

# PROTEOMICS

**Supporting Information**

**for Proteomics**

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**Protein composition of *Paracoccus denitrificans* cells grown on various  
electron acceptors and in the presence of azide**

Supplementary Table 1. List of protein spots in 2-DE gels of *P. denitrificans* TCL, the quantity of which was affected by growth on different terminal electron acceptors and/or by sodium azide

|          |               |            | Terminal electron acceptor effects |                    |                    |            | Azide effect            |                               |        | MS analysis    |                        |                               |
|----------|---------------|------------|------------------------------------|--------------------|--------------------|------------|-------------------------|-------------------------------|--------|----------------|------------------------|-------------------------------|
| Spot No. | Approx. $M_r$ | Approx. pI | $N_2O$ vs. $O_2$                   | $NO_2^-$ vs. $O_2$ | $NO_3^-$ vs. $O_2$ | Typical of | $O_2 + N_3^-$ vs. $O_2$ | $NO_2^- + N_3^-$ vs. $NO_2^-$ | Common | Analyzed (PMF) | Identified proteins    |                               |
|          |               |            |                                    |                    |                    |            |                         |                               |        |                | Database accession.No. | Protein name                  |
| 0101     | 27.8          | 4.0        |                                    |                    |                    |            | ↑5                      |                               |        |                |                        |                               |
| 0303     | 37.9          | 3.8        |                                    |                    |                    |            |                         | ↑5                            |        | +              |                        |                               |
| 0401     | 39.4          | 4.2        |                                    |                    |                    |            |                         | ↑2                            |        |                |                        |                               |
| 0601     | 53.8          | 4.3        |                                    | ↓2                 |                    |            | ↓5                      |                               |        |                |                        |                               |
| 0602     | 54.0          | 4.5        |                                    |                    |                    |            | ↑5                      |                               |        |                |                        |                               |
| 0701     | 63.2          | 4.7        | ↑5                                 |                    |                    |            | ↑5                      |                               |        |                |                        |                               |
| 1105     | 23.6          | 4.8        | ↑3                                 |                    |                    | $N_2O$     |                         | ↑5                            |        |                |                        |                               |
| 1203     | 24.2          | 4.5        |                                    | ↓3                 |                    |            |                         | ↓5                            |        |                |                        |                               |
| 1207     | 32.9          | 4.8        |                                    | ↓3                 |                    |            |                         |                               |        |                |                        |                               |
| 1304     | 33.5          | 4.1        |                                    |                    |                    |            |                         |                               |        | +              |                        |                               |
| 1309     | 34.0          | 4.5        | ↑5                                 |                    |                    | $N_2O$     |                         |                               |        |                |                        |                               |
| 1311     | 35.1          | 4.7        | ↑2                                 |                    |                    |            |                         | ↑2                            |        | +              |                        |                               |
| 1401     | 40.1          | 4.2        |                                    |                    |                    |            |                         | ↑3                            |        | +              |                        |                               |
| 1406     | 39.2          | 4.9        |                                    | ↑5                 |                    |            |                         |                               |        |                |                        |                               |
| 1408     | 39.4          | 4.6        |                                    |                    | ↑3                 | $NO_3^-$   | ↑2                      |                               |        | +              |                        |                               |
| 1410     | 39.6          | 4.8        | ↑5                                 |                    |                    |            |                         |                               |        |                |                        |                               |
| 1501     | 45.7          | 4.3        | ↑3                                 |                    | ↑2                 |            |                         |                               |        |                |                        |                               |
| 1701     | 61.8          | 4.0        |                                    |                    | ↑5                 |            |                         |                               |        | +              |                        |                               |
| 1801     | 77.3          | 4.1        |                                    |                    | ↓3                 |            | ↓3                      |                               |        |                |                        |                               |
| 1805     | 71.0          | 4.6        | ↓5                                 | ↓5                 | ↓5                 | $O_2$      | ↓5                      |                               |        |                |                        |                               |
| 2001     | 18.2          | 5.1        |                                    |                    |                    |            |                         | ↑5                            |        |                |                        |                               |
| 2102     | 20.3          | 4.9        | ↓3                                 | ↓3                 | ↓3                 | $O_2$      |                         | ↓5                            |        | +              |                        |                               |
| 2103     | 18.0          | 4.9        |                                    | ↓3                 |                    |            |                         |                               |        | +              |                        |                               |
| 2104     | 22.3          | 4.9        | ↑3                                 |                    |                    | $N_2O$     | ↑2                      | ↑5                            | ↑2     | +              |                        |                               |
| 2201     | 27.6          | 4.9        | ↑2                                 |                    |                    |            |                         |                               |        |                |                        |                               |
| 2202     | 25.8          | 4.9        | ↓3                                 | ↓3                 | ↓3                 | $O_2$      |                         |                               |        | +              |                        |                               |
| 2205     | 27.2          | 4.9        |                                    | ↑5                 |                    |            |                         |                               |        | +              |                        |                               |
