A Survey of Known and New Cephalopods from Lebanese Cretaceous Lagerstatten

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1.) Abstract:

Since the time of Herodotus, fossils have been known from the sub-lithographic limestones of Lebanon. Among these are diverse cepha lopods, including an exceptional new soft body cuttlefish and a nautilus with soft preservation. Our research further defines cephalopod fauna, contianing details found under ultraviolet conditions. This invites comparisons with other Mesozoic Lagerstatten, including the famous German (Jurassic) Lagerstatte of Solnhofen.

2.) General Lebaese Laggerstate Information:

The two main Lebanese lagerstattes we have looked at are the Hajoula and Haqel deposits. The area is composed of limestone from the Cenomanian STage of the Mid Cretaceous, which was roughly between 180-195 million years ago. The exquisite preservation of the fossils is due to the limestone's fine-grained nature of the rock. The structure of the limestones indicate the deposits were of a warm and shallow sea made up of small basins only a few hundre meters across. It has been speculated possible origins of these basins like at the intersection o block fault systems.

3.) Methodology:

When we began to examine these various fossils, we first studied them under normal light. As far as we are aware, our fossiuls have not been al tered or manipulated in any way. Under normal light, we were able to ovserve the obvious details, such as the outline of the creature and the hard parts, such as beaks, shells, and ink sacs. After this, we placed each of the specimens under a powerful ultraviolet light, utilizing both UVA and UV varieties. From this, soft body preservation became more evident. Some of the soft fossil preservation we examined included eyes and arms. After this, we measured each of the fossils for their dimensions.

4.) Results:

From our preliminary examination, we were able to determine that some of our specimens were unreported from the lagerstatte. This indicates a much richer cephalopod fauna that has been accounted for in recent years. Additionally, our samples have a greater anatomical preservation than previously recognized. As such, this demonstrates a need for further examination and continuing excavation of this particular area.

References:

"Lebanese Lagerstatte Fossils." Lebanese Lagerstätte Fossils. N.p., n.d. Web. July. 2016

Fuchs, Dirk, and Neal Larson. "Diversity, Morphology, and Phylogeny of Coleoid Cephalopods from the Upper Cretaceous Plattenkalks of Lebanon-Part I: Prototeuthidina." Journal of Paleontology 85.2 (2011). Web. Sept. 2016.

Wheeler, Quentin. "New to Nature No 33: Keuppia Levante." The Guardian. Guardian News and Media, 2011. Web. July.

Wippich, Max G.E., and Jens Lehmann. "Allocrioceras from the Cenomanian (mid-Cretaceous) of the Lebanon and Its Bearing on the Palaeobiological Interpretation of Heteromorphic Ammonites." Palaeontology 47.5 (2004): 1093-107.

Acknowledgements:

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Acanthoteuthis syriaca:

This specimen is a soft bodied cephalopod and is roughtly 10cm in width and 13cm in height. The arms are clearly shown under normal and UV light, and sucker discs can be noticed on some the arms. Large eyes are also shown in contrast with other samples of this type examined online and in private collections. All eight arms are present, especially under the ultraviolet lighting. The stain behind the body is likely from decomposition. This sample also illustrates well-poresevered ink sack and a possible



Keuppia levante:

Approximately 40cm in height and 27cm in lenght, this ancestor of the modern octopus hails from the Hajoula Quarry. In the Lebanese lagerstatte, octopi are generally rare; however, many cephalopods from this area are traded as octopi when they are other types of cephalopods. Fossil specimen of the genera are also routinely painted to enhance their salability; this specimen in particular has not been subject to such practices. The stain behind the head sca is partially decomposed ink. Under normal lighing, Keuppia levante's eyes are evident, as well as all eight arms. Beneath ultraviolet, the eyes and arms are easier to discern from the limestone. Other organs are also visible in the cephalic sac.



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cf. Glyphiteuthis abisaadiorum:

This cf. Glyphiteuthis abisaadiorum is approximately 15.5cm long and 9.5cm wide on its intact side. This is another coeloid from the Hajoula Quarry. This specimen was not activated by the ultraviolet exposure, when compared to the other fossils we examined.

Allocrioceras annulatum:

This heteromoprhy ammonite among others, in both regular and UV relating to the arms are present.



Rachiteuthis donovani:

Glyphiteuthis libanotica:

