

Supplementary data S1. List of primer pairs tested in the present study. Dir indicates the primer direction, F: forward and R: reverse. Homolens version is indicated by the number, and the gene family is given by HBG-code. <https://doi.org/10.5852/ejt.2022.828.1861.7303>

Marker	Primer	Pair	Dir	Primer sequence	Reference
<i>coxI</i>	LCO1490	1	F	GGTCAACAAATCATAAAGATATTGG	Folmer et al. 1994
	HCO2198	1	R	TAAACTTCAGGGTGACCAAAAAATCA	Folmer et al. 1994
28S	RD3A	2	F	GACCCGTCTTGAAACACGA	McCormack & Kelly 2002
	RD3r	2	R	TCGGAGGGAACCAGCTACTA	McCormack & Kelly 2002
	Por28S-830F	3	F	CATCCGACCCGTCTTGAA	Morrow et al. 2011
	Por28S-1520R	3	R	GCTAGTTGATTCGGCAGGTG	Morrow et al. 2011
<i>coxI</i> I3-M11	PficCOI2f	4	F	AACATGAGGGCANTGGGAGTAACT	Swierts et al. 2017
	PorCOI2r	4	R	ACTGCCCCATNGATAAACAT	Swierts et al. 2017
ATP6 gene (mt)	ATP6porF	5	F	GTAGTCCAGGATAATTTAGG	Swierts et al. 2017
	ATP6porR	5	R	GTAAATAGACAAAATACATAAGCCTG	Swierts et al. 2017
ATPase β intron	ATPS β -F	6	F	CGTGAGGGHAAAYGATTTHTACCATGAGATGAT	Swierts et al. 2017
	ATPS β -R	6	R	CGGGCACGGGCRCCDGGNGGTTTCGTTTCAT	Swierts et al. 2017
Homolens2-HBG001808	i1-F	7	F	GGCCTGTCCATGACAGAYTGGCAYYT	Chenuil et al. 2010
	i1-R2	7	R	CTATGTCTATACTCCATCGTCCAGATRAACTTGAA	Chenuil et al. 2010
Homolens2-HBG052978	i5-F	8	F	ACACTGCCACCCGAGTACCCNATGAARCC	Chenuil et al. 2010
	i5-R2	8	R	AGAGACAGATTTTAGTTCCCACTTCAAACCTTC	Chenuil et al. 2010
Homolens2-HBG008594	i8-F	9	F	CACCACTGGTCATATGGCAYGGNATGTG	Chenuil et al. 2010
	i8-R	9	R	TGATGCAGCCCATGCTTAATGGRTTRCARCA	Chenuil et al. 2010
Homolens2-HBG052978	i9-F	10	F	CTCGTCTCTCCATTTCCGGCyaycayccnga	Chenuil et al. 2010
	i9-R	10	R	CTATAGCGCCCTCTCCTTTGgtnggcatraa	Chenuil et al. 2010
Homolens2-HBG040291	i12-F	11	F	GGACGACAAGAGTCTGAGGGTNTGGGARGT	Chenuil et al. 2010
	i12-R	11	R	GCATGCTGGGGTCTGCAATGtayttraartc	Chenuil et al. 2010
Homolens2-HBG000163	i15-F	12	F	ACACCCTTGACGAGGGGCTGATHGARTTYGG	Chenuil et al. 2010
	i15-R	12	R	ACAGCTTGCCAGAGTCTTCCACATNGCYTC	Chenuil et al. 2010
Homolens2-HBG004117	i21-F	13	F	AACCGGTATAACAATCCTTGTGGCAARTAYATGGT	Chenuil et al. 2010
	i21-R	13	R	CCCGGAAATCATAGCCTCCCATGACYTTCATRTA	Chenuil et al. 2010

