

Ommastrephid squids *Sthenoteuthis oualaniensis* and *Dosidicus gigas* in the eastern Pacific show convergent biogeographic breaks but contrasting population structures

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Supplement. Complete collection data for *Dosidicus gigas* and primers used for PCR amplification and sequencing of *Dosidicus gigas* and *Sthenoteuthis oualaniensis*

Table S1. *Dosidicus gigas*. Sampling locations and dates (802 sequences total). Sites that are grouped between horizontal lines were pooled together for some analyses (see main text, Table 2). n: number of individuals sampled at each location. RBCM: Royal British Columbia Museum. GC: Gulf of California. ETP: eastern tropical Pacific

Location	Date	Latitude (°N or °S)	Longitude (°W)	n
Alaska, USA	Oct 2004	56.94667 °N	135.75000	2
Canada '05	Aug 2005	58.81373 °N	133.63057	2
Canada '08	2008	58.81373 °N	133.63057	15
RBCM, Canada '04	2004	48.88833 °N	125.58500	6
RBCM, Canada '05	2005	50.40611 °N	128.03667	6
Oregon, USA	Sep 2005	45.61058 °N	123.94430	2
Oregon, USA	Aug 2007	44.653 °N	125.118	19
Cordell Bank, California, USA	Dec 2006	37.86683 °N	123.51267	16
Monterey, California, USA	Nov 2004	36.33000 °N	122.90000	30
Pacific off Mexico 1	Aug 2005	31.91380 °N	118.65820	7
Ensenada, Pacific, Mexico	Sep 1999	31.83333 °N	116.61667	12
Punta Prieta, GC, Mexico	Mar 1999	27.55879 °N	112.40106	7
San Bruno, GC, Mexico	May 1999	26.22014 °N	111.41073	4
Santa Rosalía, GC, Mexico	May 1999	27.34076 °N	112.27075	6
Volcán Marías, GC, Mexico	May 1999	27.55879 °N	112.40106	15
Punta Prieta, GC, Mexico	May 2006	27.55879 °N	112.40106	22
San Pedro Martír 5, GC, Mexico	Jul 2006	28.52958 °N	112.78088	22
San Pedro Martír 6, GC, Mexico	Jul 2006	28.32083 °N	112.16683	27
San Pedro Martír 7, GC, Mexico	Jul 2006	28.20000 °N	112.33000	19
Santa Rosalía '04 1, GC, Mexico	May 2004	27.34076 °N	112.27075	17
Santa Rosalía '04 2 GC, Mexico	Oct 2004	27.34076 °N	112.27075	49
Santa Rosalía '05 1, GC, Mexico	Jun 2005	27.34076 °N	112.27075	30
Santa Rosalía '05 2, GC, Mexico	Jul 2005	27.34076 °N	112.27075	29
Santa Rosalía '05 3, GC, Mexico	Nov 2005	27.34076 °N	112.27075	15
Santa Rosalía '06 1, GC, Mexico	Jul 2006	27.34076 °N	112.27075	22
Santa Rosalía '06 2, GC, Mexico	Jul 2006	27.34076 °N	112.27075	31

GC, Mexico	Aug 2006	26.91733 °N	111.16133	1
Punta Marcial, GC, Mexico	May 2006	25.72783 °N	111.25819	34
Pacific off Mexico 2	Sep 2004	26.36583 °N	114.05833	17
Pacific off Mexico 3	Sep 2005	25.83333 °N	117.12028	11
Topolobampo, GC, Mexico	May 1999	25.60383 °N	109.04641	15
Magdalena Bay, GC, Mexico	Jun 2005	24.57839 °N	111.99979	30
Southern GC, Mexico	Jun 2005	23.58617 °N	108.87283	39
Mexico 1	Aug 2006	21.79533 °N	109.304	1
Mexico 2	Aug 2006	19.86867 °N	108.623	3
Mexico 3	Aug 2006	19.67083 °N	111.80167	1
Mexico 4	Nov 2006	16.08667 °N	106.67833	1
Southern Mexico 1	Oct 2006	14.40783 °N	94.922	6
Southern Mexico 2	Oct 2006	9.60000 °N	96.46667	1
Costa Rica Dome 1	Sep 2006	7.48083 °N	85.02194	2
Costa Rica Dome 2	Sep 2006	8.75 °N	84.28333	3
Costa Rica Dome 3	Sep 2006	8.38083 °N	89.4765	2
ETP1	Oct 2006	4.71667 °S	97.55000	14
ETP2	Oct 2006	2.18333 °S	96.28333	72
ETP3	Oct 2006	0.48333 °N	95.33333	4
Peru '07	Mar 2007	5.51635 °S	81.51822	25
ETP4	Oct 2006	1.28333 °S	81.46667	1
ETP5	Oct 2006	5.58167 °S	85.13833	1
Peru '06 3	Dec 2006	8.77400 °S	79.57917	27
Chile '05	May 2005	33.05000 °S	71.66670	28
Chile '06	Aug 2006	38.65 °S	73.91667	31

