

Supplementary Materials

Algae 2023, 38(1): 23-38

<https://doi.org/10.4490/algae.2023.38.3.14>

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Supplementary Table S1. Voucher number and collection information of newly analyzed sequences

| Species | Voucher | Collection information | rbcl |
|---|-----------|---|----------|
| " <i>Grateloupia</i> " <i>acuminata</i> Holmes | 140328-36 | Enoshima, kanagawa, Japan; Mar 28, 2014 | OQ603686 |
| " <i>G.</i> " <i>asiatica</i> S. Kawaguchi & H. W. Wang | G49 | Seokhwangdo, Jindo, Korea; Jul 10, 2001 | OQ603687 |
| | SH300 | Hoidong, Jindo, Korea; Feb 27, 2002 | OQ603688 |
| | SH301 | Sasudo, Chujado, Jeju, Korea; May 24, 2005 | OQ603689 |
| | G542 | Buckyeckryelbido, Taeon, Korea; May 9, 2006 | OQ603690 |
| | P2527 | Daecheon, Boryeong, Korea; Jan 23, 2007 | OQ603691 |
| | G731 | Hackampo, Taeon, Korea; May 21, 2007 | OQ603692 |
| | G804 | Sodol, Gangneung, Korea; Apr 12, 2008 | OQ603693 |
| | G876 | Uhyeong, Jeju, Korea; May 5, 2008 | OQ603694 |
| | G953 | Kimnyeong, Jeju, Korea; May 6, 2008 | OQ603695 |
| | G1214 | Sakya, Jeju, Korea; Jun 6, 2009 | OQ603696 |
| | P2331 | Gaduckdo, Busan, Korea; Jun 12, 2009 | OQ603697 |
| | G3974 | Odo-2ri, Pohang, Korea; Apr 18, 2010 | OQ603698 |
| | G3982 | Sungsan, Jeju, Korea; Mar 26, 2010 | OQ603699 |
| | SH159 | Kyeokpo, Buan, Korea; Apr 17, 2010 | OQ603700 |
| | P2636 | Sooryeomri, Kyeongju, Korea; Apr 29, 2010 | OQ603701 |
| | SH190 | Sangjockam, Gosung, Korea; May 5, 2011 | OQ603702 |
| | SH176 | Haeyeumkang, Geojaedo, Korea; May 6, 2011 | OQ603703 |
| | SH185 | Dojangpo, Geojaedo, Korea; May 6, 2011 | OQ603704 |
| | SH213 | Saehwa, Jeju, Korea; Jul 4, 2011 | OQ603705 |
| | SH264 | Gosan, Jeju, Korea; Jul 9, 2011 | OQ603706 |
| | SH201 | Yongwoondong, Jeju, Korea; Jul 11, 2011 | OQ603707 |
| | GrSu001 | Jongdal, Jeju, Korea; Feb 4, 2012 | OQ603708 |
| | Gras014 | Hayae, Jeju, Korea; May 3, 2012 | OQ603709 |
| | 120705-31 | Kimnyeong, Jeju, Korea; Jul 5, 2012 | OQ603710 |
| | 120720-05 | Whoaam, Ulsan, Korea; Jul 20, 2012 | OQ603711 |
| | SKKU16 | Anin, Gangneung, Korea; Oct 27, 2012 | OQ603712 |
| | SKKU47 | Kangu, Yeongdeok, Korea; Jan 25, 2013 | OQ603713 |
| | SKKU49 | Gampo, Kyeongju, Korea; Jan 25, 2013 | OQ603714 |
| | 140224-23 | Oshoro, Hokkaido, Japan; Feb 24, 2014 | OQ603715 |
| | 140422-35 | Dodoo, Jeju, Korea; Apr 22, 2014 | OQ603716 |
| | 141021-11 | Bangpo, Taeon, Korea; Oct 21, 2014 | OQ603717 |
| | GrSu013 | Geomoondo, Yeosu, Korea; Aug 20, 2016 | OQ603718 |
| | GrSu016 | Yockjido, Tongyoung, Korea; Aug 22, 2016 | OQ603719 |
| | 1806-014 | Gijang, Busan Korea; Jun 29, 2018 | OQ603720 |
| | 1903-013 | Songdo, Busan, Korea; Mar 5, 2019 | OQ603721 |
| | 1905-051 | Youpo, Namhae, Korea; May 21, 2019 | OQ603722 |
| | 1906-028 | Seogeondo, Jeju, Korea; Jun 2, 2019 | OQ603723 |
| | 1910-032 | Shinyang, Jeju, Korea; Oct 15, 2019 | OQ603724 |
| | 1911-027 | Oenarodo, Goheung, Korea; Nov 14, 2019 | OQ603725 |
| | 1911-031 | Molamdo, Goheung, Korea; Nov 15, 2019 | OQ603726 |
| | 1911-042 | Dolsando, Yeosu, Korea; Nov 16, 2019 | OQ603727 |
| | 1911-055 | Uihangri, Taeon, Korea; Nov 28, 2019 | OQ603728 |
| | 1912-057 | Myeongsundo, Ulsan, Korea; Dec 14, 2019 | OQ603729 |
| | 2001-001 | Shikanoshima, Fukuoka, Japan; Jan 5, 2020 | OQ603730 |
| | 2001-009 | Anyu, Kitakyushu, Japan; Jan 6, 2020 | OQ603731 |
| | 2001-020 | Karatsu, Saga, Japan; Jan 8, 2020 | OQ603732 |
| | 2001-025 | Hirado, Nagasaki, Japan; Jan 9, 2020 | OQ603733 |
| | 2002-001 | Dongchon, Shinjido, Korea; Feb 1, 2020 | OQ603734 |
| | 2002-026 | Namsungri, Haenam, Korea; Feb 2, 2020 | OQ603735 |
| | 2002-036 | Sanghangdo, Tongyoung, Korea; Feb 7, 2020 | OQ603736 |
| | 2004-030 | Jangdeung, Yeosu, Korea; Apr 12, 2020 | OQ603737 |
| | 2005-041 | Masanri, Pohang, Korea; May 17, 2020 | OQ603738 |
| | 2005-061 | DadongbaeIri, Pohang, Korea; May 17, 2020 | OQ603739 |

