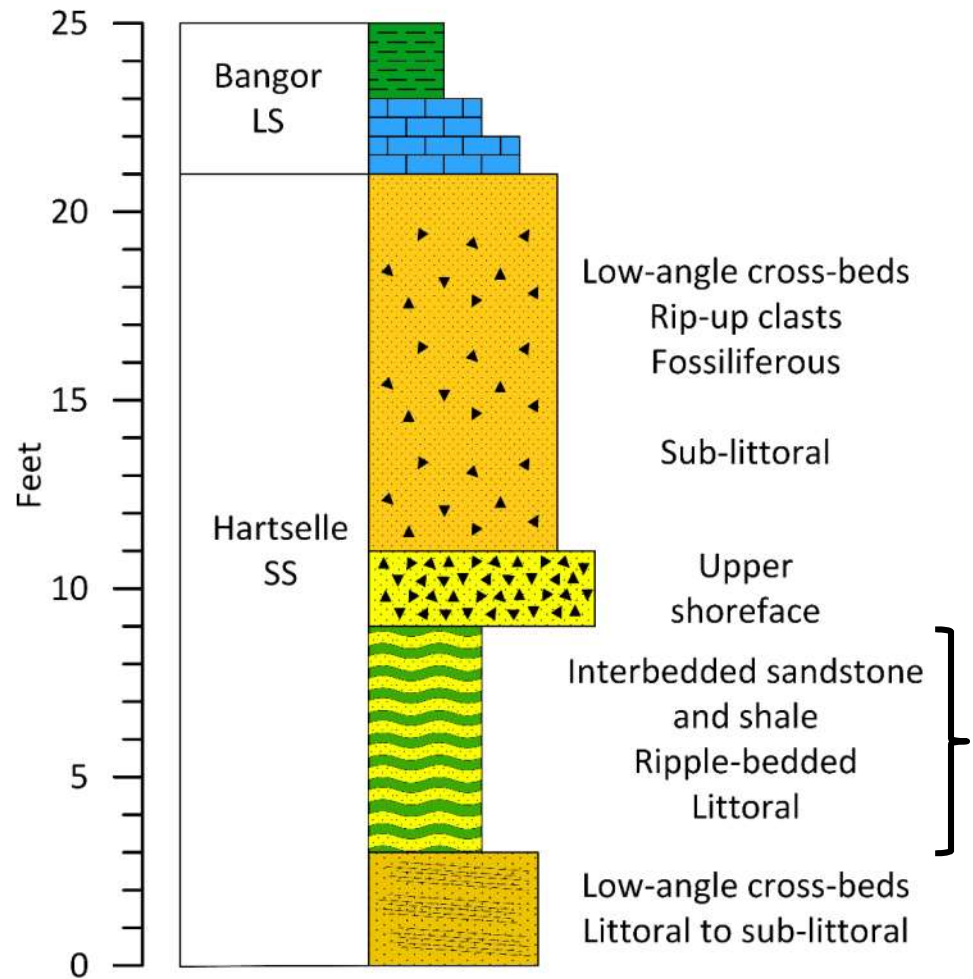




Hartselle Sandstone

Location of
Fielder Ridge
Trace Fossil Site





Stratigraphic Column

Upper Section
Fielder Ridge

Meso-Tidal
Zone



Chiridotea
ichnocoenosis



Chiridotea coeca

Ichnotaxa after
Rindsberg (1994)

Haplotichnus isp.
UM5291



***Corophium*
ichnocoenosis**



Corophium volutator

*Hartsellea
sursumramosa*



UM5084

***Corophium* ichnocoenosis**

Nereis sp.

