

**Table S2: Putative H2A.X histone variants in dinoflagellates.** The H2A.X variants of histone H2A are characterized by the presence of a SQ(E/D) $\Phi$  phosphorylation motif at the C-terminus of the protein (Talbert et al. 2012). Note that the motif is usually SQDY in heterokonts (Talbert et al. 2012), which include diatoms and thus the endosymbiont of dinotoms, thus one of proteins listed below in *Durinskia baltica* is most likely to be of endosymbiont origin.

Species	Protein	Length	C-terminal sequence
<i>Perkinsus marinus</i>	EER08766.1	137	<b>SQEM</b>
<i>Perkinsus marinus</i>	EER09215.1	135	<b>SQEM</b>
<i>Perkinsus marinus</i>	EER15538.1	162	<b>SQEM</b>
<i>Perkinsus marinus</i>	EER15802.1	136	<b>SQEI</b>
<i>Perkinsus marinus</i>	EEQ99722.1	155	<b>SQEM</b>
<i>Perkinsus marinus</i>	EER04007.1	164	<b>SQEM</b>
<i>Perkinsus marinus</i>	EER04402.1	164	<b>SQEM</b>
<i>Perkinsus marinus</i>	EEQ98671.1	138	<b>SQEM</b>
<i>Perkinsus marinus</i>	EEQ97488.1	92	<b>SQEM</b>
<i>Symbiodinium</i> sp. C15	CAMPEP_0192465542	177	<b>SQEY</b>
<i>Symbiodinium</i> sp. C1	CAMPEP_0199619000	181	<b>SQEY</b>
<i>Symbiodinium</i> sp. C1	CAMPEP_0199597416	160	<b>SQEY</b>
<i>Scrippsiella trochoidea</i>	CAMPEP_0192083196	204	<b>SQEY</b>
<i>Polarella glacialis</i>	CAMPEP_0115091146	166	<b>SQEY</b>
<i>Pelagodinium beii</i>	CAMPEP_0197627280	157	<b>SQEY</b>
<i>Oxyrrhis marina</i> LB1974	CAMPEP_0190412876	136	<b>SQQY</b>
<i>Oxyrrhis marina</i>	CAMPEP_0190349664	136	<b>SQQY</b>
<i>Noctiluca scintillans</i>	CAMPEP_0194480802	179	<b>SQEF</b>
<i>Kryptoperidinium foliaceum</i>	CAMPEP_0189651904	130	<b>SQEF</b>
<i>Karlodinium micrum</i>	CAMPEP_0200762398	199	<b>SQEF</b>
<i>Glenodinium foliaceum</i>	CAMPEP_0188370172	132	<b>SQEF</b>
<i>Durinskia baltica</i>	CAMPEP_0200040914	137	<b>SQDF</b>
<i>Durinskia baltica</i>	CAMPEP_0200047580	153	<b>SQDY</b>
<i>Crypthecodinium cohnii</i>	CAMPEP_0193858338	196	<b>SQEF</b>
<i>Crypthecodinium cohnii</i>	CAMPEP_0193883494	196	<b>SQEF</b>
<i>Alexandrium tamarense</i>	CAMPEP_0186381488	131	<b>SQSY</b>
<i>Alexandrium tamarense</i>	CAMPEP_0186337128	141	<b>SQEY</b>
<i>Alexandrium monilatum</i>	CAMPEP_0200550256	187	<b>SQEF</b>
<i>Symbiodinium minutum</i>	symbB.v1.2.004801.t1	177	<b>SQEY</b>