**TABLE S1|** COI and 16S gene sequences of giant clams and ITS1 gene sequences of zooxanthellae from the present study used in the phylogenetic analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Giant clams** |  | **Zooxanthellae** |
| **Species name** | **COI** **(Gen Bank No.)** | **16S** **(Gen Bank No.)** |  | **Species name** | **ITS1** **(Gen Bank No.)** |
| Xisha01 | *Tridacna crocea* | OK070659 | OK380469 |  | *Symbiodinium* (CladeⅠ) | MZ578378 |
| Xisha02 | *Tridacna noae* | OK070660 | MZ570152 |  | - | - |
| Xisha03 | *Tridacna crocea* | OK070662 | MZ570153 |  | - | - |
| Xisha04 | *Tridacna crocea* | OK070663 | MZ570154 |  | - | - |
| Xisha05 | *Tridacna crocea* | OK070664 | MZ570155 |  | - | - |
| Xisha06 | *Tridacna crocea* | OK070665 | MZ570156 |  | *Symbiodinium* (CladeⅠ) | MZ578379 |
| Xisha07 | *Tridacna maxima* | OK070666 | MZ570157 |  | - | - |
| Xisha08 | *Tridacna maxima* | OK070667 | MZ570158 |  | - | - |
| Xisha09 | *Tridacna crocea* | OK070668 | MZ570159 |  | *Symbiodinium* (CladeⅠ) | MZ578380 |
| Xisha10 | *Tridacna crocea* | OK070669 | MZ570160 |  | *Symbiodinium* (CladeⅠ) | MZ578381 |
| Xisha11 | *Tridacna crocea* | OK070670 | MZ570161 |  | - | - |
| Xisha12 | *Tridacna maxima* | OK070671 | MZ570162 |  | - | - |
| Xisha13 | *Tridacna crocea* | OK070672 | MZ570163 |  | - | - |
| Xisha14 | *Tridacna crocea* | OK070673 | MZ570164 |  | - | - |
| Xisha15 | *Tridacna maxima* | OK070674 | MZ570165 |  | - | - |
| Xisha16 | *Tridacna noae* | OK070675 | MZ570166 |  | *Symbiodinium* (CladeⅠ) | MZ578382 |
| Xisha17 | *Tridacna crocea* | OK070676 | MZ570167 |  | *Symbiodinium* (CladeⅠ) | MZ578383 |
| Xisha18 | *Tridacna crocea* | OK070677 | MZ570168 |  | *Cladocopium* (CladeⅡ-1) | MZ578384 |
| Xisha19 | *Tridacna crocea* | OK070678 | MZ570169 |  | *Cladocopium* (CladeⅡ-2) | MZ578385 |
| Xisha20 | *Tridacna crocea* | OK070679 | MZ570170 |  | *Cladocopium* (CladeⅡ-1) | MZ578386 |
| Xisha21 | *Tridacna maxima* | OK070680 | MZ570171 |  | *Symbiodinium* (CladeⅠ) | MZ578387 |
| Xisha22 | *Tridacna crocea* | OK070681 | MZ570172 |  | *Cladocopium* (CladeⅡ-2) | MZ578388 |
| Xisha23 | *Tridacna maxima* | OK070682 | MZ570173 |  | - | - |
| Xisha24 | *Tridacna maxima* | OK070683 | MZ570174 |  | - | - |
| Xisha25 | *Tridacna crocea* | OK070684 | MZ570175 |  | *Symbiodinium* (CladeⅠ) | MZ578389 |
| Xisha26 | *Tridacna crocea* | OK070685 | MZ570176 |  | *Symbiodinium* (CladeⅠ) | MZ578390 |
| Xisha27 | *Tridacna maxima* | OK070686 | MZ570177 |  | *Symbiodinium* (CladeⅠ) | MZ578391 |
| Xisha28 | *Tridacna crocea* | OK070687 | MZ570178 |  | - | - |
| Xisha29 | *Tridacna maxima* | OK070688 | MZ570179 |  | *Symbiodinium* (CladeⅠ) | MZ578392 |
| Xisha30 | *Tridacna maxima* | - | - |  | *Symbiodinium* (CladeⅠ) | MZ578393 |
| Xisha31 | *Tridacna crocea* | OK070689 | MZ570180 |  | - | - |
| Xisha32 | *Tridacna maxima* | OK070690 | MZ570181 |  | *Symbiodinium* (CladeⅠ) | MZ578394 |
| Xisha33 | *Tridacna noae* | OK070691 | MZ570182 |  | *Symbiodinium* (CladeⅠ) | MZ578395 |