Homolens3- HBG002428	i34-F	14	F	ATGTATGTATCCACAATGATGATYTCAAARTT	Chenuil et al. 2010
	i34-R	14	R	TTCTTCATCCTTCATACTGTCCATRATNGTCAT	Chenuil et al. 2010
Homolens3- HBG026608	i46-F	15	F	GAGGTGGATAAATACAGGGTGGARACNTGYTG	Chenuil et al. 2010
	i46-R	15	R	TCTCATGCTGCCACGTAGGGARTARTARTTCT	Chenuil et al. 2010
Homolens3- HBG011376	i50-F	16	F	GATGGAATCCATGTCTTGGTCAAYATGAAAYGG	Chenuil et al. 2010
	i50-R	16	R	GTAACCGAGTCGGTGATCAGGTARTCCATRAA	Chenuil et al. 2010
	i51-F	17, 18	F	CTGATGACGCTATCGTCTTCTGTgyaayttyaayca	Chenuil et al. 2010
	i51-R	17	R	GCAAGCTGACCTCGTCTCACAtgytctctct	Chenuil et al. 2010
	i51-R2	18	R	GCAAGCTGACCTCGTCTCAcrtgytctctct	Chenuil et al. 2010
	i51-F3	19	F	GATGAC GC TATTGTGTTTTGCAATTTYAAAY CAGC T	Chenuil et al. 2010
	i51-R3	19	R	ATCAGCCAGTTGTCCTCGACGAACRTGYTCYTCYT	Gérard et al. 2013
	i51-F4	20	F	GATGAC GC TATTGTGTTTTGCAAYTTYAAAYCAGC T	Gérard et al. 2013
	i51-R4	20	R	ATCAGCCAGTTGTCCTCGACGAACATGYTCYTCYT	Gérard et al. 2013
	Homolens3- HBG031768	i53-F2	21	F	ACTGTTCGAGGAGTTATGAGAAGAGGMWTGACDRT
i53-R3		21	R	TTCTTGTTGAACGCCCAAATYTTRTCCCAYTCCAT	Gérard et al. 2013
i53-F		22	F	GTACGTGGCATCCTCAGGAGAggnatgaengt	Chenuil et al. 2010
i53-R		22	R	CGGTTGAAGCTCCATAGCttGtcccaytccat	Chenuil et al. 2010
i56-F		23	F	CATCATCTTGGTCAGAATTTCTCCaaratgtyga	Chenuil et al. 2010
i56-R		23	R	AACTCCCTTGAGTTCCCAAAtgrtraayttcca	Chenuil et al. 2010
i56-F2		24	F	CATCATCTCGGTCAAAACTTCTCCA AVATGTTTCCRA	Gérard et al. 2013
i56-R3		24	R	GGCACTCCCTTCAGCTCCCAGTGRTRWAYTTCCA	Gérard et al. 2013
i56-F-Spla		25	F	CATCATCTTGGTCAGAATTTCTCCAAgATGTTtGA	This study
i56-R-Spla		25	R	AACTCCCTTGAGTTCCCAAATGgTTgAAAtTTCCA	This study
i56-F-Gb	26, 27	F	CATTGCTTTGAGCACCCAGA	Ordaz Németh 2014	
i56-R-Gb1	26	R	TTCCCAATGGTTGAATTTCCAGCC	Ordaz Németh 2014	
i56-R-Gb2	27	R	TTGAATTTCCAGCCGGGAGAG	Ordaz Németh 2014	

References

- Chenuil A., Hoareau T.B., Egea E., Penant G., Rocher C., Aurelle D., Mokhtar-Jamai K., Bishop J.D.D., Boissin E., Diaz A., Krakau M., Luttikhuizen P.C., Patti F.P., Blavet N. & Mousset S. 2010. An efficient method to find potentially universal population genetic markers, applied to metazoans. *BMC Evolutionary Biology* 10 (1): 276. <https://doi.org/10.1186/1471-2148-10-276>
- Folmer O., Black M., Hoeh W., Lutz R. & Vrijenhoek R. 1994. DNA primers for amplification of mitochondrial cytochrome c oxidase subunit I from diverse metazoan invertebrates. *Molecular Marine Biology And Biotechnology* 3 (5): 294–299.
- Gérard K., Guilloton E., Arnaud-Haond S., Aurelle D., Bastrop R., Chevaldonné P., Derycke S., Hanel R., Lapègue S., Lejeusne C., Mousset S., Ramšak A., Remerie T., Viard F., Féral J.P. & Chenuil A. 2013. PCR survey of 50 introns in animals: Cross-amplification of homologous EPIC loci in eight non-bilaterian, protostome and deuterostome phyla. *Marine Genomics* 12 (C): 1–8. <https://doi.org/10.1016/j.margen.2013.10.001>
- McCormack G. & Kelly M. 2002. New indications of the phylogenetic affinity of *Spongosorites suberitoides* Diaz et al., 1993 (Porifera, Demospongiae) as revealed by 28S ribosomal DNA. *Journal of Natural History* 36 (9): 1009–1021. <https://doi.org/10.1080/00222930110040394>
- Morrow C.C., Picton B.E., Erpenbeck D., Boury-Esnault N., Maggs C.A. & Allcock A.L. 2011. Congruence between nuclear and mitochondrial genes in Demospongiae: A new hypothesis for relationships within the G4 clade (Porifera: Demospongiae). *Molecular Phylogenetics and Evolution* 62 (1): 174–190. <https://doi.org/10.1016/j.ympev.2011.09.016>
- Ordaz Németh I. 2014. A phylogeographic study of the deep-sea sponge *Geodia barretti* using Exon-Primed Intron-Crossing (EPIC) markers. MSc Thesis, Uppsala University.
- Swierts T., Peijnenburg K.T.C.A., Leeuw C.A., Breeuwer J.A.J., Cleary D.F.R. & Voogd N.J. 2017. Globally intertwined evolutionary history of giant barrel sponges. *Coral Reefs* 36 (3): 933–945. <https://doi.org/10.1007/s00338-017-1585-6>