Corophium
volutator

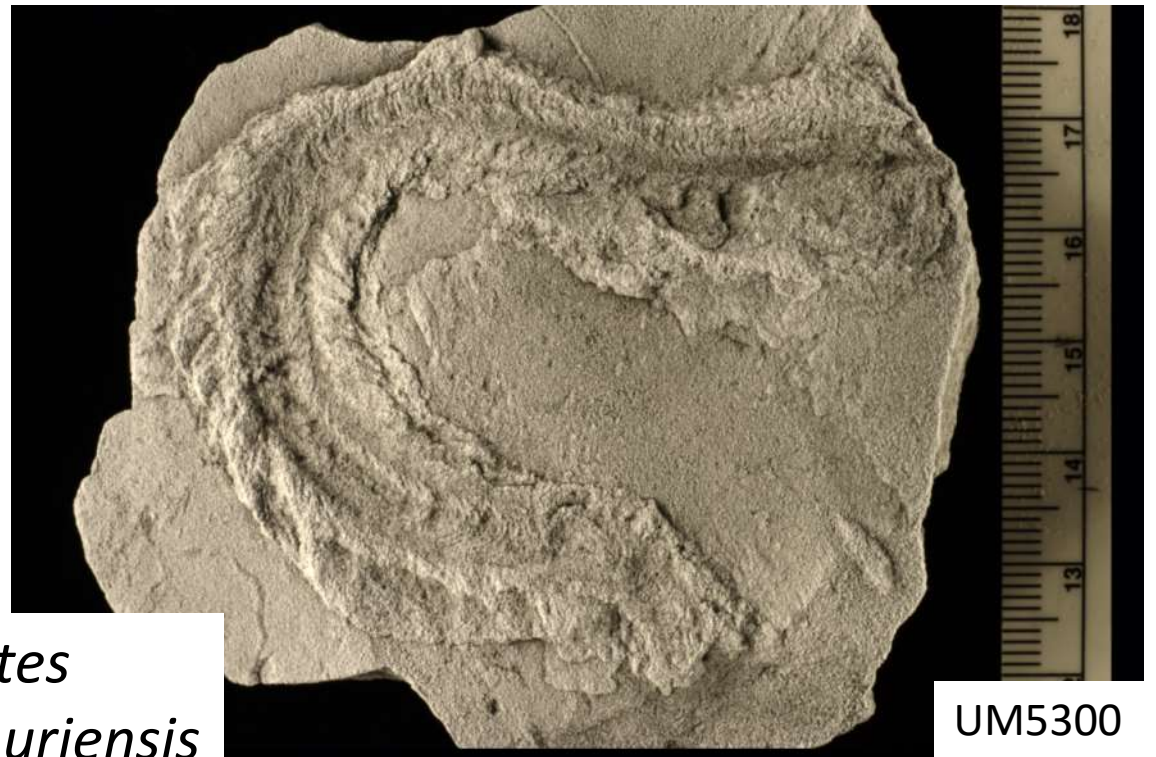


Hartsellea
sursumramosa

Corophium ichnocoenosis



Nereis sp.