| 2209     | 24.8          | 4.9        | ↓2                                 | ↓3                 |                    |            |                         |                               |        |                |                        |                               |
| 2210     | 23.7          | 4.7        |                                    |                    |                    |            | ↑5                      |                               |        |                |                        |                               |
| 2213     | 32.1          | 4.9        | ↑2                                 |                    |                    |            |                         |                               |        |                |                        |                               |
| 2214     | 31.4          | 4.9        |                                    |                    |                    |            | ↓5                      |                               |        |                |                        |                               |
| 2302     | 35.4          | 4.8        |                                    |                    |                    |            |                         |                               |        | +              |                        |                               |
| 2306     | 36.6          | 4.9        |                                    |                    |                    |            |                         | ↑5                            |        |                |                        |                               |
| 2307     | 36.6          | 4.9        | ↓5                                 | ↓5                 | ↓3                 | $O_2$      | ↓5                      |                               |        |                |                        |                               |
| 2407     | 41.7          | 4.8        |                                    |                    | ↓5                 |            | ↓2                      | ↓5                            | ↓2     |                |                        |                               |
| 2501     | 48.1          | 4.8        |                                    | ↓3                 | ↓3                 |            |                         |                               |        |                |                        |                               |
| 2608     | 51.7          | 4.9        |                                    | ↓2                 |                    |            |                         |                               |        |                |                        |                               |
| 2609     | 49.6          | 4.9        |                                    |                    |                    |            | ↓5                      |                               |        |                |                        |                               |
| 2610     | 54.9          | 4.8        | ↑3                                 |                    |                    |            | ↑2                      | ↓5                            |        | +              |                        |                               |
| 2701     | 57.2          | 4.9        | ↑2                                 |                    |                    | $N_2O$     |                         | ↑5                            |        | +              |                        |                               |
| 2702     | 57.7          | 5.0        | ↑5                                 |                    |                    |            |                         | ↑3                            |        | ++             | Q9Z462                 | 60 kDa chaperonin             |
| 2703     | 61.4          | 4.8        |                                    |                    | ↑5                 | $NO_3^-$   |                         | ↑5                            |        | +              |                        |                               |
| 2708     | 65.4          | 4.8        |                                    | ↑2                 | ↑3                 |            |                         |                               |        | ++             | Q51700                 | Nitrite reductase (Precursor) |
| 2709     | 68.4          | 4.8        |                                    |                    |                    |            | ↓5                      |                               |        |                |                        |                               |
| 2804     | 70.8          | 4.9        | ↑2                                 |                    |                    |            | ↓5                      | ↓5                            | ↓5     |                |                        |                               |
| 2805     | 67.3          | 4.9        |                                    |                    |                    |            |                         |                               |        | +              |                        |                               |
| 3103     | 23.5          | 5.1        |                                    |                    |                    |            | ↑2                      |                               |        |                |                        |                               |
| 3202     | 32.0          | 5.5        |                                    |                    |                    |            |                         | ↑5                            |        |                |                        |                               |
| 3206     | 31.6          | 5.2        |                                    |                    |                    |            |                         | ↑5                            |        |                |                        |                               |
| 3302     | 35.6          | 4.9        |                                    |                    |                    |            |                         | ↓5                            |        |                |                        |                               |
| 3304     | 33.0          | 5.1        |                                    |                    |                    |            | ↓5                      |                               |        |                |                        |                               |
| 3305     | 33.0          | 4.9        |                                    | ↓2                 |                    |            |                         |                               |        |                |                        |                               |
| 3306     | 32.3          | 5.0        |                                    |                    |                    |            |                         | ↑5                            |        |                |                        |                               |
| 3307     | 34.6          | 4.9        | ↓5                                 | ↓3                 | ↓5                 | $O_2$      |                         |                               |        |                |                        |                               |
| 3404     | 38.2          | 4.9        |                                    |                    |                    |            | ↓5                      |                               |        |                |                        |                               |
| 3405     | 36.9          | 5.1        | ↑5                                 | ↑5                 | ↑5                 | Anaer      |                         |                               |        | +              |                        |                               |
| 3407     | 37.5          | 5.0        | ↑5                                 |                    |                    |            |                         |                               |        |                |                        |                               |
| 3408     | 41.2          | 5.3        |                                    | ↓3                 | ↓3                 |            |                         |                               |        |                |                        |                               |
| 3409     | 41.4          | 5.5        |                                    |                    |                    |            |                         | ↑5                            |        |                |                        |                               |

