

## CULTIVATION BEHAVIOUR AND TERRITORIAL DEFENSE

For each species, two observers monitored resource-related behaviours and defense for a total of 500 minutes of observation over four days. Each day, damselfish ( $n=10$ ) were monitored for five 90 minutes observational periods between 700 and 1630 h (700-830, 900-1030, 1100-1230, 1300-1430, 1500-1630 h). During each 90-minute period, ten individuals were observed per observer for five minutes. The number of bites (grazing turf algae, coral-pecking, weeding of undesirable species) and defecations were recorded per minute during each five-minute period. Observers also noted aggressive interspecific and intraspecific interactions (territorial defense), including the species, size of the intruder, and the frequency of the attack during the observational period (Newton 1994). To compare the maximum bite-rates of turf algae, weeding, and coral-pecking between *S. apicalis* and *S. nigricans*, we used paired two-tailed t-tests.

Maximum bite rates were significantly higher for *S. nigricans* than *S. apicalis* for grazing turf algae and weeding undesirable species (table S3; figure S2a,b), suggesting that *S. nigricans* is a more intensive territorial grazer than *S. apicalis*. The maximum bite-rate of turf algae for *S. nigricans* is approximately 30% higher than the maximum bite-rate for *S. apicalis* (figure S2a). Although *S. nigricans* has a smaller average territory size than *S. apicalis* (approximately 0.5 m<sup>2</sup> and 1 m<sup>2</sup>, respectively), turf algae in *S. nigricans*' territories are substantially thicker and obtain a higher biomass via cultivation on branching acroporids as opposed to barren flat regions on the benthos (figure 1), as was described in the algal composition surveys. *S. nigricans* appear to engage in higher rates of grazing or 'farming' turf algae to sustain and further propagate thick turf algal mats within their territories. Rates of coral-pecking do not differ significantly between *S. apicalis* and *S. nigricans* (table S3) and remain low throughout the day, suggesting that territorial grazers play a minimal role in damaging coral colonies (figure S2c).

*S. apicalis* and *S. nigricans* pugnaciously chase away a wide array of intruders across all feeding guilds (figure S4; figure S5). For both species of *Stegastes*, no aggressive interactions were observed with lutjanids, serranids and adult scarids that were greater than 40 cm. However, *S. apicalis* did not react aggressively to territory invasions by holocentrids, scorpaenids and *Dischistodus melanotus*, suggesting that *S. apicalis* is aggressive to a smaller array of intruders than *S. nigricans*. *Stegastes*' defense against species across feeding guilds shows that they not only guard turf algae from herbivores and omnivores (including detritivores), they opportunistically protect all their resources, including invertebrates and corals from carnivores and corallivores (figure S4).

## TABLES AND FIGURES

**Table S1.** Assignments of bacterial genera into metabolic categories (autotrophs, heterotrophs, and potential pathogens). “R” denotes reference for metabolic grouping.

| <b>Autotrophs</b>          | <b>R</b> | <b>Heterotrophs</b>          | <b>R</b> | <b>Potential pathogens</b> | <b>R</b> |
|----------------------------|----------|------------------------------|----------|----------------------------|----------|
| <i>Anabaena</i>            | S1       | <i>Afifella</i>              | S19      | <i>Bartonella</i>          | S37      |
| <i>Aphanizomenon</i>       | S1       | <i>Candidatus Microthrix</i> | S20      | <i>Cardiobacterium</i>     | S38      |
| <i>Arthrospira</i>         | S2       | <i>Chondromyces</i>          | S21      | <i>Inquilinus</i>          | S39      |
| <i>Chamaesiphon</i>        | S3       | <i>Congregibacter</i>        | S22      | <i>Leptolyngbya*</i>       | S40      |
| <i>Cylindrospermopsis</i>  | S4       | <i>Flammeovirga</i>          | S23      | <i>Oscillatoria*</i>       | S40      |
| <i>Gloeobacter</i>         | S5       | <i>Kordia</i>                | S24      |                            |          |
| <i>Microcoleus</i>         | S6       | <i>Lewinella</i>             | S25      |                            |          |
| <i>Nitrospira</i>          | S7       | <i>Magnetococcus</i>         | S26      |                            |          |
| <i>Paracoccus</i>          | S8       | <i>Magnetospirillum</i>      | S27      |                            |          |
| <i>Planktothricoides</i>   | S9       | <i>Methylobacterium</i>      | S28      |                            |          |
| <i>Prochlorococcus</i>     | S10      | <i>Nisaea</i>                | S29      |                            |          |
| <i>Prochlorothrix</i>      | S9, S11  | <i>Oceanicola</i>            | S30      |                            |          |
| <i>Rhodovibrio</i>         | S12      | <i>Opitutus</i>              | S31      |                            |          |
| <i>Spirulina</i>           | S13      | <i>Phaeobacter</i>           | S32      |                            |          |
| <i>Synechococcus</i>       | S14      | <i>Pirellula</i>             | S33      |                            |          |
| <i>Thermosynechococcus</i> | S15      | <i>Rhodopirellula</i>        | S34      |                            |          |
| <i>Thioalkalivibrio</i>    | S16      | <i>Ruegeria</i>              | S32      |                            |          |
| <i>Thiorhodovibrio</i>     | S17      | <i>Shinella</i>              | S35      |                            |          |
| <i>Trichodesmium</i>       | S18      | <i>Wolbachia</i>             | S36      |                            |          |

\**Leptolyngbya* and *Oscillatoria* are coral-specific potential pathogens associated with black band disease.

**Table S2.** Average percent composition of turf algae and macroalgae found inside *S. apicalis*' territories, inside *S. nigricans*' territories and excluded from *Stegastes*' territories in the lagoon around Lizard Island in the northern GBR (A = abundant, 50-100 percent cover; O = occasional, 20-50 percent cover; R = rare, 0-20 percent cover).

| Turf Algae/Macroalgae            | <i>S. apicalis</i> ' territories |   |   | <i>S. nigricans</i> ' territories |   |   | Excluded from territories |   |   |
|----------------------------------|----------------------------------|---|---|-----------------------------------|---|---|---------------------------|---|---|
|                                  | A                                | O | R | A                                 | O | R | A                         | O | R |
| <i>Polysiphonia</i> sp.          | X                                |   |   | X                                 |   |   |                           |   |   |
| <i>Amphiroa foliacea</i>         |                                  |   | X |                                   |   | X |                           |   |   |
| <i>Ceramium</i> sp.              |                                  |   | X |                                   |   | X |                           |   |   |
| <i>Hormothamnion</i> sp.*        |                                  | X | X |                                   | X | X |                           |   |   |
| <i>Dictyosphaeria cavernosa</i>  |                                  |   | X |                                   |   |   |                           |   |   |
| <i>Lithophyllum moluccense</i>   |                                  |   | X |                                   |   |   |                           |   |   |
| <i>Lithophyllum kotschyannum</i> |                                  |   | X |                                   |   |   |                           |   |   |
| <i>Cladophora socialis</i>       |                                  |   | X |                                   |   |   |                           |   |   |
| Crustose coralline algae         |                                  |   | X |                                   |   |   |                           |   |   |
| <i>Halimeda opuntia</i>          |                                  |   | X |                                   |   |   |                           | X |   |
| <i>Sargassum crassifolium</i>    |                                  |   |   |                                   |   |   |                           | X |   |
| <i>Turbinaria ornata</i>         |                                  |   |   |                                   |   |   |                           | X |   |
| <i>Padina</i> sp.                |                                  |   |   |                                   |   |   |                           |   | X |
| <i>Ventricaria</i> sp.           |                                  |   |   |                                   |   |   |                           |   | X |

\**Hormothamnion* sp. is highly seasonal (occasional in the summer months and rare in the winter months in *S. apicalis* and *S. nigricans*' territories).

