

Supplementary Material

Fig. S1. Variable sites of cytochrome b sequences from 80 *Thunnus orientalis* individuals and two out groups *T. thunnus* and *T. alalunga*.

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[           11111111 1122222222 2222223333 3333333333 4444444444 4455555555 5555666666 6666777777 ]
[           112344556 6801146778 9900111122 4667880011 2245566889 1133445567 9901112445 5678001224 4579011112 ]
[           4277967583 8821675484 3615026879 0699670328 3414739569 4734475887 0842395178 9232058041 2040512671 ]
N1      GCAGCGGGGC CTCCTATTGG TGCACGTTGT GTTCTTACCT TGAGCTTGTT GCGTTCCTTC AGTACTTTTA TGCTTATAAA TACTGGGTTT
N2      .....A... ..T..... .....C..... .....C.
N3      .....A... ..T..... .....C..... .....C.
N4      .....TA... ..T..... .....A..... .....C.
N5      .....A... ..T..... .....
N6      .....A... ..T..... .....C..
N7      .....A... ..T..... .....G.....
N9      .....A... ..T..... .....C.....
N10     .....AA... ..T..... .....A..... A..... .....C.....C.
N11     .....A... ..T..... .....A..... .....C.
N15     .....A... ..T..... .....G..... .....C..... .....G.....C.
N16     .....A... ..T..... .....
N17     .....A... ..T..... .....G.....C.....C.
N18     .....A... ..T..... .....G..... .....C.
N19     .....A... ..T..... .....T.....
N21     .....A... ..T..... .....A.....

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N22A... ..T.....A.....C.
 N23 A.....A... ..T.....G...C.
 N24A... ..T.....
 N25A... ..T.....
 N28A... ..T.....C.....C.....
 N29A... ..T.....G.....C.....C.
 N30A... ..T.....A.....C.....C.
 N31A... ..T.....T.....C.C.
 N32A... ..T...A.....C.....
 N33A... ..T.....C.
 N34A... ..T..... ..T..... ..C.....C.
 N35A... ..T.....
 N36_N37A... ..T.....G.....C.
 N38A... ..T..... ..A.....
 N40A... ..T.....A.....
 N43A... ..T.....C.....A.....
 N46A... ..T.....C.....A.....C.
 N48A... ..T.....C.
 N50A... ..T.....A.....C.
 N51A... ..T.....C.....C.
 N53 ..G..A... ..T.....C.....
 S13A... T..T.....
 S15A... ..T.....C.....
 S24A... ..T.....C.....G.....
 S44A... ..T.....T.....C.
 S45A... ..T.....G.C.....T.....C- ..T-...C.
 S47A... ..T.....

S48A... ..T.....A..... ..A.....A.....C.
S60A... ..T.....A.....C.
S61A... ..T.....A.....C.
S62A... ..T.....C...C.
S63A... ..T.....C..... ..A..A..C.
S64A... ..T.....
S65A... ..T.....C...C.
S66A... ..T.....A.....G..C.....C.
S67A... ..T.....C.....
S68A... ..T.....A.....
S70 ..A.A... ..T.....A..G.. ..A.....T.....C.
S27A... ..T.....A.....C.
S28A... .GTT...GAC .T.T.AG... ..GA.....
S29A... ..T..C...A...CC.
N39_S3_S30A... ..T.....A.....C.
S31A... ..T.....
S32A... ..T.....T.....C.
S33T.A... ..TC.....C.....C.
S34A.T. ..T...TC.
S8_S36A... ..T.....C.
S42 ..G..A... ..T.....
S49A... ..T.....C..... ..A.....
N42_S21_S35_S50A... ..T.....
S53A... ..T.....C.
S54A... ..T.....A.....C..C.....C.
S19A... ..T.....C.
S20A... ..T.....C.....

S38A... ..T.G.....C
S39 ...A..A... ..T..... ..A..... ..T.....C.
S40A... ..T..... ..C..... ..C.....C.
alalungaA... ..T..... A..... A..... ..A..... ..C..... ..C..... ..A...C.
thynnus .A...A..T ..T..C... ..T..... ..A... .A.A.C.... .T..CT..CT .A...CC... ..T...C... ..A...C.