Table S2. *Dosidicus gigas* mitochondrial forward primers

Name	Sequence (5' to 3')	Location on genome
SqIF	GAATGAACGGATTATATTGATG	972–993
DND3F	CCACGAATGAAATCAAGGATC	1339–1359
LCO 1490	GGTCAACAAATCATAAAGATATTGG	1438–1462 & 8461–8485
DCOF	CTGACCGAAATTTTAATACAAC	2047–2068 & 9070–9091
DCOF2	TGTCAACGTAACCTTTCTTTCC	2675–2695 & 9698–9718
DgCO2F	AGCCCTTCCTTCATTACG	3186–3203 & 10209–10226
DgA6F	AAATGATAACATGATAGTAGAC	3862–3883 & 10891–10912
DgA6F2	AAATTGGTATTGGTATTATTC	4491–4511 & 11520–11540
Sq12SF	GTATAACCGCAGATGCTG	5384–5401
SqQF	TCCAAAAATTTACGTGCC	5804–5821
DNC3'F	GATCACCTGATAATTCTATACACAC	6309–6333 & 20220–20244
SqSF	GCTGCTAACTTTATTTTGAGC	7393–7413
DgN5F	CTCACATTAGTGTAACATC	12075–12094
DgN5F2	GAAGCCAACCTTCTAAAAGG	12706–12724
DgNF	GAAAAAACAATACATAACATAAG	14903–14925
DgCBF	AACGCAAAATGGCATAAGC	15463–15481
DgCBF2	TTAGCATGTACATAACGTAAC	16056–16076
SqLF	CTTAAATTCTATGCACTGATC	17864–17884
Dg16SF	AGATTAACCTTCGTCAAACC	18443–18466
SqGF	TTGTTGGAAAACAAACRTACT	19640–19661
DgEF	GAAATTGAAAATCTCATGTGC	19718–19738

Table S3. *Dosidicus gigas* mitochondrial reverse primers

Name	Sequence (5' to 3')	Location on genome
SqCO3R	AGGTCAAGGACTATATTCTAC	25–45 & 6430–6450
DgCO3R2	GTCAGAAATAGAGAATGAGG	545–564 & 6950–6969
RSqI	CATCAATATAATCCGTTTCATTC	972–993
DCOR2	ATTAGTCTTAGAGAAGTTCC	1503–1522 & 8526–8545
HCO2198	TAAACTTCAGGTGACCAAAAAATCA	2121–2146 & 9144–9169
DgA6R	GTTCATGTTATAAAATGAGCTG	3924–3945 & 10953–10974
DgA6R2	GACTATTAATCTAAAACCACC	4076–4096 & 11105–11125

Dg12SR2	ATAACAGTTTGTGTATTGCTG	5014–5034
Dg12SR	TCGTTTTGTTGTGTACATTG	5546–5566
DNC5'R	GTCTTCGAGATATGGCTAATAGAC	5912–5935 & 19829–19852
RSqS	GCTCAAAATAAAGTTAGCAGC	7393–7413
DND2R	AAAATAAATAAGAAGTTGGAAGG	7454–7476
SqND2R	AAGAGGGGCTAGYTTTTGYC	7839–7858
DgND5R	GATTCGTAAATGTATGTAGAG	13468–13488
DgN4R2	TTTGAACGAAATACTGTTAG	13992–14012
DgND4R	TATTAGCTAGAAATTATTCTG	14512–14532
SqTR	CTAATTTTGGTTTACAAGACC	15069–15089
DgN1R2	CATTGGAAGTTAGAAATTGAG	16842–16862
DgN1R	TTTTCTAATTCTAAATATGCG	17436–17456
Dg16SR	TGCTTCTTTTAGTACGAGAG	18001–18020
16SAR	CGCCTGTTTATCAAAAACAT	18592–18611
Dg16SR2	GTTTACTAAATTGTGTTGAGG	19249–19269

Table S4. PCR primers used for amplification of *Dosidicus gigas* mitochondrial DNA