**Table S3.** Diversity metrics describing algal community composition, including average value and standard error (SE) for *S. apicalis*' territories and *S. nigricans*' territories as well as the t-value, degrees of freedom (df) and p-value results of a paired two-tailed t-test. Shaded cells contain statistically significant values ( $p < 0.05$ ).

| Diversity metrics  | <i>S. apicalis</i> |       | <i>S. nigricans</i> |       | t-value | df | p-value  |
|--------------------|--------------------|-------|---------------------|-------|---------|----|----------|
|                    | Average            | SE    | Average             | SE    |         |    |          |
| Species richness   | 6.4                | 0.4   | 3.2                 | 0.172 | 6.839   | 19 | < 0.0001 |
| Evenness           | 0.712              | 0.015 | 0.553               | 0.024 | 9.967   | 19 | < 0.0001 |
| Shannon Index (H') | 1.301              | 0.072 | 0.632               | 0.048 | 9.272   | 19 | < 0.0001 |

**Table S4.** T-value, degrees of freedom (df) and p-value results of a paired two-tailed t-test comparing the maximum bite-rates of grazing turf-algae, weeding undesirable species and coral-pecking between *S. apicalis* and *S. nigricans*. “Time of day” indicates the time of day at which bite-rates of the respective resource-related behaviour reaches a maximum. Shaded cells contain statistically significant values ( $p < 0.05$ ).

| <b>Bite-rates</b> | <b>Time of day</b> | <b>t-value</b> | <b>df</b> | <b>p-value</b> |
|-------------------|--------------------|----------------|-----------|----------------|
| Turf algae        | 1300-1430 h        | -3.818         | 35        | < 0.001        |
| Weeding           | 900-1030 h         | 4.792          | 35        | < 0.001        |
| Coral pecking     | 900-1030 h         | -0.407         | 35        | 0.686          |

**Table S5.** Kruskal-Wallis one-way of analysis of variance chi-squared ( $\chi^2$ ) and p-value results for the relative abundances of autotrophs, heterotrophs and coral-specific potential pathogens in the EAM in control plots outside of *Stegastes*' territories as compared to the relative abundances autotrophs, heterotrophs and coral-specific potential pathogens in the EAM in *S. apicalis*' territories and in *S. nigricans*' territories. Shaded cells contain statistically significant values ( $p < 0.05$ ).

| Microbial Community | <i>S. apicalis</i> |         | <i>S. nigricans</i> |         |
|---------------------|--------------------|---------|---------------------|---------|
|                     | $\chi^2$           | p-value | $\chi^2$            | p-value |
| Autotrophs          | 6.615              | 0.010   | 0.111               | 0.739   |
| Heterotrophs        | 3.84               | 0.050   | 8.218               | 0.004   |
| Potential pathogens | 4.335              | 0.037   | 7.471               | 0.006   |

**Table S6.** Summary of cyanobacterial potential coral pathogens (that were assigned to *Leptolyngbya*; comprised of 168 OTUs) matched to bacteria with the highest sequence similarity in BLAST, including the OTU number, percent abundance (of our OTUs), identity (percent similarity), definition (grouping of top match), environmental source, accession number and reference. Stars indicate additional high BLAST matches that are associated with corals, coral disease and marine environments.

| OTU      | Percent | Identity | Definition                                 | Source                                                 | Accession | Ref   |
|----------|---------|----------|--------------------------------------------|--------------------------------------------------------|-----------|-------|
| OTU_3    | 19.928  | 98       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471954  | S41   |
| OTU_344  | 13.814  | 98       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471954  | S41   |
| OTU_1560 | 7.951   | 92       | Uncultured bacterium clone                 | Coral-associated                                       | AF365814  | S42   |
| OTU_12   | 5.567   | 98       | Uncultured Nostocales cyanobacterium clone | Intertidal button thrombolitic mat                     | HQ415796  | S43   |
| OTU_3458 | 3.653   | 95       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471954  | S41   |
| OTU_5    | 3.161   | 94       | Uncultured bacterium clone                 | Coral-associated                                       | AF365814  | S42   |
| OTU_60   | 2.855   | 99       | Uncultured bacterium clone                 | Necrosed coral tissue                                  | AY529887  | S47   |
| OTU_30   | 2.264   | 98       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471955  | S41   |
| OTU_38   | 2.089   | 94       | Uncultured cyanobacterium                  | Seawater                                               | AM259754  | S44   |
|          |         | 96       | Uncultured cyanobacterium clone            | Black band disease mat                                 | JX463398  | S96*  |
| OTU_2408 | 2.089   | 91       | Uncultured bacterium clone                 | Coral-associated                                       | AF365814  | S42   |
| OTU_40   | 2.056   | 99       | Uncultured bacterium clone                 | Oolitic sand                                           | JX504463  | S45   |
|          |         | 98       | Uncultured bacterium clone                 | Associated with <i>Porites</i> sp.                     | EU636615  | S78*  |
| OTU_45   | 2.012   | 96       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471955  | S41   |
| OTU_287  | 1.947   | 99       | Uncultured Nostocales cyanobacterium clone | Intertidal button thrombolitic mat                     | HQ415796  | S43   |
| OTU_35   | 1.848   | 97       | Uncultured bacterium clone                 | Coral-associated                                       | AF365814  | S42   |
| OTU_63   | 1.695   | 99       | Uncultured marine bacterium clone          | CaCO <sub>3</sub> deposition, metallic artificial reef | FJ594839  | S48   |
|          |         | 98       | Uncultured cyanobacterium clone            | Black band diseased coral tissue                       | EF123578  | S101* |
| OTU_57   | 1.367   | 92       | Uncultured bacterium clone                 | <i>Montastraea faveolata</i> - healthy tissue          | FJ203453  | S46   |
| OTU_76   | 1.006   | 96       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471955  | S41   |
| OTU_263  | 0.973   | 99       | Uncultured Nostocales cyanobacterium clone | Intertidal button thrombolitic mat                     | HQ415796  | S43   |
| OTU_90   | 0.908   | 97       | Uncultured cyanobacterium                  | Seawater                                               | AM259754  | S44   |
|          |         | 97       | Uncultured cyanobacterium clone            | Black band disease mat                                 | JX463398  | S96*  |
| OTU_114  | 0.908   | 96       | Uncultured bacterium clone                 | Coral-associated                                       | AF365814  | S42   |
| OTU_1582 | 0.886   | 97       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471954  | S41   |
| OTU_122  | 0.809   | 98       | Uncultured bacterium clone                 | <i>Porites astreoides</i>                              | GU118939  | S49   |
| OTU_123  | 0.689   | 99       | Uncultured bacterium clone                 | <i>Montastraea faveolata</i> - healthy tissue          | FJ203581  | S46   |
| OTU_229  | 0.667   | 96       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471955  | S41   |
| OTU_1729 | 0.623   | 96       | Uncultured bacterium clone                 | BBD affected corals                                    | GU471954  | S41   |
| OTU_153  | 0.591   | 95       | Uncultured bacterium clone                 | Coral-associated                                       | AF365814  | S42   |