| Xisha34 | *Tridacna maxima* | OK070692 | MZ570183 |  | - | - |
| Xisha35 | *Tridacna maxima* | OK070693 | MZ570184 |  | - | - |
| Xisha36 | *Tridacna crocea* | OK070694 | MZ570185 |  | - | - |
| Xisha37 | *Tridacna crocea* | OK070695 | MZ570186 |  | - | - |
| Xisha38 | *Tridacna maxima* | - | - |  | - | - |
| Xisha39 | *Tridacna maxima* | - | - |  | - | - |
| Xisha40 | *Tridacna crocea* | OK070696 | MZ570187 |  | *Symbiodinium* (CladeⅠ) | MZ578396 |
| Xisha41 | *Tridacna maxima* | - | - |  | *Symbiodinium* (CladeⅠ) | MZ578397 |
| Xisha42 | *Tridacna crocea* | OK070697 | MZ570188 |  | - | - |
| Xisha43 | *Tridacna maxima* | - | MZ570189 |  | *Symbiodinium* (CladeⅠ) | MZ578398 |
| Xisha44 | *Tridacna crocea* | OK070698 | MZ570190 |  | *Symbiodinium* (CladeⅠ) | MZ578399 |
| Xisha45 | *Tridacna crocea* | OK070699 | MZ570191 |  | *Symbiodinium* (CladeⅠ) | MZ578400 |
| Xisha46 | *Tridacna crocea* | OK070700 | MZ570192 |  | *Symbiodinium* (CladeⅠ) | MZ578401 |
| Xisha47 | *Tridacna crocea* | OK070701 | MZ570193 |  | - | - |
| Xisha48 | *Tridacna crocea* | OK070702 | MZ570194 |  | *Cladocopium* (CladeⅡ-1) | MZ578402 |
| Xisha49 | *Tridacna crocea* | OK070703 | MZ570195 |  | *Cladocopium* (CladeⅡ-1) | MZ578403 |
| Xisha50 | *Tridacna maxima* | - | - |  | - | - |
| Xisha51 | *Tridacna crocea* | OK070704 | MZ570196 |  | *Cladocopium* (CladeⅡ-1) | MZ578404 |
| Xisha52 | *Tridacna maxima* | - | MZ570197 |  | *Symbiodinium* (CladeⅠ) | MZ578405 |
| Xisha53 | *Tridacna crocea* | OK070705 | MZ570198 |  | *Symbiodinium* (CladeⅠ) | MZ578406 |
| Xisha54 | *Tridacna crocea* | OK070706 | MZ570199 |  | - | - |
| Xisha55 | *Tridacna crocea* | OK070707 | MZ570200 |  | *Symbiodinium* (CladeⅠ) | MZ578407 |
| Xisha56 | *Tridacna crocea* | OK070708 | MZ570201 |  | *Symbiodinium* (CladeⅠ) | MZ578408 |
| Xisha57 | *Tridacna maxima* | OK070709 | - |  | *Cladocopium* (CladeⅡ-2) | MZ578409 |
| Xisha58 | *Tridacna maxima* | - | - |  | - | - |
| Xisha59 | *Tridacna crocea* | OK070710 | MZ570202 |  | *Symbiodinium* (CladeⅠ) | MZ578410 |
| Xisha60 | *Tridacna crocea* | OK070711 | MZ570203 |  | *Cladocopium* (CladeⅡ-1) | MZ578411 |
| Xisha61 | *Tridacna crocea* | OK070712 | MZ570204 |  | *Cladocopium* (CladeⅡ-2) | MZ578412 |
| Xisha62 | *Tridacna crocea* | OK070713 | MZ570205 |  | *Cladocopium* (CladeⅡ-1) | MZ578413 |
| Xisha63 | *Tridacna crocea* | OK070714 | MZ570206 |  | - | - |
| Xisha64 | *Tridacna crocea* | OK070715 | MZ570207 |  | - | - |
| Xisha65 | *Tridacna crocea* | OK070716 | MZ570208 |  | - | - |
| Xisha66 | *Tridacna crocea* | OK070717 | MZ570209 |  | - | - |
| Xisha67 | *Tridacna maxima* | - | - |  | *Cladocopium* (CladeⅡ-2) | MZ578414 |
| Xisha68 | *Tridacna maxima* | - | - |  | *Cladocopium* (CladeⅡ-2) | MZ578415 |
| Xisha69 | *Tridacna maxima* | OK070737 | MZ570210 |  | *Cladocopium* (CladeⅡ-1) | MZ578416 |
| Xisha70 | *Tridacna maxima* | OK070738 | MZ570211 |  | *Cladocopium* (CladeⅡ-1) | MZ578417 |
| Xisha71 | *Tridacna maxima* | OK070739 | MZ570212 |  | *Cladocopium* (CladeⅡ-1) | MZ578418 |