Supplementary Table S1. Continued

| Species | Voucher | Collection information | <i>rbcL</i> | |
|---|--|--|---|----------|
| <i>G. catenata</i> Yendo | 2005-093 | Bongsan 2 ri, Uljin, Korea; May 24, 2020 | OQ603740 | |
| | 2005-176 | Moochangpo, Boryeong, Korea; May 27, 2020 | OQ603741 | |
| | 2006-003 | Goongchonhang, Samcheok, Korea; Jun 1, 2020 | OQ603742 | |
| | Gras020 | Padori, Taeon, Korea; Feb 23, 2016 | OQ603743 | |
| | G416 | Hansuri, Jeju, Korea; Nov 13, 2004 | OQ603744 | |
| | G741 | Oiyeondo, Boryeong, Korea; Aug 12, 2006 | OQ603745 | |
| | GrCa001 | Geumneung, Jeju, Korea; May 8, 2012 | OQ603746 | |
| | 120518-02 | Kimnyeong, Jeju, Korea; May 18, 2012 | OQ603747 | |
| | 120601-10 | Saehwa, Jeju, Korea; Jun 1, 2012 | OQ603748 | |
| | 140908-11 | Deokjeok, Incheon, Korea; Sep 8, 2014 | OQ603749 | |
| | GrRa001 | Jeongam, Yangyang, Korea; Dec 29, 2015 | OQ603750 | |
| | 1912-045 | Myeongsundo, Ulsan, Korea; Dec 14, 2019 | OQ603751 | |
| | 2004-032 | Jangdeung, Yeosu, Korea; Apr 12, 2020 | OQ603752 | |
| | 2007-040 | Seogeondo, Jeju, Korea; Jul 6, 2020 | OQ603753 | |
| | " <i>G.</i> <i>divaricata</i> Okamura | G3842 | Anin, Gangneung, Korea; Mar 14, 2010 | OQ603754 |
| | | G3850 | Jeoncheon, Donghae, Korea; Mar 14, 2010 | OQ603755 |
| SH10 | | Jeoncheon, Donghae, Korea; Mar 14, 2010 | OQ603756 | |
| G3973 | | Odo 2ri, Pohang, Korea; Apr 18, 2010 | OQ603757 | |
| SH353 | | Jeoncheon, Donghae, Korea; Dec 21, 2011 | OQ603758 | |
| SH354 | | Jeoncheon, Donghae, Korea; Dec 21, 2011 | OQ603759 | |
| 2005-129 | | Sodol, Gangneung, Korea; May 31, 2020 | OQ603760 | |
| 2005-130 | | Sodol, Gangneung, Korea; May 31, 2020 | OQ603761 | |
| 2005-165 | | Anin, Gangneung, Korea; May 31, 2020 | OQ603762 | |
| 2106-064 | | Songjiho beach, Goseong, Korea; Jun 24, 2021 | OQ603763 | |
| " <i>G.</i> <i>livida</i> (Harvey) Yamada | G328 | Nagasaki, Chiba, Japan; Aug 1, 2004 | OQ603764 | |
| | 140224-21 | Oshoro, Hokkaido, Japan; Feb 24, 2014 | OQ603765 | |
| | 170417-22 | Shimoda, Shizuoka, Japan; Apr 17, 2017 | OQ603766 | |
| | 170417-66 | Shimoda, Shizuoka, Japan; Apr 17, 2017 | OQ603767 | |
| " <i>G.</i> <i>subpectinata</i> Holmes | G1183 | Sakya, Jeju, Korea; Jun 6, 2009 | OQ603768 | |
| | G1188 | Sakya, Jeju, Korea; Jun 6, 2009 | OQ603769 | |