[
[111 1111111111 1111111111 111111111]]
[7777777777 7777778888 8888888888 8889999999 9999999000 0000000000 0000001111 111111111]]
[2334566667 7788890011 3334445577 8990111112 2222336000 2222344445 6668990011 33333344]]
[3121047893 4736987909 0176792435 4672024671 2378098258 0379534890 0260342407 24678901]]
N1 TTATGATCAC TTAGCTACTC CTAATTTTCAT TTCTGCCTTA CATTAATTTA TAGGATTATT GCGCTCCTCG GAGATCCT
N2C..... ..T.... ..A
N3C..... ..T.... ..A
N4T.....
N5C..... ..T.... ..A
N6 .C..... ..T.....
N7G..... ..T.....
N9C..... ..T..T.
N10T.....
N11C..... ..T.... ..GG.
N15A..... ..T.... ..GG.
N16C..... ..A.C.... ..G.T....
N17T.....
N18A..... ..T.... ..A.AGG.
N19A..... ..T..T.... ..GG.
N21C..... ..T.... ..GG.
N22T..... ..TA.AGGA

S39T.C... ..
S40A.....T.....
T. alalungaC.....A.....G.....T....AGG...
T. thynnus ...CA.....CCC.T...T.A.G.C....T.T...G.....C.G..G..G.C.....T....A.....

Fig. S2. Variable sites of D-loop sequences from 80 *Thunnus orientalis* individuals and two out groups *T. thynnus* and *T. alalunga*.

[111 1111111111 1111111111 1111111222 2222222222 2222222222 2222222222 2222222223 3333333333]
[12344557 7888999001 1223333455 6667778889 9999999000 0000111111 2222223344 4445555667 8889999990 0000002333]
[1994714693 5123136462 3260189359 0240343480 3456789013 6789012569 3457890502 3690237241 3581467890 1345890123]
N1 TTTAAGTATA CTTGATTTAA TCCAACCCCA CTTAACAGAC TTATTCTTCA TTCTAGTCAA AATAAACTAT CCTAACATCT TATGACCAGT AACTAGGAGC
N2A.G..C....T...T.T. ..C.....G.CT...G .C...TC...CGC ...G...T.TG..
N3A....T...T.T. ..C.....TCT..T. .CT..CC.T. .G.....GC ...G...T.TTGA.
N4A....T...T.T. ..C.....G.CTC... .CT..CC...GC .A...T..T. C.....T... ..
N5T.T.C.....
N6T.T.C.....
N7T..T...G.C...C...GCT.TG.C
N9A....T..G.T.TC ..C.....G.CT... ..TC...G. .A...G...TG..
N10A....C.. .T...T.T. ..C.....G.CT... .CAC.C...GCTC C.....
N11 .C.---T...T.T. ..C.....G.C.....G.T.TG..
N15A....T...T.T. ..C.....G.CT... .C...CC...GC ...G...T.T... ..
N16A.... ..C.....T...T.T. ..C.....GTCT... .CT..C...G.T. ..C...TG.. .G...A...
N17A..C.T...T.T. .CC.G...G.CT... .C...T.T.G.T. C...TG.. G.....
N18A....T...T.T. ..C.....G.CT... .C...C.T.G.C...TG..
N19A.... ..C.....T..G.T.T. ..C.....GTCT... .CT..C...GCT. ..C...TG..AA...
N21A....T...T.T. ..C.....GTCT... .C...CC...G.T.TG..
N22---G. .T...T.T.GT .C..C... .C...C...G.CT. C.....G.. ..

