Revised Figures

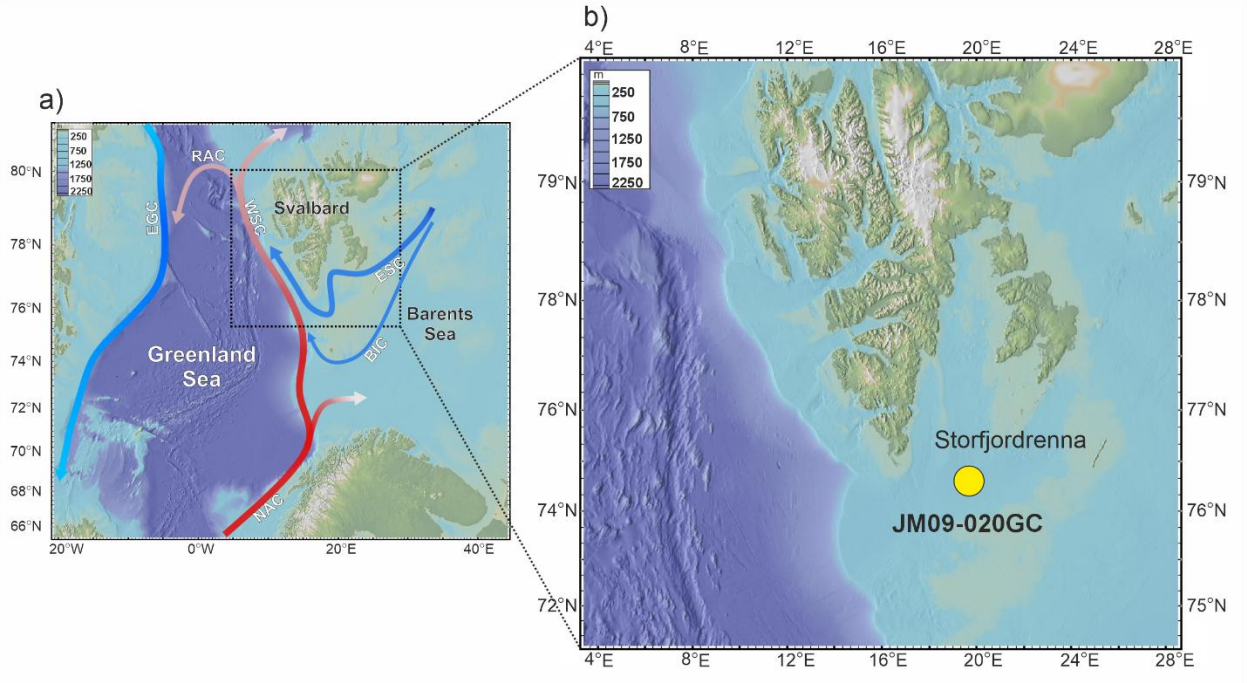

Figure 1. a) Map of the study area and (b) location of core JM09-020GC (yellow dot). Red arrows indicate warm currents, and blue arrows indicate cold currents. Abbreviations: NAC: North Atlantic Current, WSC: West Spitsbergen Current, RAC: Return Atlantic Current, ESC: East Spitsbergen Current, BIC: Bear Island Current, EGC: East Greenland Current.)