Supplementary Table 1. Continued

|      |      |     |    |    |    |                              |                  |    |    |    |        |  |
|------|------|-----|----|----|----|------------------------------|------------------|----|----|----|--------|--|
| 3716 | 62.4 | 5.3 |    |    |    |                              |                  | ↓5 |    | +  |        |  |
| 3717 | 58.7 | 5.4 |    |    |    |                              |                  | ↓5 |    |    |        |  |
| 3805 | 70.9 | 5.0 |    |    |    |                              |                  |    |    | +  |        |  |
| 3810 | 65.6 | 5.2 | ↑5 |    |    |                              |                  |    | ↑3 |    |        |  |
| 4203 | 28.4 | 5.2 |    |    |    |                              |                  |    | ↑5 |    |        |  |
| 4204 | 30.8 | 5.5 | ↑5 |    |    |                              | N <sub>2</sub> O |    |    |    |        |  |
| 4206 | 25.8 | 5.5 |    | ↓3 | ↓2 |                              |                  |    |    |    |        |  |
| 4303 | 33.0 | 5.5 |    |    |    |                              |                  |    | ↓5 |    |        |  |
| 4307 | 34.4 | 5.5 | ↑5 |    |    |                              | N <sub>2</sub> O |    |    |    |        |  |
| 4308 | 35.7 | 5.5 |    | ↓2 |    |                              |                  | ↑2 |    |    |        |  |
| 4310 | 37.3 | 5.5 |    |    |    |                              |                  |    | ↑5 |    |        |  |
| 4406 | 40.0 | 5.5 |    | ↓3 |    |                              |                  |    |    |    |        |  |
| 4504 | 40.3 | 5.5 | ↑3 |    |    |                              | N <sub>2</sub> O |    |    |    |        |  |
| 4602 | 55.3 | 5.4 |    |    |    |                              |                  |    | ↑2 | +  |        |  |
| 4606 | 53.8 | 5.5 |    |    |    |                              |                  | ↑2 |    |    |        |  |
| 4713 | 58.4 | 5.5 |    |    |    |                              |                  |    |    | +  |        |  |
| 4809 | 69.5 | 5.5 |    |    |    |                              |                  |    |    | +  |        |  |
| 4812 | 74.6 | 5.5 |    | ↓3 | ↓5 |                              |                  |    |    |    |        |  |
| 5003 | 18.0 | 5.6 |    |    |    |                              |                  |    |    | +  |        |  |
| 5101 | 20.0 | 5.5 |    |    |    |                              |                  |    | ↑5 |    |        |  |
| 5207 | 32.1 | 5.5 |    |    | ↓3 |                              |                  | ↑2 |    |    |        |  |
| 5303 | 28.8 | 5.5 |    |    |    |                              |                  |    | ↑5 |    |        |  |
| 5404 | 40.4 | 5.5 |    | ↑5 |    |                              |                  |    |    |    |        |  |
| 5409 | 39.9 | 5.6 |    |    |    |                              |                  | ↑5 |    |    |        |  |
| 5510 | 49.4 | 5.5 |    |    |    |                              |                  | ↓5 |    |    |        |  |
| 5513 | 50.1 | 5.6 |    |    |    |                              |                  | ↑2 |    |    |        |  |
| 5809 | 72.6 | 5.5 |    |    |    |                              |                  |    | ↑3 |    |        |  |
| 6106 | 24.7 | 5.5 |    | ↓2 |    |                              |                  | ↑2 | ↑5 | ↑2 | +      |  |
| 6205 | 32.2 | 5.6 |    |    |    |                              |                  | ↑2 |    |    |        |  |
| 6306 | 37.2 | 5.5 |    |    |    |                              |                  | ↑3 | ↑3 | ↑3 | +      |  |
| 6405 | 39.5 | 5.6 | ↓2 |    |    |                              |                  |    |    |    |        |  |
| 6406 | 41.0 | 5.6 |    |    |    |                              |                  | ↑2 |    |    |        |  |
| 6510 | 42.3 | 5.6 |    |    | ↑3 |                              |                  |    |    |    |        |  |
| 6511 | 46.8 | 5.6 | ↑5 | ↑5 | ↑5 | Anaer                        |                  | ↓5 |    |    |        |  |
| 6512 | 49.8 | 5.6 |    |    | ↑5 | NO <sub>3</sub> <sup>-</sup> |                  | ↑5 |    | +  |        |  |
| 6709 | 66.7 | 5.6 |    | ↑2 |    |                              |                  | ↓5 |    |    |        |  |
| 6712 | 64.5 | 5.6 | ↑3 | ↑3 | ↑5 | Anaer                        | ↑3               | ↓5 |    | +  |        |  |
| 6713 | 63.3 | 5.6 |    |    |    |                              |                  | ↓2 |    |    |        |  |
| 6716 | 62.4 | 5.6 |    |    |    |                              |                  | ↑5 |    |    |        |  |
| 7105 | 24.0 | 5.6 |    |    |    |                              |                  | ↑2 |    |    |        |  |
| 7203 | 34.6 | 5.6 |    |    | ↑2 |                              |                  | ↑2 |    |    | +      |  |
| 7205 | 32.7 | 5.6 | ↓3 | ↓2 |    |                              |                  |    |    |    |        |  |
| 7308 | 35.2 | 5.6 |    |    |    |                              |                  |    | ↑5 |    |        |  |
| 7402 | 39.8 | 5.6 |    |    |    |                              |                  |    |    | ++ | Q9X7H5 | Glyceraldehyde-3-phosphate dehydrogenase |
| 7406 | 39.5 | 5.6 |    |    |    |                              |                  |    | ↑2 |    |        |  |
| 7503 | 40.7 | 5.6 |    |    |    |                              |                  | ↑2 |    | ++ | P54810 | Acetyl-CoA acetyltransferase             |
| 7506 | 44.0 | 5.6 | ↓2 |    |    |                              |                  |    | ↓5 |    |        |  |
| 8115 | 26.1 | 5.9 |    |    |    |                              |                  |    | ↑5 |    |        |  |
| 8404 | 40.5 | 6.0 | ↑5 |    |    |                              | N <sub>2</sub> O | ↑3 |    |    |        |  |
| 8405 | 38.5 | 6.5 |    |    |    |                              |                  | ↑3 |    | +  |        |  |
| 8502 | 44.6 | 6.0 |    |    | ↑2 |                              |                  |    |    |    |        |  |

