

### Supporting Table S8 (for Figure 5a)

Linear discriminant analysis output for Figure 5a. According to the MANOVA test, Bacteria, Microalgae, and Plants are significantly different: Pillai Trace=1.57,  $F_{10,90}=33.2$ ,  $P<0.001$ .

#### Coefficients of linear discriminants.

|     | LD1   | LD2   |
|-----|-------|-------|
| Ile | 0.07  | 0.00  |
| Leu | -0.83 | 0.04  |
| Lys | 0.28  | -0.50 |
| Phe | 0.08  | 0.62  |
| Thr | 0.06  | 0.08  |
| Val | 0.39  | -0.37 |

#### Proportion of trace.

|  | LD1  | LD2  |
|--|------|------|
|  | 0.63 | 0.37 |

#### Posterior probabilities of the classifier samples.

| ID  | Actual     | Predicted (% probability) |              |        |
|-----|------------|---------------------------|--------------|--------|
|     |            | Bacteria                  | Microalgae   | Plants |
| B1  | Bacteria   | <b>99.8</b>               | 0.2          | 0.0    |
| B10 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B11 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B12 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B2  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B3  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B4  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B5  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B6  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B7  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B8  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| B9  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0    |
| C1  | Microalgae | 0.0                       | <b>99.6</b>  | 0.4    |
| C2  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| C3  | Microalgae | 0.0                       | <b>99.3</b>  | 0.7    |
| C4  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| D1  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| D2  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| D3  | Microalgae | 0.3                       | <b>97.6</b>  | 2.1    |
| D4  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| D5  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| H1  | Microalgae | 0.0                       | <b>97.0</b>  | 3.0    |
| H2  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| H3  | Microalgae | 0.0                       | <b>99.5</b>  | 0.5    |
| H4  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| K1  | Microalgae | 0.0                       | <b>99.9</b>  | 0.1    |
| K2  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| K3  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| K4  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| K5  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| K6  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| N1  | Microalgae | 0.0                       | <b>99.9</b>  | 0.1    |
| N2  | Microalgae | 0.0                       | <b>99.7</b>  | 0.3    |
| N3  | Microalgae | 0.0                       | <b>99.8</b>  | 0.2    |
| X1  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| X2  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| X3  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| X4  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |
| Y1  | Microalgae | 0.0                       | <b>100.0</b> | 0.0    |

|     |        |     |     |              |
|-----|--------|-----|-----|--------------|
| T1  | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T10 | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T11 | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T12 | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T2  | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T3  | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T4  | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T5  | Plants | 0.0 | 0.2 | <b>99.8</b>  |
| T6  | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T7  | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T8  | Plants | 0.0 | 0.0 | <b>100.0</b> |
| T9  | Plants | 0.0 | 0.0 | <b>100.0</b> |

Probability of essential amino acid origins of *Daphnia*, seston, and soils.

| ID  | Bacteria | Microalgae  | Plants       |
|-----|----------|-------------|--------------|
| dL1 | 0.1      | <b>99.6</b> | 0.4          |
| dL2 | 12.7     | <b>84.0</b> | 3.3          |
| dL3 | 1.7      | <b>97.6</b> | 0.6          |
| dL4 | 30.7     | <b>57.3</b> | 12.0         |
| dL5 | 14.2     | <b>81.6</b> | 4.2          |
| pL2 | 0.0      | <b>96.8</b> | 3.1          |
| sL1 | 0.0      | 0.0         | <b>100.0</b> |
| sL2 | 0.7      | 2.3         | <b>97.0</b>  |
| sL4 | 0.3      | 0.3         | <b>99.4</b>  |
| sL5 | 13.2     | 18.1        | <b>68.7</b>  |

### Supporting Table S8 (for Figure 5b)

Linear discriminant analysis output for Figure 5b. According to the MANOVA test, Bacteria, Fungi and Microalgae are significantly different: Pillai Trace=1.71,  $F_{10,84}=50.4$ ,  $P<0.001$ .

#### Coefficients of linear discriminants.

|     | LD1   | LD2   |
|-----|-------|-------|
| Ile | -0.20 | -0.09 |
| Leu | 0.56  | 0.75  |
| Lys | 0.69  | -0.30 |
| Phe | -0.21 | 0.09  |
| Thr | -0.07 | -0.12 |
| Val | -0.75 | -0.40 |

#### Proportion of trace.

|  | LD1  | LD2  |
|--|------|------|
|  | 0.61 | 0.39 |

#### Posterior probabilities of the classifier samples.

| ID  | Actual     | Predicted (% probability) |              |              |
|-----|------------|---------------------------|--------------|--------------|
|     |            | Bacteria                  | Fungi        | Microalgae   |
| B1  | Bacteria   | <b>99.9</b>               | 0.0          | 0.1          |
| B10 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B11 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B12 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B2  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B3  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B4  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B5  | Bacteria   | <b>99.9</b>               | 0.0          | 0.1          |
| B6  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B7  | Bacteria   | <b>99.9</b>               | 0.0          | 0.1          |
| B8  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B9  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| F1  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| F2  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| F3  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| F4  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| F5  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| F6  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| F7  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| F8  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| F9  | Fungi      | 0.0                       | <b>100.0</b> | 0.0          |
| C1  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| C2  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| C3  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| C4  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| D1  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| D2  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| D3  | Microalgae | 0.1                       | 0.0          | <b>99.9</b>  |
| D4  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| D5  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| H1  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| H2  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| H3  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| H4  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| K1  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| K2  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| K3  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| K4  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |
| K5  | Microalgae | 0.0                       | 0.0          | <b>100.0</b> |

|    |            |     |     |              |
|----|------------|-----|-----|--------------|
| K6 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |
| N1 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |
| N2 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |
| N3 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |
| X1 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |
| X2 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |
| X3 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |
| X4 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |
| Y1 | Microalgae | 0.0 | 0.0 | <b>100.0</b> |

Probability of essential amino acid origins in fish.

| Sample | Predicted (% probability) |       |            |
|--------|---------------------------|-------|------------|
|        | Bacteria                  | Fungi | Microalgae |
| ch     | 0                         | 0     | 100.0      |
| lg     | 0                         | 0     | 100.0      |
| xg     | 0                         | 0     | 100.0      |

### Supporting Table S8 (for Figure 5c)

Linear discriminant analysis output for Figure 5c. According to the MANOVA test, Bacteria, Microalgae, and Phaeophyceae are significantly different: Pillai Trace=1.11,  $F_{10,88}=11.0$ ,  $P<0.001$ .