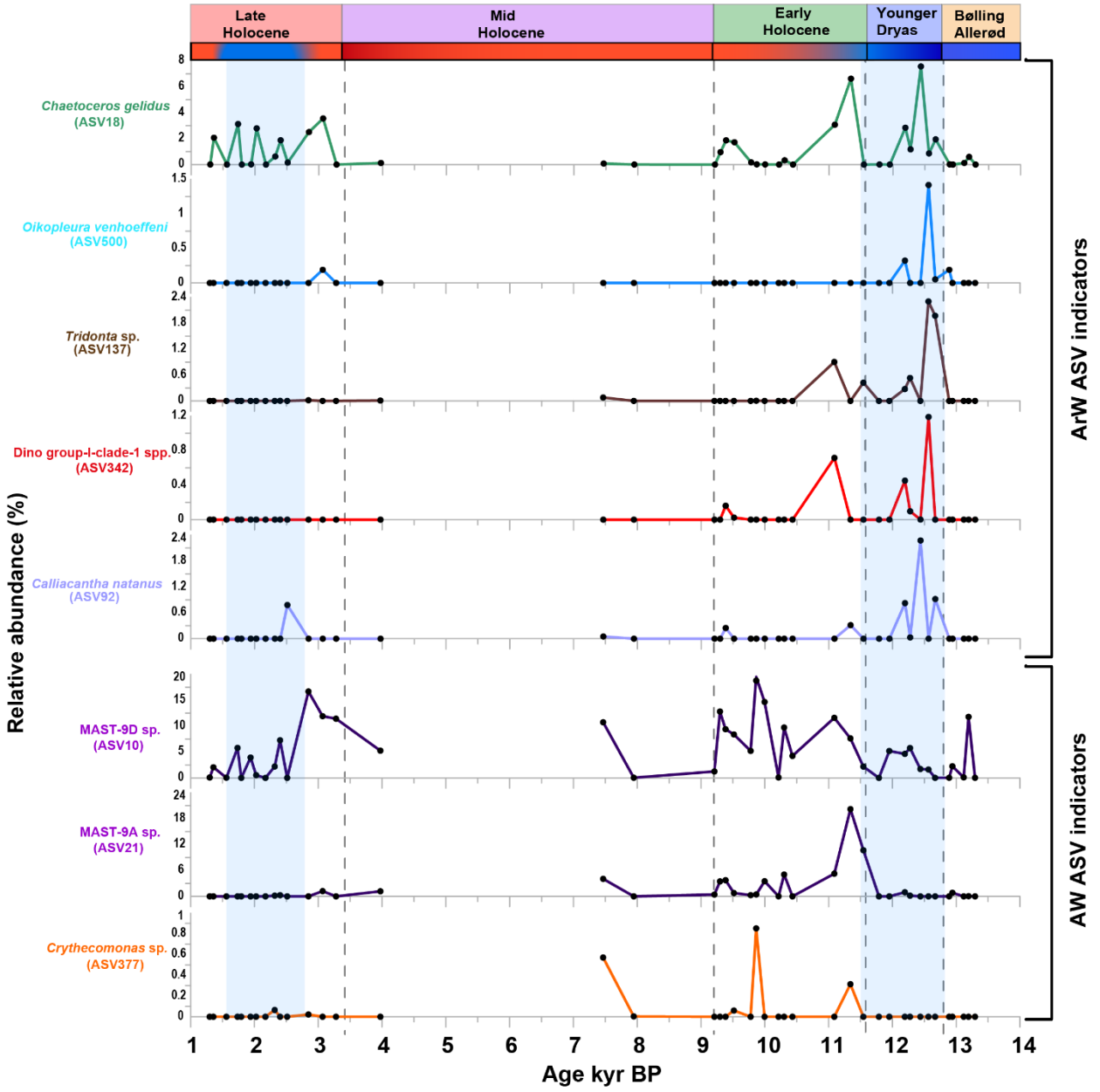

Figure 5: Potential ASV-based indicators of AW and ArW conditions from the study (correlation >0.4, P <0.05, positive results from at least two method (displayed data as relative abundance %, and included the ASVs recorded in more than four samples).