Primer pair ^a	Fragment range on mitochondrial genome
DGEF / SqCO3R	19718–00045
DNC3'F / DCOR2	20220–1522
SqIF / HCO2198	972–2146
DCOF / DNC5'R	2047–5935
Sq12SF / SqCO3R	5384–6450
DNC3'F / SqND2R	6309–7858
SqSF / DGA6R2	7393–11125
DgA6F / SqTR	10891–15089
DgNF / Dg16SR	14903–18020
SqLF / DNC5'R	17864–19852

^aSpecific primers may occur within either copy 1 or 2 of the duplicated regions of the mitochondrial genome, but the second primer defines the region amplified

Table S5. *Sthenoteuthis oualaniensis* forward primers

Name	Sequence (5' to 3')	Location on genome
SoCO3F	CACCATTTTGGTTTTGAAG	685–703 & 7088–7106
SoAF	AGAAGATATGATTTGCAATC	831–850
SqIF	GAATGAACGGATTATATTGATG	972–993
DND3F	CCACGAATGAAATCAAGGATC	1340–1360
LCO 1490	GGTCAACAAATCATAAAGATATTGG	1436–1460 & 8458–8482
DCOF	CTGACCGAAATTTTAATACAAC	2045–2066 & 9067–9088
SoCOF	GTATTTGCTTTGTTTGCTGG	2569–2588 & 9591–9610
SoCO2F	TGAACAGTTCCATCATTAGG	3443–3462 & 10465–10484
DgA6F	AAATGATAACATGATAGTAGAC	3860–3881 & 10882–10903
DgA6F2	AAATTGGTATTGGTATTATTC	4489–4509 & 11511–11531
SoA6F	TATCTTTGAAATTGGTATTGG	4481–4501 & 11503–11523
Sq12SF	GTATAACCGCAGATGCTG	5380–5398
SoCF	TGTTTCCTAAAGTTTGCAAC	5727–5746
SqQF	TCCAAAAATTTACGTGCC	5810–5827
SqSF	GCTGCTAACTTTATTTGAGC	7389–7409
SoN5F	CCTCAAATAATGTAGAAAGA	12099–12118
SoN5F2	AGTAGGTGCTGCTATAGC	12674–12691
SDHF	TTATCTGYAAGCCACAAC	13325–13344
DgCBF	AACGCAAAATGGCATAAGC	15456–15474
SoCBF	AAAGAAGCACCATTAGCATG	16036–16055
SoND6F2	AAATTATAAARAATATATAAATAC	16547–16571
SqLF	CTTAAATTCTATGCACTGATC	17857–17877
Dg16SF	AGATTAACCTTCGTCAAACC	18439–18458
DgEF	GAAATTGAAAATCTCATGTGC	19708–19728

Table S6. *Sthenoteuthis oualaniensis* reverse primers

Name	Sequence (5' to 3')	Location on genome
SqCO3R	AGGTCAAGGACTATATTCTAC	25–45 & 6428–6448
SoCO3R	TAGTTAGTGTATAGATTGAG	473–493 & 6876–6896
RSqI	CATCAATATAATCCGTTTCATTC	972–993
SCOR	GTTCCGGTACGGATTATTAATC	1514–1534 & 8536–8566
HCO2198	TAAACTTCAGGGTGACCAAAAAATCA	2119–2144 & 9141–9166
SoCO2R	TAATGATGGAAGTTCACG	3441–3460 & 10463–10482
DgA6R	GTTTCATGTTATAAAATGAGCTG	3822–3943 & 10944–10965
SoA6R	TGGCTGCTAGTCGAATAG	4348–4365 & 11370–11387
Dg12SR2	ATAACAGTTTGTGTATTGCTG	5015–5035
So12SR	GAGAGTTTGATATAGTTAGTG	5425–5445
DNC5'R	GTCTTCGAGATATGGCTAATAGAC	5913–5936 & 19818–19841
RSqS	GCTCAAAAATAAAGTTAGCAGC	7389–7409
SqND2R	AAGAGGGGCTAGYTTTTGYC	7836–7855
SoHR	TGGGCTTACAGATAAAAATTC	13319–13372
SoND4R2	TTTCTAAATGAGATGTTGATC	13885–14005
SoND4R	GTTGATGCTGCTGGCTAG	14514–14531
SqTR	CTAATTTTGGTTTACAAGACC	15062–15082
SoCBR	GAAATTAGTATATRTTCCC	15563–15582
SoCBR2	GGGATTGTGTTTAGTCGTTT	16173–16192
SoND1R2	GTACTTATCTTTTGTATGAG	16810–16830
SoND1R	TCTAAYTCTAAATATGCATT	17427–17446
Dg16SR	TGCTTCTTTTAGTACGAGAG	17993–18012
16SAR	CGCCTGTTTATCAAAAACAT	18584–18603
So16SR	ACAATACTGAATAAGGGTC	19316–19334