|          |       |    |                                                 |                                                |          |       |
|----------|-------|----|-------------------------------------------------|------------------------------------------------|----------|-------|
| OTU_171  | 0.525 | 96 | Uncultured cyanobacterium                       | Seawater                                       | AM259754 | S44   |
|          |       | 97 | Uncultured cyanobacterium clone                 | Black band disease mat                         | JX463398 | S96*  |
| OTU_189  | 0.481 | 98 | Uncultured cyanobacterium                       | Marine sediment                                | AM177431 | S50   |
| OTU_1659 | 0.470 | 97 | Uncultured bacterium clone                      | Diseased tissue                                | JQ516288 | S69   |
| OTU_55   | 0.470 | 98 | Uncultured <i>Rivularia</i> sp.                 | Rock surface of calcareous river               | EU009142 | S91   |
|          |       | 98 | Uncultured bacterium clone                      | Biofilm, glass                                 | JF262020 | S102* |
| OTU_87   | 0.470 | 94 | Uncultured Oscillatoriales cyanobacterium clone | Quartz, Tibet desert                           | FJ790628 | S92   |
| OTU_238  | 0.470 | 96 | Uncultured bacterium clone                      | Coral-associated                               | AF365814 | S42   |
| OTU_266  | 0.459 | 99 | Uncultured bacterium clone                      | <i>Montipora</i> tissue                        | FJ809378 | S52   |
| OTU_199  | 0.448 | 94 | Uncultured cyanobacterium                       | Seawater                                       | AM259754 | S44   |
|          |       | 93 | Uncultured bacterium clone                      | Coral-associated                               | AF365814 | S42*  |
| OTU_2230 | 0.448 | 92 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - healthy tissue  | FJ203574 | S46   |
| OTU_1397 | 0.427 | 98 | <i>Aphanocapsa</i> sp.                          | Bahamian marine stromatolite                   | EU249123 | S66   |
| OTU_1049 | 0.416 | 99 | Uncultured bacterium clone                      | Biofilm, glass                                 | JQ727046 | S61   |
| OTU_1891 | 0.416 | 96 | Uncultured bacterium clone                      | Coral-associated                               | AF365814 | S42   |
| OTU_1142 | 0.416 | 97 | Uncultured bacterium clone                      | BBD affected corals                            | GU471954 | S41   |
| OTU_225  | 0.405 | 96 | Uncultured bacterium clone                      | Sandy carbonate sediment                       | EF208676 | S51   |
|          |       | 96 | <i>Aphanocapsa</i> sp.                          | Bahamian marine stromatolite                   | EU249123 | S66*  |
| OTU_2136 | 0.383 | 94 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - diseased tissue | FJ203286 | S46   |
| OTU_1301 | 0.328 | 97 | Uncultured bacterium clone                      | BBD affected corals                            | GU471954 | S41   |
| OTU_353  | 0.306 | 97 | Uncultured bacterium clone                      | Coral-associated                               | AF365814 | S42   |
| OTU_342  | 0.295 | 99 | Uncultured bacterium clone                      | Oolitic sand                                   | JX504282 | S45   |
| OTU_350  | 0.284 | 99 | Uncultured bacterium clone                      | <i>Diploria strigosa</i>                       | GU118301 | S49   |
| OTU_764  | 0.284 | 94 | Uncultured bacterium clone                      | BBD affected corals                            | GU471955 | S41   |
| OTU_147  | 0.273 | 98 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - healthy tissue  | FJ203523 | S46   |
| OTU_523  | 0.262 | 95 | Uncultured cyanobacterium clone                 | White syndrome, <i>Turbinaria mesenterina</i>  | EU780386 | S55   |
| OTU_3487 | 0.262 | 95 | Uncultured bacterium clone                      | BBD affected corals                            | GU471954 | S41   |
| OTU_375  | 0.252 | 94 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - healthy tissue  | FJ203581 | S46   |
| OTU_441  | 0.241 | 97 | Uncultured cyanobacterium clone                 | Intertidal thrombolites                        | GQ484027 | S54   |
| OTU_425  | 0.219 | 99 | Uncultured bacterium clone                      | <i>Crassostrea gigas</i>                       | JF827522 | S53   |
| OTU_189  | 0.219 | 96 | Cyanobacterium                                  | Black band diseased <i>S. siderea</i>          | EF372582 | S93   |
| OTU_792  | 0.186 | 97 | <i>Calothrix</i> sp.                            | Rock surface, littoral zone, Baltic Sea        | AM230670 | S73   |
|          |       | 96 | Uncultured Nostocales cyanobacterium clone      | Intertidal button thrombotic mat               | HQ415796 | S43*  |
| OTU_2732 | 0.175 | 94 | Uncultured Nostocales cyanobacterium clone      | Intertidal button thrombotic mat               | HQ415796 | S43   |
| OTU_432  | 0.175 | 98 | Uncultured cyanobacterium clone                 | Microbial mat                                  | DQ181693 | S95   |
| OTU_1172 | 0.164 | 96 | Uncultured cyanobacterium clone                 | Permeable shelf sediment                       | DQ289927 | S64   |
| OTU_1609 | 0.164 | 92 | Oscillatoriales cyanobacterium                  | Oscillatoriales cyanobacterium                 | KC463193 | S68   |