N23G. .T...T.T.G.GT .C..C..... .C....C...G.CT. C.....G...
 N24-C... ..G. .T...T.T.G.C...AC...G. ...G...T.TG...
 N25A... ..T...T.T. ..C....GT .C..CT.C.. .C.C.CC...G.T.G...
 N28T...T.T. ..C....G.CT.... .C..A... ..G.T.TG...
 N29A... ..T...T.T. ..C....GTCT.... .CT..CC..GG. ...G...T.TC...
 N30A..G ..A..... .T...T.T. ..C..... ..CT.... .C..TC...G. T..G...T.T...
 N31T...T.T.G.C.C..C...G.T.TG.C
 N32T...TT.T. ..C....G.C..... .CT..AC...G.T.TG...
 N33A... ..T...T.T. ..C.....TCT..T. .CT..CC.TGGCT.TTGA.
 N34A... ..T...T.T. .CC.G...G.CT.... .C..T.T.GCT. C....TG.. G...
 N35T...T.TGG.C..G... ..G.T.T...
 N36A... ..C..... .T...T.T. ..C....GTCT.... .CT..C... ..G.T. ..C..TT.. ...AA...
 N37A... ..C..A... .T...T.T. ..C....GTCT.... .CT..C... ..G.T. ..C..TG.. .G...A...
 N38T...TTTT.G.C...C... ..GCT.T...
 N39A... ..T..T...T.T. ..C....C.CTCC.. .CT..CC... ..GC ...G...T.T...
 N40T...T.T.T..G.C...C... ..G.T...
 N43A... ..G. .T...TT.T. ..C....GTCT.... .CT..CC... ..G. ...G...T.TC... .T...
 N46GA..G ..A..... .T...T.T. ..C..... ..CT.... .C..TC... ..GC T..G...T.T...
 N48T...TTTT.G.C...C... ..GCT.T...
 N50A... ..A..... ..T.T. ..C..... ..CT.... .C...C... ..C....GC ...G...T.T...
 N51A... ..G. .T...TT.T. ..C....GTCT.... .CT..CC... ..G. ...G...T.TC... .T...
 N53T...T.T.G.C..GAC... ..G.T.T...
 S3A... ..T...T.TC ..C....G.T.... .CT..TC... ..T.G. TA.....T.TG...
 S8A... ..T...T.T. ..C....GTCTC... .C...CC... G.....GC .A.G..CT.G.T...
 S13T...T.T.G..... ..C...C...T...
 S15T..... ..T.T.G.C...C...T.....T.T... ..G...
 S21A... ..T...T.TC ..C....G.CT.... .CT..TC... ..G. TA.....T.TG... ..A.

S24 T...T.T. ..C.....G.CT..... C...A....G.T.TG...
S44A.... T..G.T.TC ..C.....G.CT..... TC....G. .A..... TG...
S45A.... T...T.T. ..C.....TCT..T. .CT..CC.T.GCT.TGA.
S47---..... T...T.T.G.C.....G.G...T.T...
S48 ...G.A....C. .A...T.T. ..C.....G.CT..... .GC.TC...GCT..T.T...
S60A.... ..A..... T...T.T. ..C.....G.CT.....CC... ..G...GCT. C....T... ..C.....
S61A.... T...T.T. ..C.....G.CT.....CC...GC ...G...T.T...
S62A.... T...T.T. ..C.....GTCTC... .C..CC... G.....GC .A.G...T.G.T...
S63A.... T...T.T. ..C.....GTCTC... .C..CA... G.....GC .A.G...T.G.T...
S64G. TT...T.T.G.C... .C..C...G.T. C....TG.C
S65T...-T.T. ..C.....G.CT..... C..A....G.T.TG...
S66A....C. .A.G..T.T.G.CT..... CGC.TC..GGCT..T.T...
S67C..... T...T.T.GTC..G....G.T...
S68A....C. .A.G..T.T.G.CT..... CGC.TC..GGCT..T.T...
S70A....G T...T.T. ..C...G.G.CT..... C..CC... -.....G. ...G...T.T...
S27A....C. .A.G..T.T. ..C..... CT..... CGC.CC...GCT.CT.T...
S28A.... T...T.T. T.C..... CT..... C..CC...GCT. ..AG.T... ..A...
S29A.... ..A..... T...T.T. ..C..... CTC... .CT..CC...GC ...G...T. .G...T...
S30A....T T...T.T. ..C.....C.CT.C.. .CT..CC...GC ...G...T.T...
S31T...T.T.G.C.....GCTG...
S32 C...A....G. T...T.T. ..CT...G.CTC... .C..CC.G.GCT.TG...G...
S33A.... T..G.T.TC ..C.....G.CT..... C.TC....G. .A..... TG...
S34A.... T...T.T. ..C.....G.CT..... C..C.T.G.T. C....TG...
S35T...T.T.G. C.....C...C.....GCTCT...
S36A.... T..G.T.TC ..C.....G.CT..... .CT..TC...G. TAC....T.TG...
S42T...T.T.T.G.C...C.....G.T...
S49T...T.T.G.C..AC....T.....T...