This specimen is about 15cm

long and 6.5cm across. This Glyphi-

teuthis libonatica is the new name

for this fossil. This creature exhibits

incredible preservation, especially

in regards to its ink sac, eyes, beak,

and arms which are enhanced by

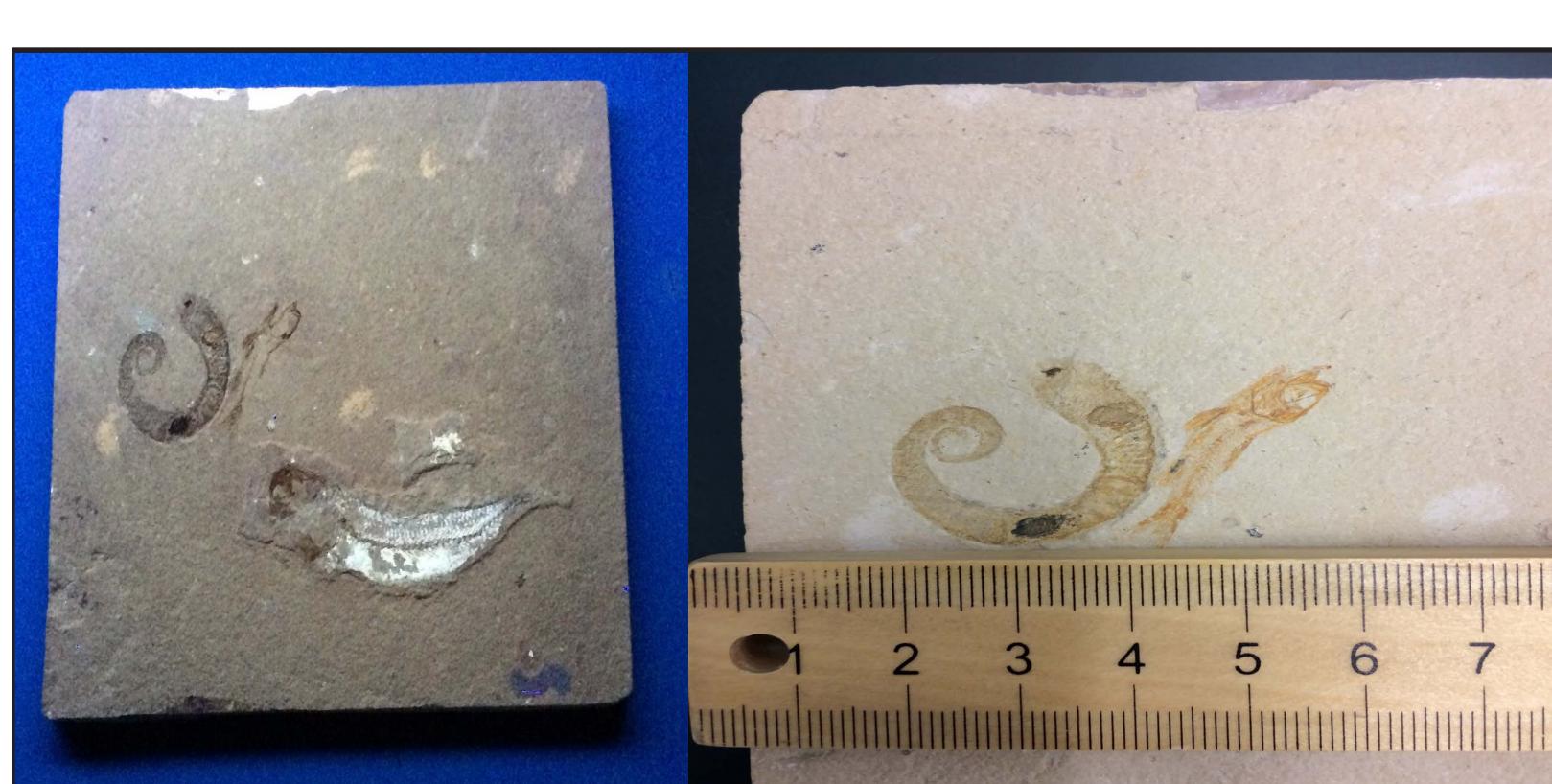
the use of ultraviolet light.

This specimen is also a form of soft-bodied cephalopod and the larger of the two samples we have is roughtly 12cm in height and 7cm in lenght. Details of the creature are easier to discern under the xposure of UV light, when compared to normal lighting. The arm crowns are visible in both fossils.



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1.5cm in length and 13cm in width. This particular fossil comes from the Hagel deposit in Lebanon. It has the typical I faunal associations accompanying it or the limestone. The ammonite depicts internal structures, including aptchyus light settings. Additonally, the stomach ontents have been preserved and can be observed in both normal and UV lighting. In usual ammonite fashion, no soft parts



Fossil Nautiloid:

This entire fossil is 30cm in lenght and 14cm in width, however, our primary interest lies at the lower half of the rock slab, where the nautiloid has preserved. The fossil fish on the limestone has been coated, but the nautiloid has not. Unfortunately, the nautiloid living chamber was damaged in the process of exposing the tail of the fish. As a result, the damage obliterated some of the details on the soft parts. As far as we have been able to determine, nautiloids are a rare component of the Lebanese Cenomian. This specimen was recovered in the 1970s. The opposite side of the slab is covered in dozens of brittle starfish.





Sepiidae Cuttlefish:

This large cuttlefish is 41cm long and 20cm across, and this specimen is from the Hagel area of Lebanon. Without ultraviolet light, the features that can be examined are the cuttlebone, eyes, fin, arms, and hood. Once again, these largely phosphatized structures are brightly highlighted by the use of UV light. In the process of assembling this poster, we became aware of a second Sepia-type cuttlefish from the same quarry and note that is a different species from the one depicted here. Soft-bodied Sepia-type cephalopods appear to be exceedingly rare in the fossil record.