|          |       |    |                                                 |                                               |          |      |
|----------|-------|----|-------------------------------------------------|-----------------------------------------------|----------|------|
| OTU_298  | 0.164 | 96 | Uncultured cyanobacterium                       | Sponge cortex                                 | AM259864 | S44  |
| OTU_2653 | 0.153 | 95 | Uncultured bacterium clone                      | Associated with <i>Porites</i> sp. coral      | EU636510 | S78  |
| OTU_3096 | 0.153 | 96 | Uncultured bacterium clone                      | BBD affected corals                           | GU471955 | S41  |
| OTU_2047 | 0.142 | 96 | Uncultured bacterium clone                      | Particle-attached bacteria fraction           | EU636510 | S78* |
| OTU_744  | 0.131 | 94 | Uncultured bacterium clone                      | Endolith                                      | JX258078 | S56  |
| OTU_763  | 0.131 | 96 | Uncultured cyanobacterium                       | Sponge cortex                                 | AM259864 | S44  |
| OTU_783  | 0.131 | 95 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - healthy tissue | FJ203453 | S46  |
| OTU_2099 | 0.131 | 95 | Uncultured bacterium clone                      | BBD affected corals                           | GU471954 | S41  |
| OTU_473  | 0.131 | 92 | Uncultured Oscillatoriales cyanobacterium clone | Quartz, Tibet desert                          | FJ790628 | S92  |
| OTU_648  | 0.120 | 92 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - healthy tissue | FJ203581 | S46  |
| OTU_859  | 0.109 | 97 | Uncultured bacterium clone                      | Coral-associated                              | AF365850 | S42  |
| OTU_978  | 0.109 | 99 | Uncultured cyanobacterium                       | <i>Xestospongia muta</i> sponge               | GU590841 | S58* |
| OTU_1021 | 0.109 | 96 | <i>Chroococciopsis</i> sp.                      | <i>Chroococciopsis</i> sp.                    | JF810076 | S60  |
| OTU_1024 | 0.109 | 94 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - healthy tissue | FJ203615 | S46  |
| OTU_75   | 0.109 | 95 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - healthy tissue | FJ203453 | S46  |
| OTU_787  | 0.098 | 97 | Uncultured Nostocales cyanobacterium clone      | Intertidal button thrombolytic mat            | HQ415796 | S43  |
| OTU_931  | 0.098 | 99 | Uncultured bacterium clone                      | Coral mucus                                   | FJ152382 | S57  |
| OTU_951  | 0.098 | 94 | Uncultured cyanobacterium clone                 | Intertidal thrombolites                       | GQ484055 | S54  |
| OTU_1093 | 0.098 | 97 | Uncultured bacterium clone                      | Seawater                                      | KC294803 | S62  |
| OTU_1135 | 0.098 | 96 | <i>Leptolyngbya</i> sp.                         | Red Sea                                       | JX470180 | S63  |
| OTU_1476 | 0.098 | 95 | Uncultured bacterium clone                      | BBD affected corals                           | GU471954 | S41  |
| OTU_2679 | 0.098 | 91 | <i>Rivularia</i> sp.                            | Intertidal zone                               | KC989702 | S80  |
| OTU_1010 | 0.098 | 93 | Uncultured cyanobacterium                       | Seawater                                      | AM259746 | S44  |
|          |       | 93 | Uncultured cyanobacterium clone                 | Black band disease mat                        | JX463422 | S96* |
| OTU_91   | 0.098 | 96 | Uncultured cyanobacterium                       | Seawater                                      | AM259754 | S44  |
|          |       | 97 | Uncultured cyanobacterium clone                 | Black band disease mat                        | JX463398 | S96* |
| OTU_421  | 0.098 | 97 | <i>Aphanocapsa</i> sp.                          | Bahamian marine stromatolite                  | EU249123 | S66  |
| OTU_1860 | 0.098 | 96 | Uncultured bacterium clone                      | <i>Montastraea faveolata</i> - healthy tissue | FJ203604 | S46  |
| OTU_1002 | 0.087 | 96 | Uncultured bacterium                            | Highly saline rhizospheric soil               | HG938349 | S59  |
| OTU_1003 | 0.087 | 96 | Uncultured bacterium clone                      | Necrosed coral tissue                         | AY529887 | S47  |
| OTU_1630 | 0.087 | 97 | Uncultured bacterium                            | Highly saline rhizospheric soil               | HG938349 | S59  |
| OTU_1111 | 0.077 | 95 | Uncultured bacterium clone                      | <i>Porites astreoides</i>                     | GU118939 | S49  |
| OTU_1313 | 0.077 | 96 | Uncultured organism clone                       | <i>Acropora palmata</i>                       | GU119575 | S49  |
| OTU_1372 | 0.077 | 95 | <i>Cyanothece</i> sp.                           | <i>Cyanothece</i> sp.                         | AY620238 | S65  |
| OTU_2686 | 0.077 | 97 | Uncultured bacterium clone                      | <i>Diploria strigosa</i>                      | GU118152 | S49  |
| OTU_2890 | 0.077 | 91 | <i>Calothrix</i> sp.                            | Rock surface, littoral zone, Baltic Sea       | AM230670 | S73  |
| OTU_590  | 0.077 | 98 | Uncultured cyanobacterium clone                 | Black band disease mat                        | JX463398 | S96  |
| OTU_1462 | 0.066 | 94 | Uncultured cyanobacterium                       | Marine sediment                               | AM168001 | S67  |

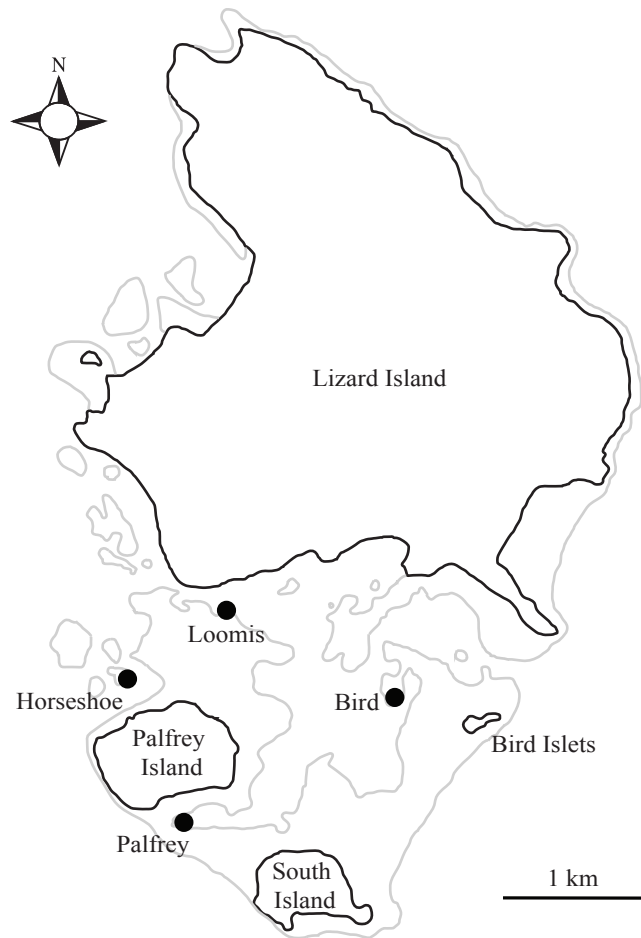
|          |       |    |                                           |                                                        |          |       |
|----------|-------|----|-------------------------------------------|--------------------------------------------------------|----------|-------|
| OTU_1655 | 0.066 | 99 | Uncultured bacterium clone                | Oolitic sand                                           | JX504288 | S45   |
| OTU_1666 | 0.066 | 95 | Uncultured bacterium clone                | Oolitic sand                                           | JX504329 | S45   |
| OTU_3573 | 0.066 | 96 | Uncultured bacterium clone                | <i>Diploria strigosa</i>                               | GU118152 | S49   |
| OTU_425  | 0.066 | 98 | Cyanobacterium endosymbiont               | <i>Rhopalodia gibba</i>                                | AB546730 | S94   |
| OTU_560  | 0.066 | 98 | <i>Cyanothece</i> sp.                     | <i>Cyanothece</i> sp.                                  | CP000806 | S82   |
| OTU_1709 | 0.055 | 87 | Uncultured bacterium clone                | <i>Montastraea faveolata</i> - healthy tissue          | FJ203376 | S46   |
| OTU_1832 | 0.055 | 92 | Uncultured bacterium clone                | Sandy carbonate sediment                               | EF208676 | S51   |
| OTU_2116 | 0.055 | 94 | Uncultured bacterium clone                | Necrosed coral tissue                                  | AY529887 | S47   |
| OTU_2160 | 0.055 | 93 | Uncultured bacterium clone                | Coral-associated                                       | AF365814 | S42   |
| OTU_3125 | 0.055 | 94 | Uncultured organism clone                 | <i>Acropora palmata</i>                                | GU119563 | S49   |
| OTU_3185 | 0.055 | 98 | Uncultured bacterium                      | Sediment of Lake Jusan                                 | AB779889 | S87   |
| OTU_3388 | 0.055 | 92 | Uncultured bacterium clone                | <i>Montastraea faveolata</i> - diseased tissue         | FJ203286 | S46   |
| OTU_3557 | 0.055 | 97 | <i>Cyanothece</i> sp.                     | <i>Cyanothece</i> sp.                                  | CP001701 | S90   |
| OTU_3657 | 0.055 | 96 | Uncultured cyanobacterium                 | Seawater                                               | AM259754 | S44   |
|          |       | 96 | Uncultured cyanobacterium clone           | Black band disease mat                                 | JX463398 | S96*  |
| OTU_340  | 0.055 | 97 | <i>Aphanocapsa</i> sp.                    | Bahamian marine stromatolite                           | EU249123 | S66   |
| OTU_816  | 0.055 | 99 | Uncultured bacterium clone                | <i>Diploria strigosa</i>                               | GU118301 | S49   |
| OTU_1014 | 0.055 | 94 | Uncultured bacterium clone                | <i>Montastraea faveolata</i> - healthy tissue          | FJ203581 | S46   |
| OTU_1714 | 0.044 | 97 | Uncultured <i>Halomicronema</i> sp. clone | Hamelin pool seawater                                  | EF150805 | S70   |
| OTU_2080 | 0.044 | 98 | <i>Porphyridium purpureum</i> chloroplast | <i>Porphyridium purpureum</i>                          | AP012987 | S71   |
| OTU_2098 | 0.044 | 90 | Uncultured organism clone                 | <i>Acropora palmata</i>                                | GU119563 | S49   |
| OTU_2125 | 0.044 | 96 | Uncultured bacterium clone                | Sea                                                    | JF514264 | S72   |
|          |       | 96 | Uncultured bacterium clone                | Particle-attached bacteria                             | EU628072 | S78*  |
| OTU_2151 | 0.044 | 92 | <i>Calothrix</i> sp.                      | Rock surface, littoral zone, Baltic Sea                | AM230670 | S73   |
|          |       | 94 | Uncultured cyanobacterium clone           | microbial mat of black band disease                    | JX022546 | S103* |
| OTU_2181 | 0.044 | 94 | Uncultured bacterium clone                | Coral-associated                                       | AF365814 | S42   |
| OTU_2194 | 0.044 | 94 | Uncultured bacterium clone                | <i>Montastraea faveolata</i> - healthy tissue          | FJ203581 | S46   |
| OTU_2252 | 0.044 | 99 | Uncultured marine bacterium clone         | CaCO <sub>3</sub> deposition, metallic artificial reef | FJ594844 | S48   |
|          |       | 97 | <i>Leptolyngbya</i> sp.                   | <i>Leptolyngbya</i> sp.                                | AY493584 | S104* |
| OTU_2261 | 0.044 | 95 | Uncultured cyanobacterium clone           | Sediments, polluted with crude oil                     | JQ580215 | S74   |
| OTU_2353 | 0.044 | 97 | Uncultured cyanobacterium clone           | <i>Montastrea faveolata</i>                            | FJ425596 | S75   |
| OTU_2541 | 0.044 | 96 | Uncultured bacterium clone                | Biofilm on artificial substrates                       | KC299299 | S76   |
| OTU_2553 | 0.044 | 95 | Uncultured marine microorganism clone     | coastal tropical surface seawater                      | KC425580 | S77*  |
| OTU_2613 | 0.044 | 96 | Uncultured bacterium clone                | <i>Montastraea franksi</i>                             | GU118716 | S49   |
| OTU_2635 | 0.044 | 96 | Uncultured bacterium clone                | <i>Montastraea faveolata</i> , aquarium 23 days        | FJ202607 | S46   |
| OTU_2758 | 0.044 | 94 | Uncultured bacterium clone                | <i>Montastraea faveolata</i> - healthy tissue          | FJ203581 | S46   |

