

Table 1

Phylogenetic Position of Hagfish Hox Genes. The clustering of the hagfish sequences (rows) with one of the three organisms amphioxus (amph.), lamprey and gnathostomes (gnath.) is given by ● (high support) or ○ (low support). If there is no obvious clustering, ● or ○ denote star-likeness (star). The different tree building methods are neighbor-joining (n), parsimony (p), maximum likelihood (m) and splits decomposition (s). If clustering with gnathostomes occurs, the cluster type is added as comment. Hagfish Hox genes that significantly cluster together are marked by |.

Gene	star				amph.				lamprey				gnath.				Comment
	n	p	m	s	n	p	m	s	n	p	m	s	n	p	m	s	
Hox1Z	●	●	●	●													A
Hox1Y				●									●	○	○		
Hox1X	●	●	●	●													
Hox2Z									○	○	○	○	○	○	○	○	B
Hox3Z		●	●	●					○				○				
Hox3Y	●	●	●	●													
HoxMZ1	●	●	●	●													
HoxMZ2	●	●	●	●													
HoxMZ3	●	●	●	●													
HoxMZ4	●	●	●	●													
HoxMW	●	●	●	●													
HoxMV			●	●									●	●		B7	
Hox8Z		●	●	●					●								
Hox8Y		●	●	●					●								
Hox8X		●	●	●					●								
Hox8W	○	○	●	●	●	○								○			
Hox9Z1	●	●	●	●													
Hox9V	●	●	●	●													
Hox9Z3	●	●	●	●													
Hox9Z4		●	●	●									●			●	
Hox9Y	●	●	●	●													
Hox9X	●	●	●	●													
Hox9W	○	○	●	●	○	○											
Hox10Z				●	●	●	●										D D
Hox10Y1	○	○	○	○	○	○	○									●	
Hox10Y2	○	○	○	○	○	○	○									●	
Hox10X	●			●					○	○			○	○			
Hox10W	●			●					○				○	●			
Hox10W2	●			●					○	○			○	○			
Hox11Z	●	●	●	●								●					
Hox11Y					●	●		●							●		
Hox11X	●								●	●	○				○		
Hox13Z	●	●	●	●													
Hox13Y		●	●	●	●			●								●	
																	91
																	13.5
																	11.5
																	16

Table 2

Phylogenetic Position of Hagfish Hox Genes. First two codon positions only, only *Homo sapiens* as representative of the gnathostomes.

Gene	star				amph.				lamprey				gnath.				Comment
	n	p	m	s	n	p	m	s	n	p	m	s	n	p	m	s	
Hox1Z				•					•				•		•		D
Hox1Y													•	•	•	•	A
Hox1X	○			•									○	○	○		D
Hox2Z				•					•	•	•						
Hox3Z													•	•	•	•	D
Hox3Y				•									•	•	•		B
HoxMZ1				•			○		•		○						
HoxMZ2				•			○		•		○						
HoxMZ3				•			○		•		○						
HoxMZ4			•	•									•				6
HoxMW			•	•									•				B6
HoxMV			•	•					•								
Hox8Z									•	•	•	○					
Hox8Y					○	•	•	○				○					
Hox8X					•	•	•	○				○					
Hox8W		•							•		•	○					
Hox9Z1				•									•	•	•		D
Hox9V																	
Hox9Z3																	
Hox9Z4				•									•	•	•		A
Hox9Y	•	•	•	•													
Hox9X													•	•	•	•	B
Hox9W					•	•	•	•									
Hox10Z				•	○	○	○		○	○	○						
Hox10Y1	•			•						○	○						
Hox10Y2	•			•						○	○						
Hox10X				•									•	•	•		A
Hox10W	•	•	•	•													
Hox10W2	•	•	•	•													
Hox11Z				•	•	•	•										
Hox11Y				•	○	○									•		D
Hox11X				•							○		•	•			A
Hox13Z	•	•	•	•													
Hox13Y	•	•	•	•													
Total		48.5				17.5				20.5				32.5			

Table 3

Phylogenetic Position of Hagfish Hox *Proteins* in comparison to Amphioxus, Lampreys, and Gnathostomes (represented by hornshark, human, and latimeria).

Gene	star		amph.		lamprey		gnath.		Comment
	n	p	n	p	n	p	n	p	
Hox1Z					•	•			
Hox1Y							•	•	A
Hox1X		•					•		C
Hox2Z	•						•		
Hox3Z			•					•	A
Hox3Y							•	•	B
HoxMZ1		•			•				A4,D4
HoxMZ2		•			•				
HoxMZ3		•			•				
HoxMZ4		•			•				
HoxMW	•	•							
HoxMV		•			•				
Hox8Z	•	•							
Hox8Y	•	•							
Hox8X	•	•							
Hox8W	•	•							
Hox9Z1	•								
Hox9V	•								
Hox9Z3	•								
Hox9Z4							•	•	A
Hox9Y	•								
Hox9X							•	•	B
Hox9W							•	•	D
Hox10Z	•			•					
Hox10Y1							•	•	A
Hox10Y2					•	•			
Hox10X							•	•	A
Hox10W									
Hox10W2	•	•							
Hox11Z			•	•					
Hox11Y	•					○		○	
Hox11X					○	○	○	○	
Hox13Z					○	○	○	○	
Hox13Y			•	•					
Total	25		6		11.5		21.5		