Nereites
missouriensis

UM5300

***Corophium* and *Mya* ichnocoenoses**



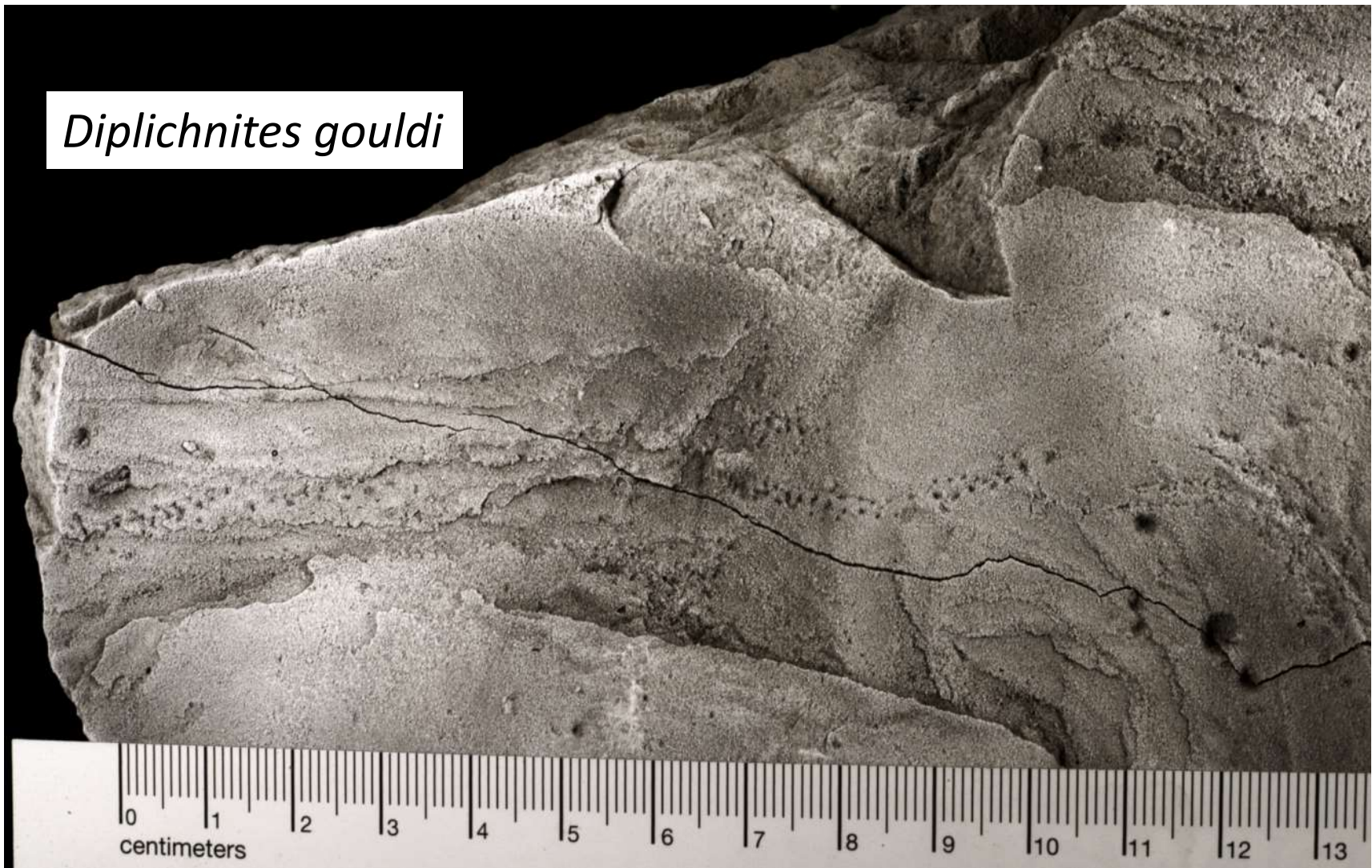
Arenicola marina

Uchirites implexus?