|          |       |    |                                            |                                                 |          |       |
|----------|-------|----|--------------------------------------------|-------------------------------------------------|----------|-------|
| OTU_2824 | 0.044 | 96 | <i>Cyanothece</i> sp.                      | <i>Cyanothece</i> sp.                           | CP000806 | S82   |
| OTU_2899 | 0.044 | 97 | Uncultured bacterium clone                 | BBD affected corals                             | GU471944 | S41   |
| OTU_3186 | 0.044 | 95 | Uncultured bacterium clone                 | Sediment collected from Merri Creek             | EU284458 | S88   |
| OTU_172  | 0.044 | 96 | Uncultured Nostocales cyanobacterium clone | Intertidal button thrombolitic mat              | HQ415796 | S43   |
| OTU_614  | 0.044 | 93 | Uncultured bacterium clone                 | <i>Montastraea faveolata</i> - healthy tissue   | FJ203453 | S46   |
| OTU_1083 | 0.044 | 93 | Uncultured cyanobacterium clone            | Microbial mat                                   | DQ181685 | S95   |
| OTU_1129 | 0.044 | 91 | Uncultured bacterium clone                 | <i>Montastraea faveolata</i> - healthy tissue   | FJ203574 | S46   |
| OTU_1159 | 0.044 | 94 | Uncultured bacterium clone                 | <i>Montastraea faveolata</i> - healthy tissue   | FJ203524 | S46*  |
| OTU_1318 | 0.044 | 91 | Uncultured cyanobacterium clone            | Intertidal thrombolites                         | GQ483866 | S54   |
| OTU_1346 | 0.044 | 94 | Uncultured cyanobacterium clone            | White syndrome, <i>Turbinaria mesenterina</i>   | EU780364 | S55*  |
| OTU_1510 | 0.044 | 95 | Uncultured bacterium clone                 | Seawater next to dolphin                        | JQ197040 | S97   |
|          |       | 95 | Uncultured bacterium clone                 | Marine bulk water                               | JX016995 | S105* |
| OTU_1540 | 0.044 | 98 | Uncultured cyanobacterium clone            | White syndrome, <i>Turbinaria mesenterina</i>   | EU780386 | S55   |
| OTU_2657 | 0.033 | 98 | Uncultured bacterium clone                 | <i>Acropora eurystoma</i> exposed to pH 7.3     | GU319302 | S79   |
| OTU_2741 | 0.033 | 97 | <i>Gloeothece</i> sp.                      | <i>Gloeothece</i> sp.                           | AB067580 | S81   |
| OTU_2775 | 0.033 | 96 | <i>Leptolyngbya</i> sp.                    | Red Sea                                         | JX470180 | S63   |
| OTU_2779 | 0.033 | 97 | Uncultured bacterium clone                 | Oolitic sand                                    | JX504499 | S45   |
| OTU_2857 | 0.033 | 94 | Uncultured bacterium clone                 | Antarctic soil, glacier forefield               | JX172450 | S83   |
|          |       | 94 | Uncultured cyanobacterium clone            | Beach sediment                                  | JX041703 | S84*  |
| OTU_2956 | 0.033 | 96 | Uncultured cyanobacterium clone            | Beach sediment                                  | JX041703 | S84   |
| OTU_3022 | 0.033 | 91 | Uncultured cyanobacterium clone            | Intertidal thrombolites                         | GQ484055 | S54   |
| OTU_3038 | 0.033 | 93 | Uncultured bacterium clone                 | Coral-associated                                | AF365814 | S42   |
| OTU_3043 | 0.033 | 93 | Uncultured organism clone                  | Guerrero Negro hypersaline mat                  | JN513686 | S85   |
| OTU_3063 | 0.033 | 97 | Cyanobacterium sp.                         | Soil                                            | KC695862 | S86   |
| OTU_3140 | 0.033 | 91 | Uncultured bacterium clone                 | <i>Montastraea faveolata</i> , aquarium 23 days | FJ202541 | S46   |
| OTU_3471 | 0.033 | 96 | Uncultured bacterium clone                 | BBD affected corals                             | GU471954 | S41   |
| OTU_3494 | 0.033 | 97 | Uncultured cyanobacterium                  | Microbial mat from stromatolite head            | AB602500 | S89   |
| OTU_3548 | 0.033 | 93 | Uncultured bacterium clone                 | Coral-associated                                | AF365814 | S42   |
| OTU_68   | 0.033 | 92 | Uncultured bacterium clone                 | <i>Montastraea faveolata</i> - healthy tissue   | FJ203453 | S46   |
| OTU_214  | 0.033 | 97 | Uncultured cyanobacterium                  | Seawater                                        | AM259754 | S44   |
|          |       | 97 | Uncultured cyanobacterium clone            | Black band disease mat                          | JX463398 | S96*  |
| OTU_532  | 0.033 | 97 | <i>Cyanothece</i> sp.                      | <i>Cyanothece</i> sp.                           | AB067581 | S81   |
| OTU_840  | 0.033 | 98 | Uncultured bacterium clone                 | Necrosed coral tissue                           | AY529887 | S47   |
| OTU_1221 | 0.033 | 99 | Uncultured Nostocales cyanobacterium clone | Intertidal button thrombolitic mat              | HQ415797 | S43   |
| OTU_1687 | 0.033 | 96 | Uncultured bacterium clone                 | <i>Porites astreoides</i>                       | GU118939 | S49   |