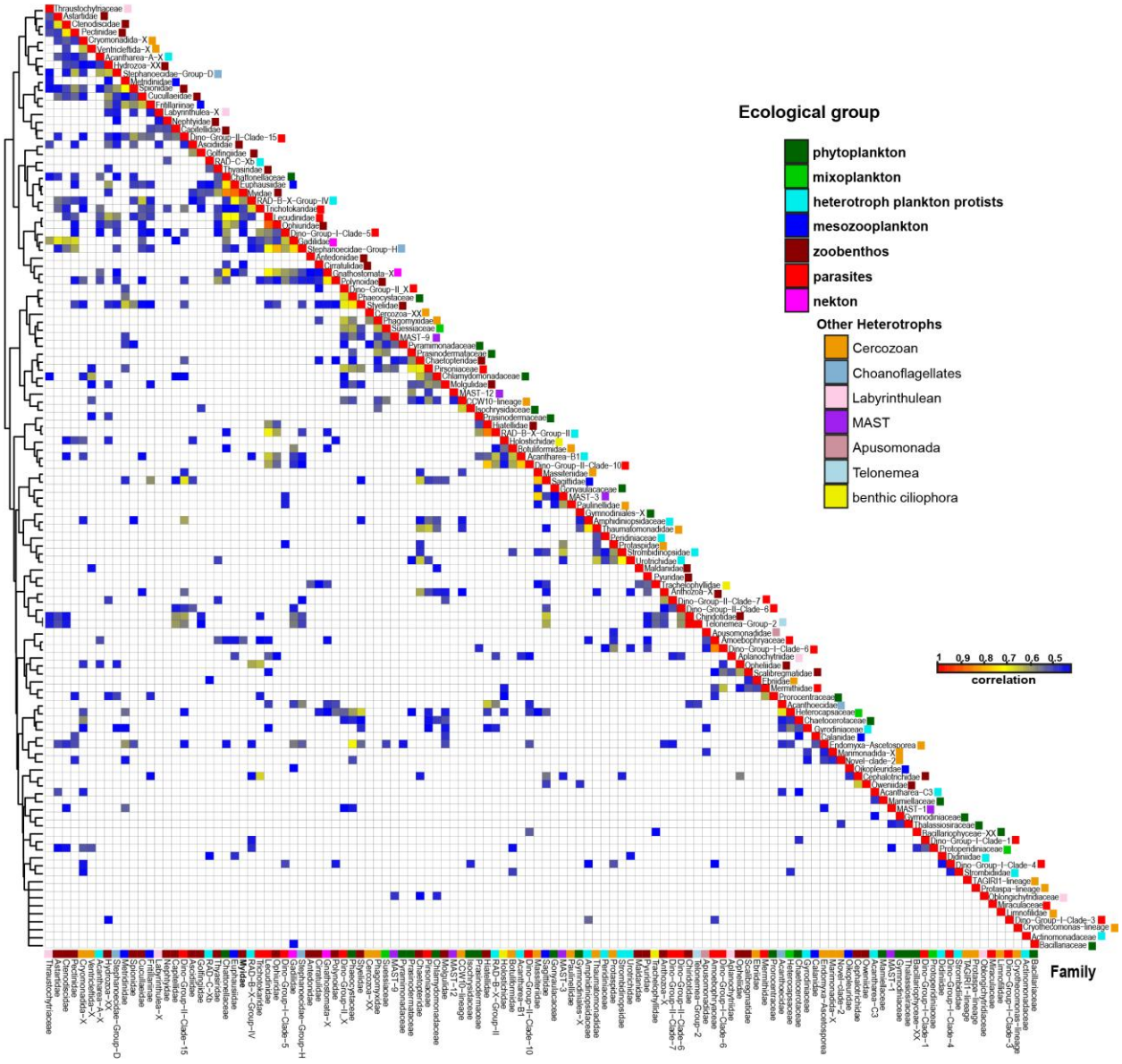

Figure 6: Heatmap of co-occurrence based on spearman rank coefficient analysis between eukaryote families represent in the study (illustrated only the positive correlation ≥ 0.4, and p value adjusted (BH) <0.05).