Table S7. Additional *Sthenoteuthis oualaniensis* primers specific to the Pacific Typical clade

Name	Sequence (5' to 3')	Location on genome
DS2ND4F	CTCACATGAACTTGCTTAAG	13832–13851
DS2N4LF	CTCTAATATAAATAAAACTGCC	14977–14998
DS2ND1F	CAAACCACATAATTATCATG	17252–17271
DS2N4R	ATTGGCGAGTAATTATTCGG	14501–14520
DS2CBR	ATTGAAATTAGTATATTATTCC	15561–15583

Table S8. Additional *Sthenoteuthis oualaniensis* primers specific to the Equatorial clade

Name	Sequence (5' to 3')	Location on genome
WGNCF	CCTTATTCTTTATTTATAAC	6234–6253 & 20135–20154
WGN4LF	TTATCAAACCTATTACTACTCC	14863–14883
WGCBF	AACCACACCAATATTTCAAG	15964–15983
WGCO2R	TATATTGACAATTTCTAGTG	3596–3615 & 10623–10642
WGN5R	CTGTTTTGGTGGTTCTAGG	12826–12844
WGN4R3	TGTGTGTAGAGAACATCTAC	13466–13485
WGN4R2	TTGATAGGAGTATTCTTTC	14018–14037
WGN4R	GGAATATTAGTAGTATTGAGG	14562–14582
WGCBR2	CTAGTAATGTCTATTTGTGTC	15418–15438
WGCBR	ATAGTTATAAAGATTTATTTGG	15626–15647
WGND1R	TTGTTCTCTGTGTTTCTAG	17499–17518

Table S9. PCR primers used for amplification of Eastern Typical clade of *Sthenoteuthis oualaniensis* mitochondrial DNA

Primer pair ^a	Region amplified on mitochondrial genome
DgEF / SCOR	19708–1534
DNC3'F / DgA6R	1340–3943
DCOF / DG12SR2	2045–5035
DgA6F / DNC5'R	3860–5936
Sq12SF / SqND2R	5380–7855
SqSF / DgA6R	7389–10965
DgA6F / SqTR	10882–15082
SoN5F / SoCBR	12099–15582
DGCBF / Dg16SR	15456–18012
SqLF / DNC5'R	17857–19841

^aSpecific primers may occur within either copy 1 or 2 of the duplicated regions of the mitochondrial genome, but the second primer defines the region amplified

Table S10. PCR primers used for amplification of the Pacific Typical clade of *Sthenoteuthis oualaniensis* mitochondrial DNA

Primer pair ^a	Region amplified on mitochondrial genome
DgEF / SCOR	19703–1532
DNC3'F / DgA6R	1338–3941
DCOF / DG12SR2	2043–5033
DgA6F / DNC5'R	3858–5931
SoCF / SqND2R	5722–7853
SqSF / DgA6R	7387–10963
DgA6F / DgND5R	10880–13478
SDHF / SoCBR2	13323–16190
DGCBF / Dg16SR	15454–18010
SqLF / DNC5'R	17855–19836

^aSpecific primers may occur within either copy 1 or 2 of the duplicated regions of the mitochondrial genome, but the second primer defines the region amplified

Table S11. PCR primers used for amplification of the Equatorial clade of *Sthenoteuthis oualaniensis* mitochondrial DNA

Primer pair ^a	Region amplified on mitochondrial genome
DgEF / RSqI	19719–00994
SoAF / SCOR	834–1545
SqIF / HCO2198	994–2155
DCOF / DG12SR2	2056–5049
DgA6F / DNC5'R	3870–5952
SoCF / RSqS	5742–7425
SoCO3F / SqND2R	7104–7871
SqSF / DgA6R	7405–10981
SoA6F / WGN4R3	11519–13485
SDHF / WGCBR	13340–15647
DGCBF / Dg16SR	15471–18027
SqLF / DNC5'R	17872–19852

^aSpecific primers may occur within either copy 1 or 2 of the duplicated regions of the mitochondrial genome, but the second primer defines the region amplified