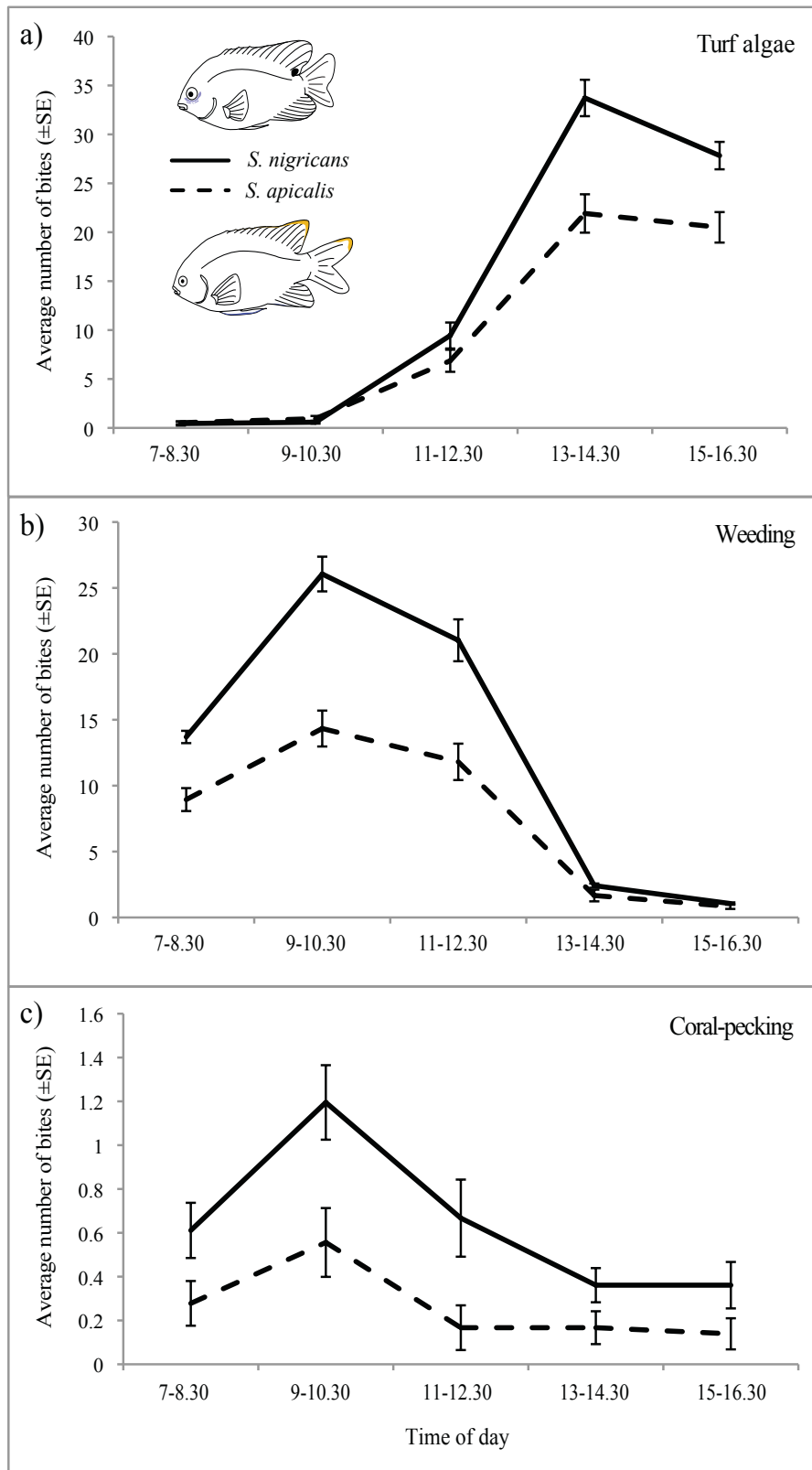
|          |       |    |                                         |                                               |          |      |
|----------|-------|----|-----------------------------------------|-----------------------------------------------|----------|------|
| OTU_1729 | 0.033 | 92 | Uncultured marine bacterium clone       | CaCO3 deposition, metallic artificial reef    | FJ594843 | S48  |
|          |       | 92 | <i>Leptolyngbya</i> sp.                 | Red Sea                                       | JX481735 | S63* |
| OTU_1799 | 0.033 | 93 | Uncultured cyanobacterium               | Coastal water                                 | AB691165 | S98  |
|          |       | 93 | Uncultured bacterium clone              | Coral-associated                              | AF365467 | S42* |
| OTU_1878 | 0.033 | 96 | Uncultured bacterium clone              | <i>Montastraea faveolata</i> - healthy tissue | FJ203524 | S46  |
| OTU_2252 | 0.033 | 91 | Uncultured bacterium isolate            | Mesophilic terrestrial mat                    | EF126282 | S99  |
| OTU_1754 | 0.022 | 92 | Filamentous thermophilic cyanobacterium | Filamentous cyanobacterium                    | DQ471445 | S100 |
| OTU_1755 | 0.022 | 91 | Uncultured bacterium clone              | <i>Montastraea faveolata</i> - healthy tissue | FJ203574 | S46  |
| OTU_72   | 0.011 | 95 | Uncultured bacterium clone              | Coral-associated                              | AF365814 | S42  |
| OTU_308  | 0.011 | 96 | Uncultured bacterium clone              | BBD affected corals                           | GU471955 | S41  |
| OTU_466  | 0.011 | 96 | Uncultured bacterium clone              | Coral-associated                              | AF365814 | S42  |
| OTU_1047 | 0.011 | 97 | Uncultured bacterium clone              | <i>Montastraea faveolata</i> - healthy tissue | FJ203453 | S46  |

**Table S7.** Summary of GLMM statistics showing the effects of *S. nigricans*' territories on the presence of black band disease in *Acropora muricata* outcrops. Shaded cells contain statistically significant values ( $p < 0.05$ ).