#### Coefficients of linear discriminants.

|     | LD1   | LD2   |
|-----|-------|-------|
| Ile | 0.04  | -0.48 |
| Leu | -0.80 | 0.40  |
| Lys | 0.37  | 0.24  |
| Phe | -0.14 | -0.01 |
| Thr | 0.09  | 0.19  |
| Val | 0.56  | -0.17 |

#### Proportion of trace.

|  | LD1  | LD2  |
|--|------|------|
|  | 0.92 | 0.08 |

#### Posterior probabilities of the classifier samples.

| ID  | Actual     | Predicted (% probability) |              |              |
|-----|------------|---------------------------|--------------|--------------|
|     |            | Bacteria                  | Microalgae   | Phaeophyceae |
| B1  | Bacteria   | <b>99.6</b>               | 0.4          | 0.0          |
| B10 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B11 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B12 | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B2  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B3  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B4  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B5  | Bacteria   | <b>99.9</b>               | 0.1          | 0.0          |
| B6  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B7  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B8  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| B9  | Bacteria   | <b>100.0</b>              | 0.0          | 0.0          |
| C1  | Microalgae | 0.0                       | <b>51.4</b>  | 48.6         |
| C2  | Microalgae | 0.0                       | <b>100.0</b> | 0.0          |
| C3  | Microalgae | 0.0                       | <b>96.6</b>  | 3.4          |
| C4  | Microalgae | 0.0                       | <b>97.1</b>  | 2.9          |
| D1  | Microalgae | 0.0                       | <b>92.2</b>  | 7.8          |
| D2  | Microalgae | 0.0                       | <b>98.8</b>  | 1.2          |
| D3  | Microalgae | 0.1                       | <b>99.8</b>  | 0.1          |
| D4  | Microalgae | 0.0                       | <b>100.0</b> | 0.0          |
| D5  | Microalgae | 0.0                       | <b>95.8</b>  | 4.2          |
| H1  | Microalgae | 0.0                       | <b>99.8</b>  | 0.2          |
| H2  | Microalgae | 0.0                       | <b>96.5</b>  | 3.5          |
| H3  | Microalgae | 0.0                       | <b>97.3</b>  | 2.7          |
| H4  | Microalgae | 0.0                       | <b>99.6</b>  | 0.4          |
| K1  | Microalgae | 0.0                       | <b>96.7</b>  | 3.3          |
| K2  | Microalgae | 0.0                       | <b>80.7</b>  | 19.3         |
| K3  | Microalgae | 0.0                       | <b>90.3</b>  | 9.7          |
| K4  | Microalgae | 0.0                       | <b>96.0</b>  | 4.0          |
| K5  | Microalgae | 0.0                       | <b>98.8</b>  | 1.2          |
| X1  | Microalgae | 0.0                       | <b>95.1</b>  | 4.9          |
| X2  | Microalgae | 0.0                       | <b>97.5</b>  | 2.5          |
| X3  | Microalgae | 0.0                       | <b>99.8</b>  | 0.1          |
| X4  | Microalgae | 0.0                       | 15.7         | <b>84.3</b>  |
| Y1  | Microalgae | 0.0                       | <b>99.6</b>  | 0.4          |
| K6  | Microalgae | 0.0                       | <b>99.8</b>  | 0.2          |
| N1  | Microalgae | 0.0                       | <b>99.7</b>  | 0.3          |

|     |              |     |             |             |
|-----|--------------|-----|-------------|-------------|
| N2  | Microalgae   | 0.0 | <b>99.9</b> | 0.1         |
| N3  | Microalgae   | 0.0 | <b>99.9</b> | 0.1         |
| P1  | Phaeophyceae | 0.0 | 18.0        | <b>82.0</b> |
| P10 | Phaeophyceae | 0.0 | 0.3         | <b>99.7</b> |
| P11 | Phaeophyceae | 0.0 | 34.8        | <b>65.2</b> |
| P12 | Phaeophyceae | 0.0 | 34.2        | <b>65.8</b> |
| P2  | Phaeophyceae | 0.0 | 3.6         | <b>96.4</b> |
| P3  | Phaeophyceae | 0.0 | 25.0        | <b>75.0</b> |
| P4  | Phaeophyceae | 0.0 | 2.5         | <b>97.5</b> |
| P6  | Phaeophyceae | 0.0 | 35.9        | <b>64.1</b> |
| P7  | Phaeophyceae | 0.0 | 2.8         | <b>97.2</b> |
| P8  | Phaeophyceae | 0.0 | 0.1         | <b>99.9</b> |
| P9  | Phaeophyceae | 0.0 | 35.8        | <b>64.2</b> |

Probability of essential amino acid origins of mussels.

| Sample | Predicted (% probability) |            |              |
|--------|---------------------------|------------|--------------|
|        | Bacteria                  | Microalgae | Phaeophyceae |
| gav    | 0                         | 99.8       | 0.2          |
| sc     | 0                         | 99.7       | 0.3          |