S50G. .T....T.T.G.C....C...G. ...G....T.TG.....
 S53A..... .T....T.T. ..C..... .CTC.T. .CT..CC...GCG..... .T.....
 S54A..... .G. .T....T.T. ..C.....G.CT.... .CAC.CC...G. GCT. C.....T.....
 S19A..... .T..G.T.TC ..C.....G.CT.... .TC.....G. .A..... .TG.....
 S20T...TT.T. ..C.....G.C..... .CT..AC...G.T.TG.....
 S38T...T.TGG.C..G.....G.T.T.....
 S39T...TTT.G.C....C...GCTCT.....
 S40 ..G..A..... .G..... .T...TT.T. ..C.....GTCT.... .CT..CC...G. ...G....T.TC..CT.....

T. alalunga -....A.....C..G. .A...TT.T.T CC...CC.. C.T..T.T.GG. .A...T..T. ...A..T...-..T...T
 T. thynnusA.....A..T..G. CA...TT.T.A.. CCTC..CC-. C.T..T.T..G...GC .A.....T. ...A..T... ..T...T

[3333333344 4444444444 4444444444 4455555555 5555666666 6666666666 6666666677 7777777778 8888888888]
 [3377779900 0113444455 5667778889 9901233677 7899000112 2334455566 6777889900 1157778890 3335566777]
 [4845682301 8376267813 4340360795 8968629604 5812124076 9891228924 8036671723 2572482382 3451657679]

N1 TTCGATTTCT GTTGTATTCA TCGTAAAGGA CCGATAGTGT TAATGCAATC GTATCATAAA ACACATCGTT AACTGTACAC TTTATTGACC
 N2 ..T..... .A..... .G... .A...C..C..... .T..C.....
 N3 ..TA..... .C.A..... .G .A...CA.T.....
 N4 ..TA..... .C.A..... .A..G.C.. .A..... .T.....
 N5A.....C.....
 N6C.....A.....
 N7T..C..... .A..G.C.. .C..... .T.....
 N9 ...A..... .AG.G.C..G..... .T.....
 N10 ..T..... .C.A...T.A..G.C.. .C..... .TG.....
 N11 ...A..... .A..G.C.. .G..... .T.. C.....
 N15 ..T..... .A..... .A..G.C..C.....C..... .T.....
 N16 ...A..... .A..... .C..... .A..G.C..T.....T
 N17 ..T..... .A..... C...G... .A...C..T.....
 N18 ..T.....C ..A..... C...G... .A...C..T.....