|                             | <b>Estimate</b> | <b>Std. Error</b> | <b>z-value</b> | <b>p-value</b> |
|-----------------------------|-----------------|-------------------|----------------|----------------|
| Intercept                   | -4.482          | 1.230             | -3.645         | <0.001         |
| <i>S. nigricans</i> present | 3.462           | 1.297             | 2.670          | 0.008          |

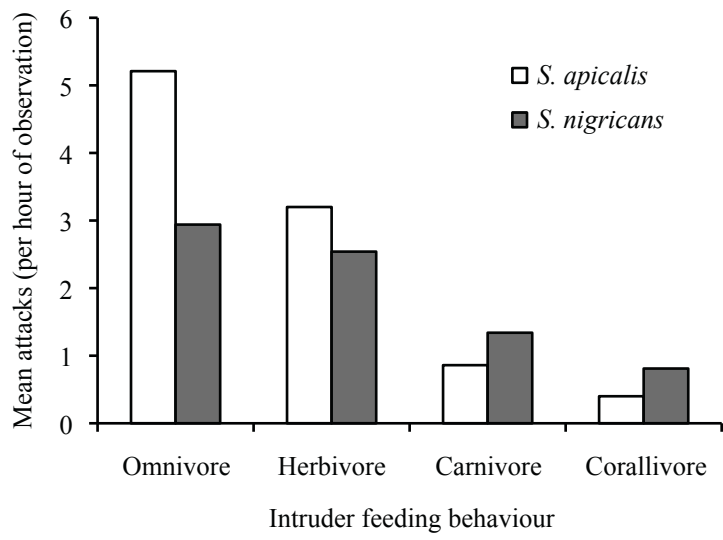


**Figure S1.** Map of Lizard Island and fringing reefs showing the microbial sampling site in the lagoon by Palfrey Island (Palfrey) and the four black band disease (BBD) survey sites (Palfrey, Bird, Loomis and Horseshoe).

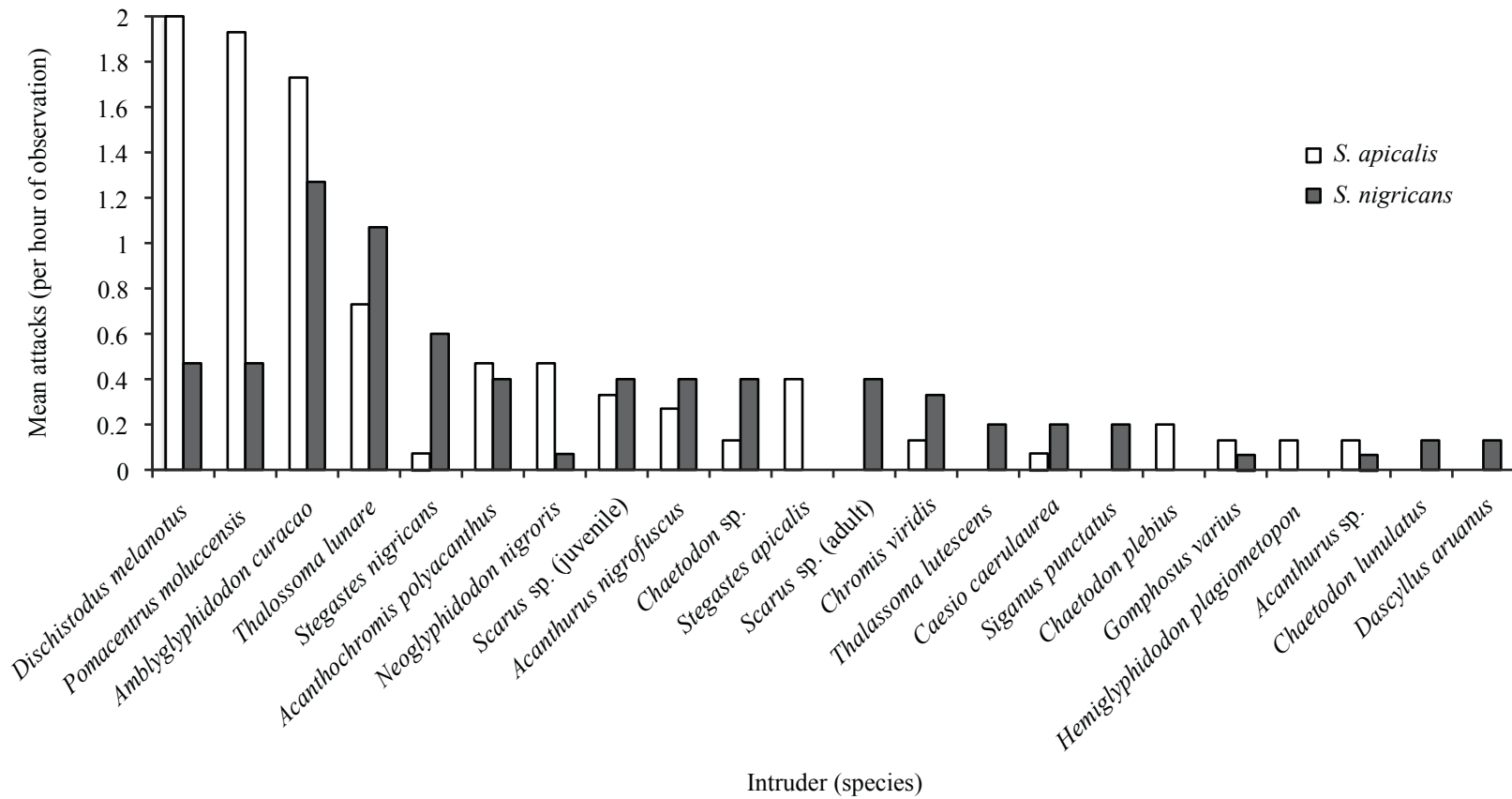


**Figure S2.** Three resource-related behaviours: (a) grazing turf algae, (b) weeding undesirable species and (c) coral-pecking of *S. apicalis* and *S. nigricans*. The number of bites for each resource-related behaviour was averaged across observational periods (five-minute periods).