| | SH14 | Gamchusa, Donghae, Korea; Mar 14, 2010 | OQ603770 | |
| | 120324-01 | Sakya, Jeju, Korea; Mar 24, 2012 | OQ603771 | |
| | 120325-07 | Jongdal, Jeju, Korea; Mar 25, 2012 | OQ603772 | |
| | 120515-09 | Hado, Jeju, Korea; May 15, 2012 | OQ603773 | |
| | 120519-92 | Namae, Yangyang, Korea; May 19, 2012 | OQ603774 | |
| | 120519-93 | Namae, Yangyang, Korea; May 19, 2012 | OQ603775 | |
| | 121027-47 | Gangneung, Korea; Sep 27, 2012 | OQ603776 | |
| | SKKU36 | Hoidong, Jindo, Korea; Dec 17, 2012 | OQ603777 | |
| | 130414-75 | Shimoda, Shizuoka, Japan; Apr 12, 2013 | OQ603778 | |
| | 130801-27 | Jackdo, Yeosu, Korea; Aug 1, 2013 | OQ603779 | |
| | 140823-04 | Kangu, Yeongdeok, Korea; Aug 23, 2014 | OQ603780 | |
| | 140823-36 | Jukbyeon, Uljin, Korea; Aug 23, 2014 | OQ603781 | |
| | L160309-06 | Sakya, Jeju, Korea; Mar 9, 2016 | OQ603782 | |
| | GrSu003 | Geomoondo, Yeosu, Korea; Jun 21, 2016 | OQ603783 | |
| | GrSu010 | Geomoondo, Yeosu, Korea; Jun 21, 2016 | OQ603784 | |
| | 1807-001 | Sobackildo, Goheung, Korea; Jul 12, 2018 | OQ603785 | |
| | 1912-059 | Myeongsundo, Ulsan, Korea; Dec 14, 2019 | OQ603786 | |
| | 1912-060 | Myeongsundo, Ulsan, Korea; Dec 14, 2019 | OQ603787 | |
| | 2001-014 | Tsunoshima island, Shimonoseki, Japan; Jan 7, 2020 | OQ603788 | |
| | 2001-016 | Tsunoshima island, Shimonoseki, Japan; Jan 7, 2020 | OQ603789 | |
| | 2004-007 | Chodo, Yeosu, Korea; Apr 10, 2020 | OQ603790 | |
| | 2004-031 | Jangdeung, Yeosu, Korea; Apr 12, 2020 | OQ603791 | |
| | 2005-029 | Masanri, Pohang, Korea; May 17, 2020 | OQ603792 | |
| | 2005-038 | Masanri, Pohang, Korea; May 17, 2020 | OQ603793 | |
| | 2005-040 | Masanri, Pohang, Korea; May 17, 2020 | OQ603794 | |
| | 2005-045 | Odo1ri, Pohang, Korea; May 17, 2020 | OQ603795 | |
| | 2005-091 | Bongsan 2ri, Uljin, Korea; May 24, 2020 | OQ603796 | |
| | 2005-092 | Bongsan 2ri, Uljin, Korea; May 24, 2020 | OQ603797 | |
| | 2005-132 | Sodol, Gangneung, Korea; May 31, 2020 | OQ603798 | |
| | 2005-136 | Sodol, Gangneung, Korea; May 31, 2020 | OQ603799 | |
| 2006-001 | Goongchonhang, Samcheok, Korea; Jun 1, 2020 | OQ603800 | | |
| 2006-002 | Goongchonhang, Samcheok, Korea; Jun 1, 2020 | OQ603801 | | |
| 2106-057 | Sacheonjin, Gangneung, Korea; Jun 24, 2021 | OQ603802 | | |
| 2106-065 | Songjiho beach, Goseong, Korea; Jun 24, 2021 | OQ603803 | | |