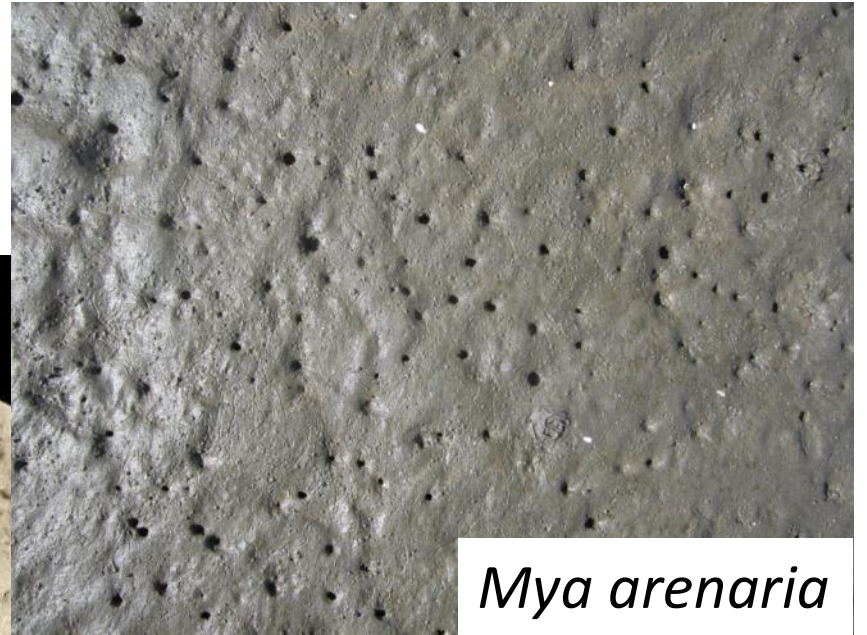
UM5136

Diplichnites gouldi



Mya ichnocoenosis

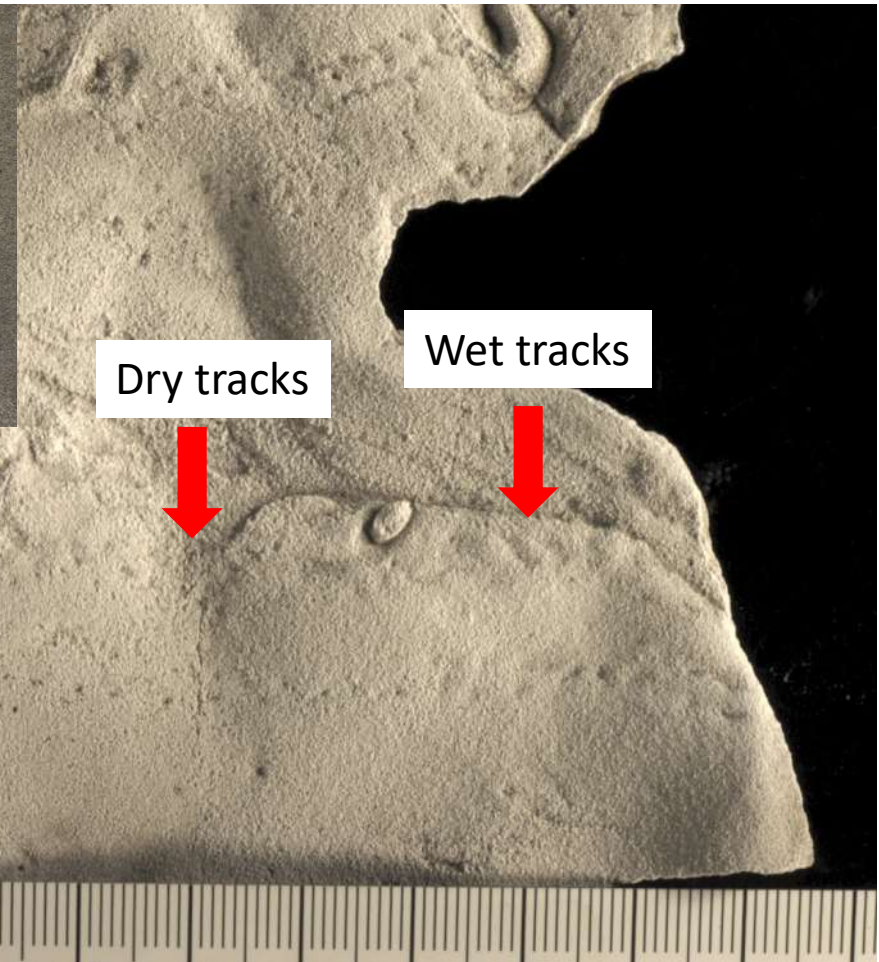
Lockeia silquaria



Mya arenaria



Trails in wet to dry sand



UM5136

Diplichnites gouldi

Distressed-context traces



UM5158

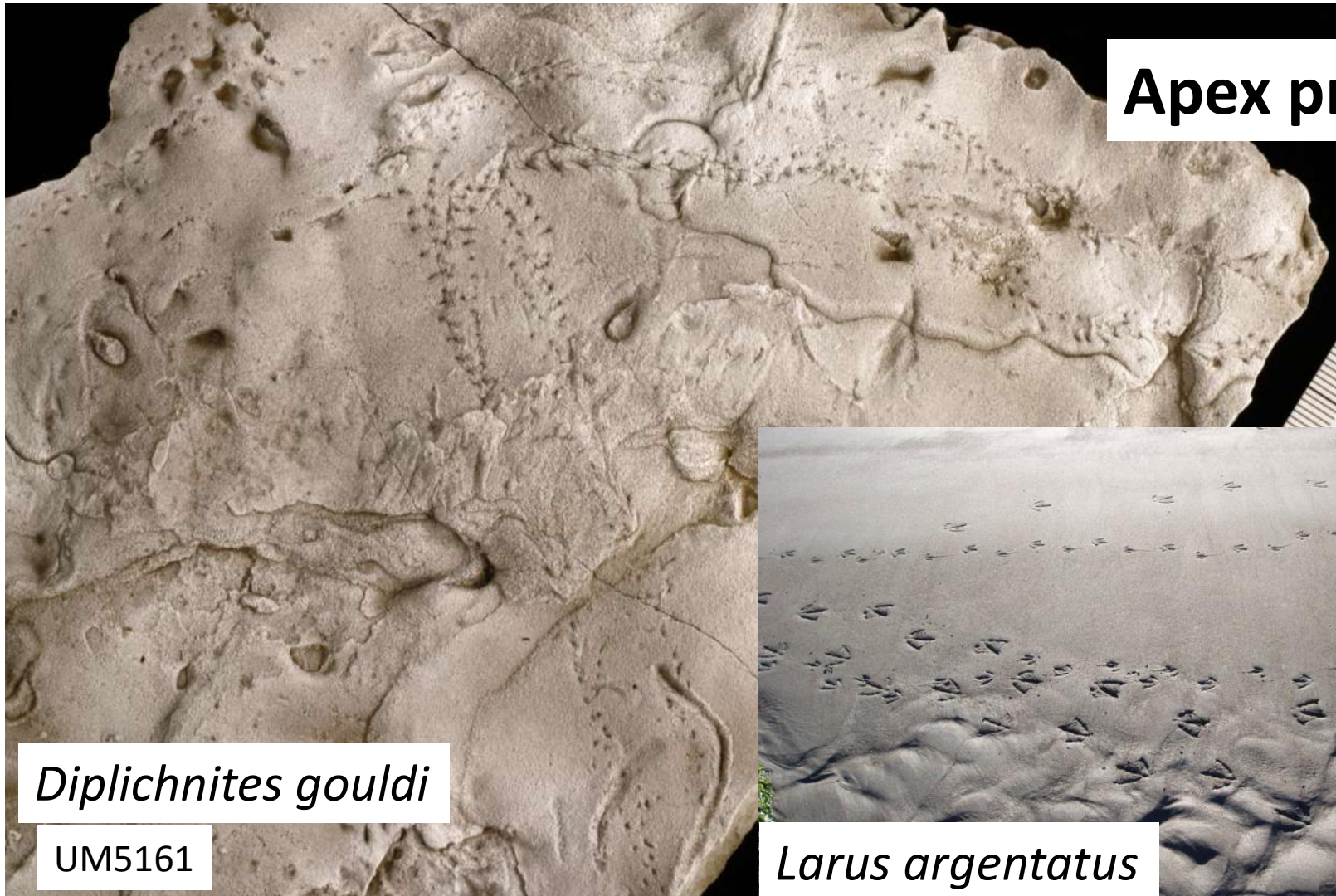
Sand wave facies



Drag marks



Apex predator?



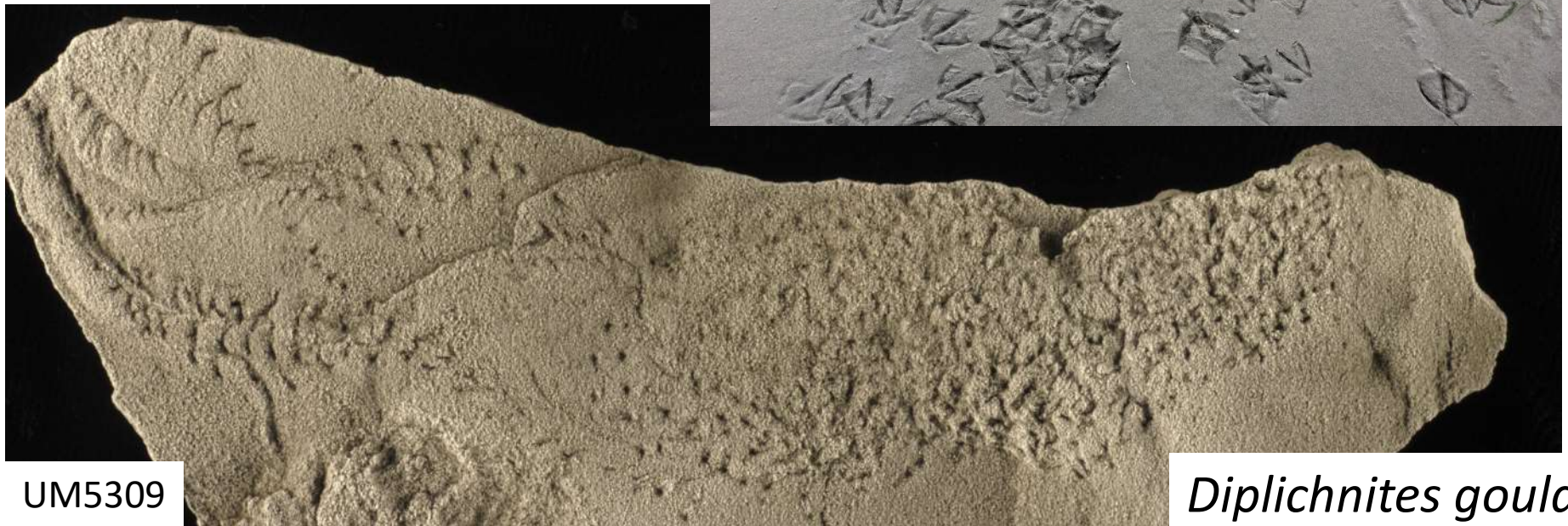
Diplichnites gouldi

UM5161



Larus argentatus

Feeding frenzy



UM5309

Diplichnites gouldi



Crossing trails

Diplichnites gouldi

UM5314



Slippery slopes

Diplichnites gouldi

UM5316

Conclusions

Abundance of tracks attributable to crustaceans (isopods and amphipods) evidence for extensive tidal flats.

Variety of littoral traces evidence for extended exposure and meso to macro tidal environment

Tracks of myriapods evidence for nearby terrestrial habitat, possibly connection to mainland.

References

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