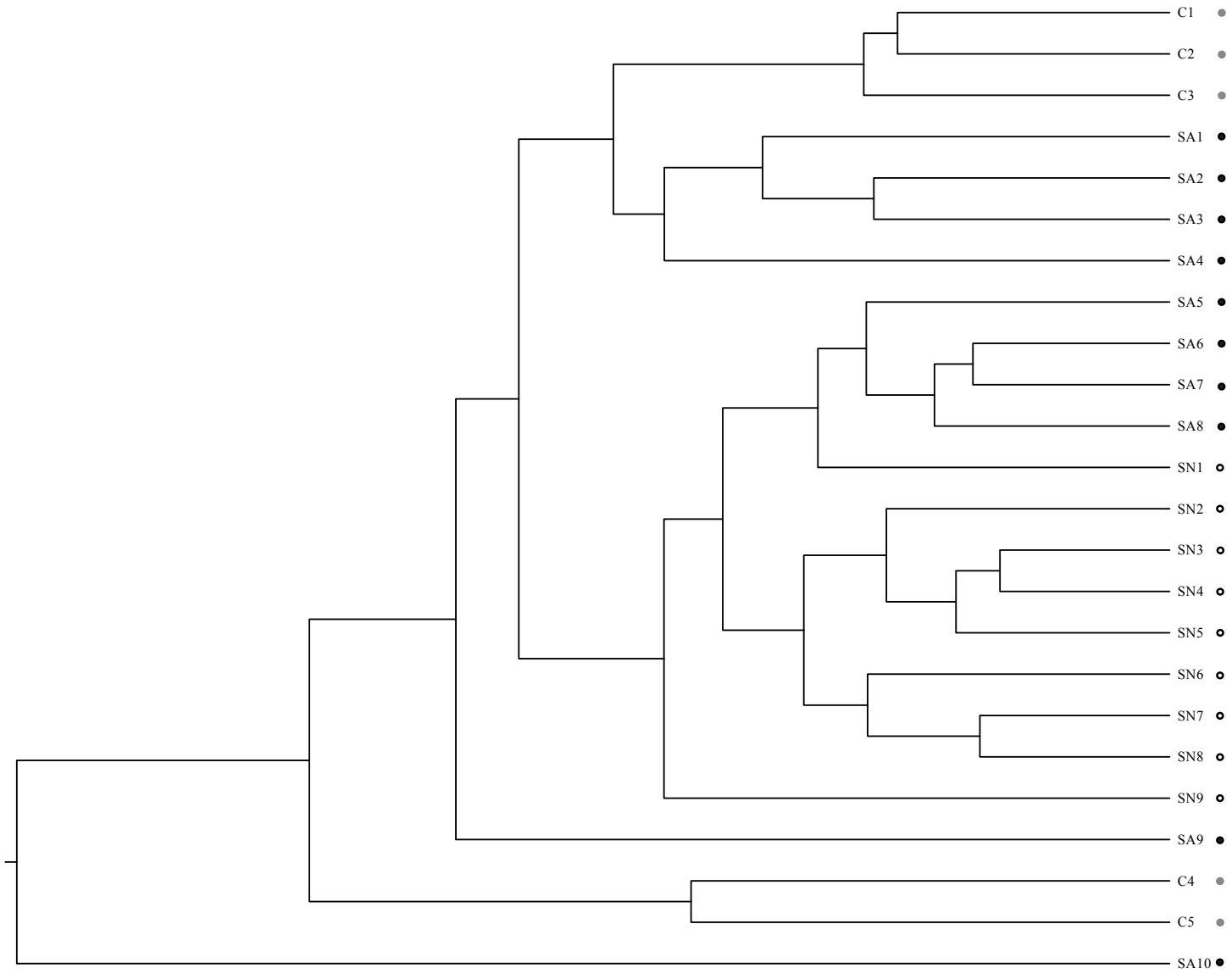




**Figure S3.** Territorial defense of *S. apicalis* and *S. nigricans* by intruder feeding guild.



**Figure S4.** Territorial defense of *S. apicalis* and *S. nigricans* by intruding species.



0.04

**Figure S5.** UPGMA cluster of EAM microbial community samples (C = control, EAM outside of damselfish territories; SA = EAM inside *S. apicalis*' territories; SN = EAM inside *S. nigricans*' territories). The circular symbols with which the sample is represented on figure 2 is included after the sample name.

|                |                                                                                      |     |
|----------------|--------------------------------------------------------------------------------------|-----|
| Majority       | GATGAACGCTGGCGGTATGCTTAACACATGCAAGTTGAACGAGAGCCT-AGCTCTAGTAGCGGACGGGTGAGTAATACGT     |     |
|                | 10 20 30 40 50 60 70 80                                                              |     |
| uncultured bbd | -----GAT-----                                                                        | 75  |
| OTU_3          | -----                                                                                | 79  |
| OUT344         | -----                                                                                | 79  |
| OTU3458        | -----                                                                                | 79  |
| OTU12          | -----CG- C-----C-----A T T CG A T-----G-----CG-----                                  | 80  |
| OTU1560        | -----C T-----GA TTA- T T C-----AA-----C-----                                         | 79  |
| Majority       | GAGAATCTACCTTTAGGAGGGGAATAACAATTGGAAACGATTGCTAATGCCCCATATGCTGTXAAGTGAAAAGATTTTTC     |     |
|                | 90 100 110 120 130 140 150 160                                                       |     |
| uncultured bbd | -----A-----T-----A-----                                                              | 155 |
| OTU_3          | -----G-----                                                                          | 159 |
| OUT344         | -----G-----                                                                          | 159 |
| OTU3458        | -----G-----                                                                          | 159 |
| OTU12          | -----G-----TTC-----G C-----G-----C-----A GA G T C AA GA-----A T                      | 159 |
| OTU1560        | A-----A-----G-----G-----GC-----AT-----CA-----TA-----C T                              | 159 |
| Majority       | GCCTAAAGATGAGCTCACGCCTGATTAGCTT-GTTGGTAGGGTAATGGCCTACCAAGGCTACGATCAGTAGCTGATTTGA     |     |
|                | 170 180 190 200 210 220 230 240                                                      |     |
| uncultured bbd | -----T-----                                                                          | 234 |
| OTU_3          | -----                                                                                | 238 |
| OUT344         | -----A-----                                                                          | 239 |
| OTU3458        | -----                                                                                | 238 |
| OTU12          | -----G T-----A-----G-----AA-----G-----G C-----                                       | 238 |
| OTU1560        | -----TG T-----A-----A-----GA T-----T-----T G-----                                    | 238 |
| Majority       | GAGGATGATCAGCCACACTGGAACCTGAGACACGGTCCAGACTTCTACGGAAGGCAGCAGTGGGGAATTTCCGCAAT-GG     |     |
|                | 250 260 270 280 290 300 310 320                                                      |     |
| uncultured bbd | -----                                                                                | 313 |
| OTU_3          | -----                                                                                | 317 |
| OUT344         | -----A T-----                                                                        | 319 |
| OTU3458        | -----                                                                                | 315 |
| OTU12          | -----G-----C-----C-----G-----                                                        | 317 |
| OTU1560        | -----C-----A-----                                                                    | 315 |
| Majority       | GCGCAA-GCCTGACGGAGCAATACCG-CGTGAGGGATGAATGCCTATGGGTTGTAAACC--TCTTTTATTGGGGAAGAA-     |     |
|                | 330 340 350 360 370 380 390 400                                                      |     |
| uncultured bbd | -----                                                                                | 388 |
| OTU_3          | -----                                                                                | 392 |
| OUT344         | -----A-----AG A                                                                      | 396 |
| OTU3458        | -----A-----GTCT-----C A                                                              | 394 |
| OTU12          | A-----CG-----G G T T-----CAA-----T-                                                  | 392 |
| OTU1560        | -----G-----T C-----A-----                                                            | 385 |
| Majority       | ---TTTGTACGGTA-CCC AATG--AAT AAGCATCGGCTAA-CTCCGTGCCAGCXGCCGCCGTAATXXXXXXXXXXXXXXXXX |     |
|                | 410 420 430 440 450 460 470                                                          |     |
| uncultured bbd | -----A-----G-----ACGGGGGATGCAAG                                                      | 460 |
| OTU_3          | -----C-----CACCTGAGAT                                                                | 460 |
| OUT344         | -----A-----C G AAC                                                                   | 456 |
| OTU3458        | GTT GA-----TA-----GA A-----A-----C-----A-----                                        | 459 |
| OTU12          | ---AA-----TTG-----C-----C-----                                                       | 449 |
| OTU1560        | ---A-----T-----A A-----                                                              | 438 |

**Figure S6.** Alignment of our four most abundant uncultured cyanobacterial potential pathogen sequences (that were assigned to *Leptolyngbya*) to the unidentified bacterium clone sequence [S41] with the highest similarity from the BLAST results (see table S6).

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