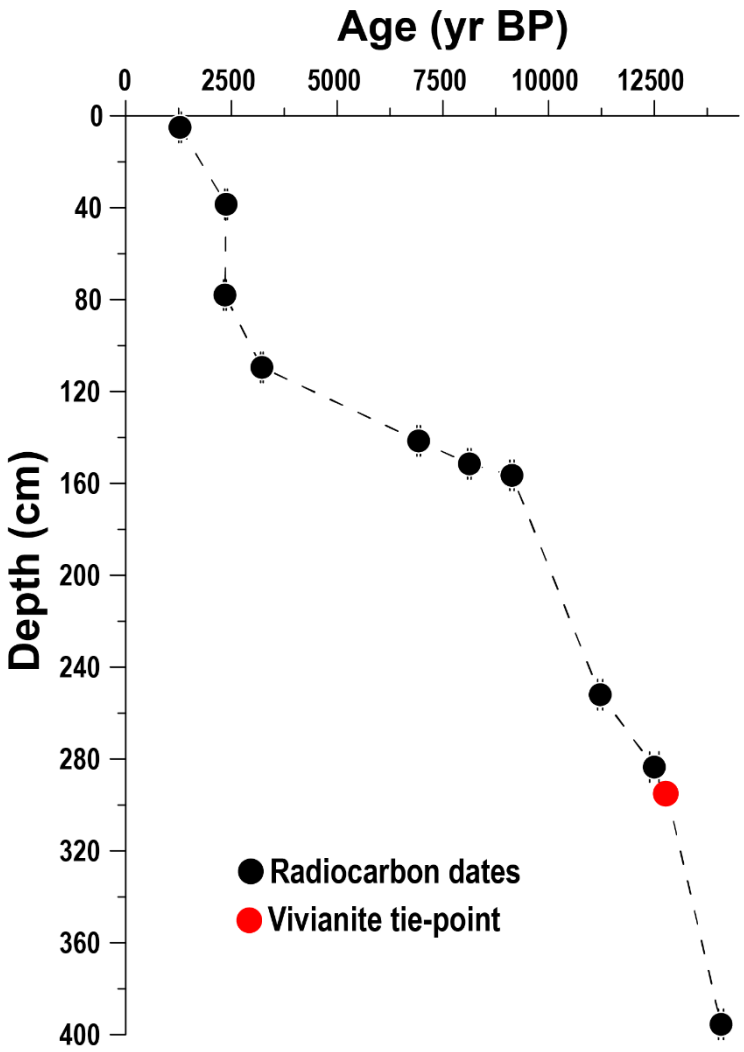

Figure S1: Age–depth model for core JM09-020-GC constructed from 11 AMS ^{14}C dates recalibrated using the Marine20 calibration curve.