N19 A..... G... ..A..G.C.. .G..... T... ..C.....
 N21 ...A.C.... ..A..... C..... ..A...CA.A..... ..G..... T.....
 N22 ...A..... .C.....A..G.C.. T.....
 N23 ...A..... .C.....A..G.C.. T.T.....
 N24 ..T..... .C..... T.A..G.C.. ...C.....T T.....
 N25 ..T..... ..A..... C..... ..A...C..G..... T.....
 N28C..... G... ..A...C.. .G..... T.....
 N29C.A..C.....A...C.. ...A..... ..C..... T.....
 N30 ..TA..... G... ..A..G.C..C..... T.....
 N31T. .C.....A..G.C.. ...C..... TG...A... ..T.....
 N32C..... G... ..A..G.C.. .G..... A.T.....
 N33 ..TA..... .C.A..... G ..A...CA.G..... T.....
 N34 ..T..... ..A..... C...G... ..A...C.. T.....
 N35 A..... T.....
 N36 ...A..... ..A.....A..G.C.. .G..... A..T.....G..
 N37 ...A..... ..A.....A..G.C.. T.....
 N38CT.G..... T.A..... GC..... T.....
 N39 ..T..... ..A..... G... ..A..G.C.. CG..... ..C..... ..C..... T.....
 N40A...G ..A...A..... T.....
 N43C.A..C.....A..G.C.. ...A..... ..C..... ..T..... T.....
 N46 ..TA..... G... ..A..G.C..C..... ..C..... T.....
 N48CT. --..... G... ..A..G.C..C..... ..C..... T.....
 N50 ..TA..... ..CAC..... G... ..A..G.C.. T.....
 N51C.A..C.....A..G.C.. ...A..... ..C..... ..T..... T.....
 N53 ...A.....A.....C...G..... T.....
 S3 ..T.....A..... T.AG.G.C.. .G...G...C..... T.....
 S8 ..TA..... .C.A..... G... ..A..G.C.. T.....

S13T.C.....A....C..
S15 ..T.....A..G....T.....
S21 ..T..... ..C..... T.AG.G.C.. .G.....C.....T.....
S24C..... ..G... ..A....C.. .G.....T.....C.....
S44 ...A.....AG.G.C..G.....T.....-..
S45 ..TA..... .C.A..... ..G ..A....CA.T.....T.....
S47 ...A..... T.A..G.C.. ...A.....T.....
S48 ..T..... .C..... ..A..G.CA.T.....T.....
S60 ..TA.....G... ..A..G.C.. .G.....T.....A..
S61 ..T..... ..A..... ..AG.G.C..C.....C.....T.....
S62 ..TA..... .C.A..... ..G... ..A.CG.C..G.....T.....
S63 ..TA..... .C.A..... ..G... ..A.CG.C..T.....
S64T. .C..... T.A..G.C.. ...C.....T.....T..
S65C..... .T...G... ..A....C.. .G.....T.....
S66 ..T..... .C.....A..G.C..G.....T.....
S67 .C.....C.A..G....C.....T.....
S68 ..T..... .C.....A..G.C..T.....
S70 ..T..... .C.A..C.A..G.C..C.....C.....T.....
S27 ..T..... .C.....A..G.C..T.....
S28 ..TA...T. ...A..... ..G... ..A.CG.C.. .G......C.C.....C.....C.T..
S29 ..T.T.C... .C.A..... C...TG... T.A..GAC.C.....T.....T.....
S30 ..T..... ..A..... ..GA... ..A..G.C.. .G......C.....C.....T.....
S31 ...A.....C..... ..A..G.C.. ...C...C.T.....
S32A..... ..A..G.C.. .G.....GT.....
S33 ...A.....A..G.C..G.....T.....
S34 ..T..... ..A..... C...G... ..A....C..A.A.T.....
S35A....C.....T.....T.....

S36 ...A..... A..... ..AG.G.C.. .G.....C....T..
S42 ...A.....A. ..A..G....T..
S49 C.....A..G....T..
S50 A..G.C.. ...C.....G.....T..
S53 ..T.....C...G..G ..A..G.... ..G..... ..G.....T..
S54 ..T.....AG.G.C..T.....T.....
S19 ...A.....AG.G.C..G.....T.. ..C.....
S20 C.....G... ..A...C.. .G.....T.....
S38 A.....T.....
S39 G... ..A..... ..A..G..T.....T.....G.....
S40 C.A..C...A...C.. ...AT.... ..C..... ..T.....T.....
T. alalunga C.TA...T. ..CA..... TTA..G...C .G.....CG..AT.....
T. thynnus C.TA.C..T. ...A..... TTA..G...C ...C.....AT.....