## SUMMARY

| No. of up-/down-regulated spots |          |                                     |   |   |  |   |        | No. of spots typical of individual growth modes |                |                  |                              |                              |           |
|---------------------------------|----------|-------------------------------------|---|---|--|---|--------|---|----------------|------------------|------------------------------|------------------------------|-----------|
|                                 |          | N <sub>2</sub> O vs. O <sub>2</sub> | NO <sub>2</sub> <sup>-</sup> vs. O <sub>2</sub> | NO <sub>3</sub> <sup>-</sup> vs. O <sub>2</sub> | O <sub>2</sub> + N <sub>2</sub> vs. O <sub>2</sub> | NO <sub>2</sub> <sup>-</sup> + N <sub>3</sub> <sup>-</sup> vs. NO <sub>2</sub> <sup>-</sup> | common |   | O <sub>2</sub> | N <sub>2</sub> O | NO <sub>2</sub> <sup>-</sup> | NO <sub>3</sub> <sup>-</sup> | Anaerobic |
|                                 |          |                                     |   |   |  |   |        |   |                |                  |                              |                              |           |
|                                 | > 3-fold | 18                                  | 6   | 8   | 9  | 25  | 1      |   |                |                  |                              |                              |           |
|                                 | > 5-fold | 11                                  | 5   | 5   | 5  | 20  | 0      |   |                |                  |                              |                              |           |
| Down                            | < 2-fold | 9                                   | 19  | 12  | 14   | 12  | 2      | MS analysis                                     |                |                  |                              |                              |           |
|                                 | < 3-fold | 6                                   | 12  | 11  | 12   | 12  | 1      | Analyzed (PMF)                                  |                |                  | Identified                   |                              |           |
|                                 | < 5-fold | 3                                   | 2   | 4   | 11   | 12  | 1      | 33  |                |                  | 4                            |                              |           |

((Legend to Supplement Table 1))

The arrows indicate the type of regulation (up (↑) or down(↓)). The number behind the arrow indicates how many times the quantity was altered. For example, 5 indicates more than 5-fold alteration, 3 indicates more than 3-fold alteration. In the columns marked terminal electron acceptors effects, the spot quantity under described growth conditions was compared with the one under aerobic growth. If the spot quantity under certain terminal electron acceptor exceeded all others by more than 2-fold, the inducing acceptor is introduced in the column, typical of. In the columns marked, azide effects, we compared the spot quantities under presented terminal electron acceptor ( $\text{NO}_2^-$ ,  $\text{O}_2$ ) with and without  $\text{NaN}_3$  (0.4mM). The + in the column labelled analyzed (PMF) means that the protein spot was subjected to analysis by PMF with good spectrum obtained; if the PMF resulted in successful protein identification, the symbol ++ is present. Accession number and protein name with Swiss-Prot/TrEMBL databases.