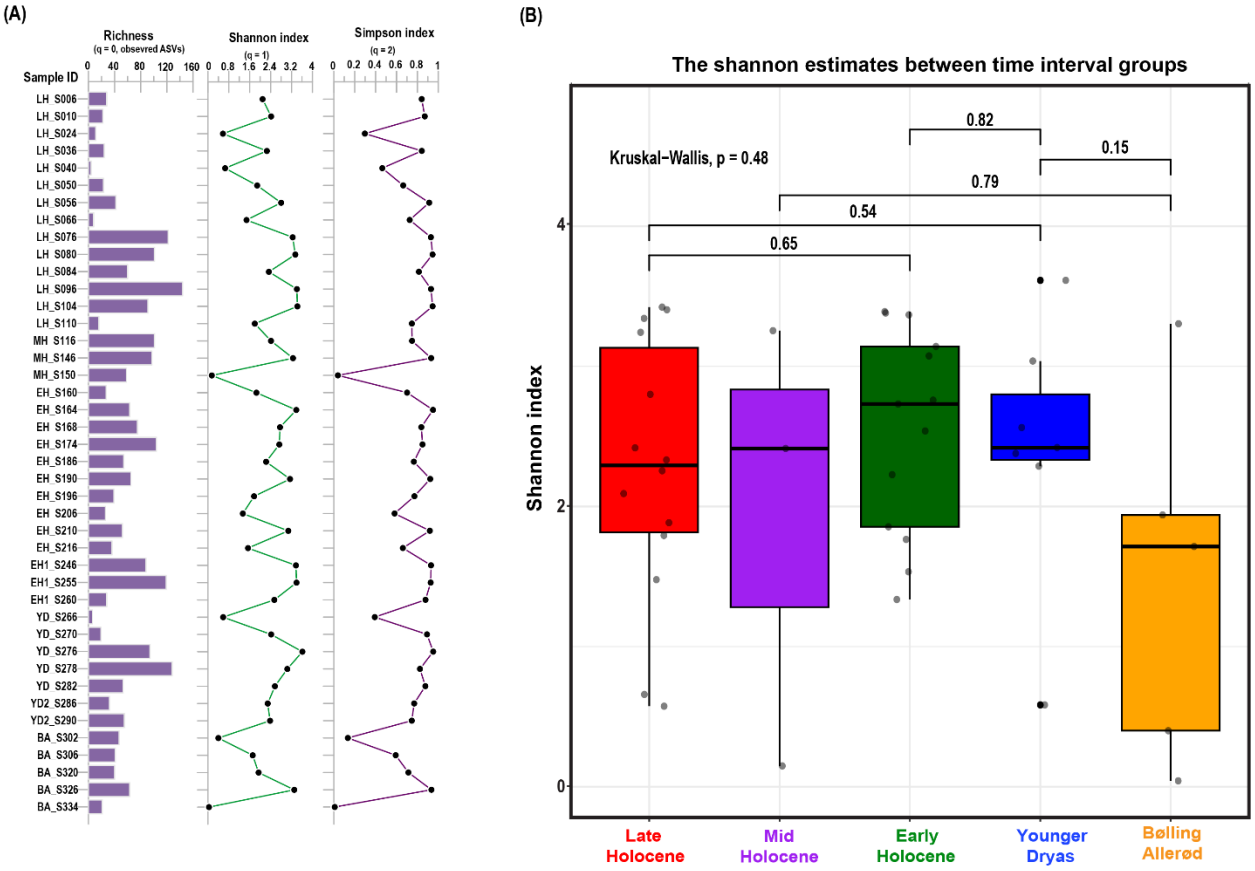

Figure S2: (a) Plot of alpha diversity indices, including richness (q = 0), Shannon diversity (q = 1), and Simpson diversity (q = 2), calculated using Shannon diversity (LH- Late Holocene, MH- Mid Holocene, EH- Early Holocene, YD- Younger Dryas, BA- Bølling-Allerød). (b) the Hill-Shannon between the main groups with the a Kruskal-Wails rank test, and the significance between them with a pairwise Wilcoxon rank sum test with adjusted p value (Benjamini-Hochberg).