| Xisha72 | *Tridacna maxima* | OK070740 | MZ570213 |  | *Cladocopium* (CladeⅡ-2) | MZ578419 |
| Xisha73 | *Tridacna maxima* | OK070741 | MZ570214 |  | *Symbiodinium* (CladeⅠ) | MZ578420 |
| Xisha74 | *Tridacna maxima* | OK070742 | MZ570215 |  | *Cladocopium* (CladeⅡ-2) | MZ578421 |
| Xisha75 | *Tridacna maxima* | OK070743 | MZ570216 |  | *Cladocopium* (CladeⅡ-1) | MZ578422 |
| Xisha76 | *Tridacna maxima* | - | - |  | *Cladocopium* (CladeⅡ-1) | MZ578423 |
| Xisha77 | *Tridacna maxima* | OK070744 | MZ570217 |  | - | - |
| Sanya01 | *Tridacna noae* | OK070657 | MZ570218 |  | - | - |
| Sanya02 | *Tridacna noae* | OK070658 | MZ570219 |  | *Symbiodinium* (CladeⅠ) | MZ578424 |
| Sanya03 | *Tridacna noae* | OK070661 | MZ570220 |  | *Symbiodinium* (CladeⅠ) | MZ578425 |
| Sanya04 | *Tridacna noae* | OK070732 | MZ570221 |  | *Symbiodinium* (CladeⅠ) | MZ578426 |
| Sanya05 | *Tridacna noae* | OK070733 | MZ570222 |  | - | - |
| Sanya06 | *Tridacna crocea* | OK070734 | MZ570223 |  | *Symbiodinium* (CladeⅠ) | MZ578427 |
| Sanya07 | *Tridacna noae* | OK070735 | MZ570224 |  | *Symbiodinium* (CladeⅠ) | MZ578428 |
| Sanya08 | *Tridacna noae* | OK070736 | MZ570225 |  | - | - |
| Sanya09 | *Tridacna crocea* | OK070718 | MZ570226 |  | *Symbiodinium* (CladeⅠ) | MZ578429 |
| Sanya10 | *Tridacna noae* | OK070719 | MZ570227 |  | - | - |
| Sanya11 | *Tridacna noae* | OK070720 | MZ570228 |  | - | - |
| Sanya12 | *Tridacna noae* | OK070721 | MZ570229 |  | *Cladocopium* (CladeⅡ-2) | MZ578430 |
| Sanya13 | *Tridacna crocea* | OK070722 | MZ570230 |  | - | - |
| Sanya14 | *Tridacna noae* | - | - |  | *Symbiodinium* (CladeⅠ) | MZ578431 |
| Sanya15 | *Tridacna noae* | OK070723 | MZ570231 |  | *Symbiodinium* (CladeⅠ) | MZ578432 |
| Sanya16 | *Tridacna crocea* | OK070724 | MZ570232 |  | - | - |
| Sanya17 | *Tridacna noae* | OK070725 | MZ570233 |  | *Symbiodinium* (CladeⅠ) | MZ578433 |
| Sanya18 | *Tridacna crocea* | OK070726 | MZ570234 |  | - | - |
| Sanya19 | *Tridacna noae* | OK070727 | MZ570235 |  | *Symbiodinium* (CladeⅠ) | MZ578434 |
| Sanya20 | *Tridacna noae* | OK070728 | MZ570236 |  | *Symbiodinium* (CladeⅠ) | MZ578435 |
| Sanya21 | *Tridacna crocea* | OK070729 | MZ570237 |  | - | - |
| Sanya22 | *Tridacna noae* | OK070730 | MZ570238 |  | *Symbiodinium* (CladeⅠ) | MZ578436 |
| Sanya23 | *Tridacna crocea* | OK070731 | MZ570239 |  | - | - |

Note: - showed Unamplified.

**TABLE S2|** Shell morphological characters in two phenotypes of *T. crocea*.

|  |  |  |
| --- | --- | --- |
| Item | *T. crocea* -1 | *T. crocea* -2 |
| Shell height / shell length | 0.72±0.04 | 0.73±0.07 |
| Shell width / shell length | 0.52±0.04b | 0.57±0.05a |
| Hinge length / shell length | 0.41±0.03 | 0.44±0.05 |
| Byssal opening length / shell length | 0.45±0.04b | 0.47±0.03a |
| Byssal opening width / shell length | 0.20±0.03b | 0.26±0.10a |
| Number of radial rib | 4~5 | 4~5 |
| Number of hinge tooth | 2~10 | 4~9 |

Notes: Different letters within the same row denote significant differences between means at *P* < 0.05.