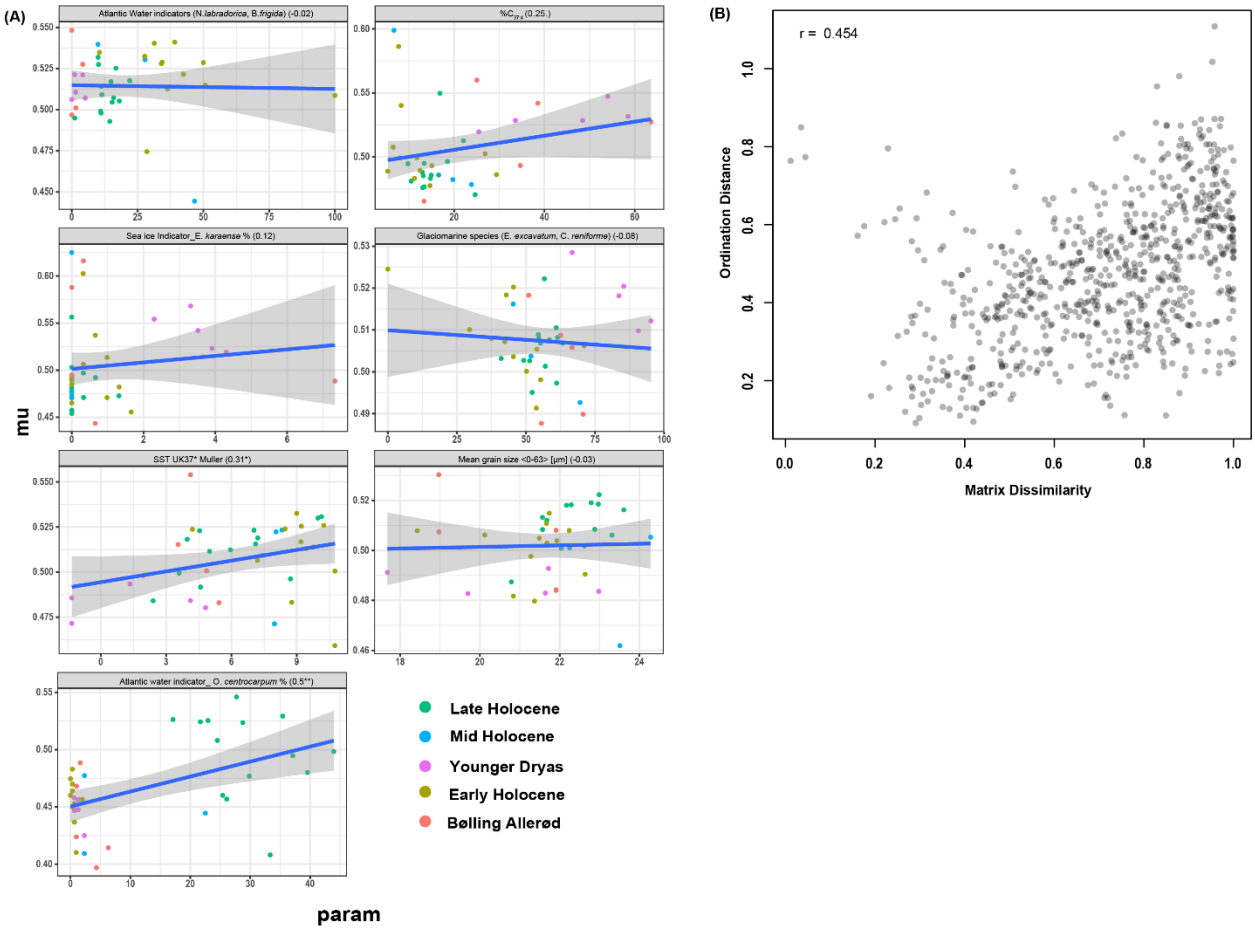

Figure S2: (A) plots of set ordination (FSO) based on Bray-Curtis dissimilarity matrix method for CSS normalization dataset between community composition and paleo proxies (p cor-rected (BH); **<0.01, *<0.05, .<0.1). (B) Relationship between community matrix dissimilarity and MFSO ordination distance.

Table S1: AMS 14C dates and calibrated ages (Łącka et al. 2015)

Lab ID	Depth (cm)	Dated material	Raw AMS 14C BP	Error	Calibrated age (year BP, 2σ)		
					Min age	Max age	Median age
Poz-46955	5	*Cliatocardium cliatum*	1835	30	1122	1435	1284
Poz-46957	38.5	*Astarte crenata*	2755	30	2173	2595	2375
Poz-46958	78	*Astarte crenata*	2735	30	2141	2552	2347
Poz-46959	109.5	*Astarte crenata*	3450	30	3029	3388	3221
Poz-46961	141.5	*Astarte crenata*	6580	40	6737	7138	6926
Poz-46962	151.5	*Astarte crenata*	7790	40	7963	8306	8126
Poz-46963	156.5	*Bathyrca glacialis*	8610	50	8938	9364	9133
Poz-46964	252	*Thracia* sp.	10200	60	10995	11497	11220
	283.5		11090	110	12137	12741	12499
Tie point	295	*Vivianite*	12800				
Poz-46965	395.5	Bivalvia shell	12570	60	13791	14379	14076