Supplementary Table 2. List of protein spots in 2-DE gels of *P. denitrificans* membrane fraction, the quantity of which was affected by growth on different terminal electron acceptors and azide

|      |               |            | Terminal electron acceptor and azide effects |  |        | MS analysis    |                       |   |
|------|---------------|------------|--|--|--------|----------------|-----------------------|---|
|      | Approx. $M_r$ | Approx. pI | $\text{NO}_3^-$ vs. $\text{O}_2$             | $\text{O}_2 + \text{N}_3^-$ vs. $\text{O}_2$ | Common | Analyzed (PMF) | Identified proteins   |   |
|      |               |            |  |  |        |                | Database accession.No | protein Name                                |
| 0011 | 23.6          | 3.9        | ↓5   |  |        | +              |                       |   |
| 0120 | 25.7          | 3.9        | ↓5   |  |        | +              |                       |   |
| 0127 | 28.3          | 3.9        | ↑5   |  |        |                |                       |   |
| 0207 | 32.9          | 3.7        | ↑2   |  |        |                |                       |   |
| 0211 | 32.7          | 4.0        | ↑2   |  |        | +              |                       |   |
| 0214 | 34.2          | 4.1        | ↑5   |  |        |                |                       |   |
| 0304 | 36.8          | 4.0        |  |  |        | +              |                       |   |
| 0307 | 39.6          | 4.5        | ↓2   |  |        |                |                       |   |
| 0503 | 52.6          | 4.5        |  |  |        | ++             | Q9Z460                | F1-ATPase beta-subunit [Fragment]           |
| 1016 | 24.3          | 4.4        |  | ↓2   |        |                |                       |   |
| 1123 | 28.3          | 4.6        | ↑5   |  |        |                |                       |   |
| 1204 | 34.5          | 4.5        |  |  |        | +              |                       |   |
| 1211 | 31.6          | 4.7        |  |  |        | +              |                       |   |
| 1213 | 36.5          | 4.6        | ↑5   |  |        |                |                       |   |
| 1319 | 38.6          | 4.5        |  |  |        | +              |                       |   |
| 1702 | 73.5          | 4.6        | ↑5   | ↑5   | ↑5     | +              |                       |   |
| 2004 | 23.6          | 4.9        | ↓3   |  |        |                |                       |   |
| 2117 | 26.6          | 4.9        | ↑5   |  |        |                |                       |   |
| 2205 | 35.9          | 4.8        | ↑5   |  |        |                |                       |   |
| 2322 | 40.5          | 5.0        |  | ↑5   |        |                |                       |   |
| 3107 | 28.2          | 5.0        | ↑5   |  |        |                |                       |   |
| 3108 | 31.6          | 5.0        | ↓2   |  |        |                |                       |   |
| 3203 | 34.0          | 5.0        | ↑5   |  |        |                |                       |   |
| 3618 | 67.1          | 5.1        | ↓5   |  |        |                |                       |   |
| 4004 | 19.5          | 5.2        | ↓5   |  |        |                |                       |   |
| 4008 | 23.2          | 5.2        | ↓2   |  |        |                |                       |   |
| 4011 | 24.2          | 5.2        |  |  |        | +              |                       |   |
| 4106 | 28.4          | 5.1        | ↑5   |  |        | ++             | P10772                | Adenylate kinase                            |
| 4107 | 25.3          | 5.1        | ↑5   |  |        |                |                       |   |
| 4113 | 26.5          | 5.3        | ↑5   |  |        |                |                       |   |
| 5001 | 24.9          | 5.3        | ↑3   |  |        | +              |                       |   |
| 5006 | 23.2          | 5.5        | ↓5   | ↓2   | ↓2     |                |                       |   |
| 5009 | 18.0          | 5.5        |  |  |        | ++             | Q9WX81                | Granule-associated protein                  |
| 5103 | 30.3          | 5.4        | ↑3   |  |        |                |                       |   |
| 5313 | 34.8          | 5.3        | ↑5   |  |        |                |                       |   |
| 5529 | 55.2          | 5.4        |  |  |        | +              |                       |   |
| 5618 | 60.7          | 5.5        | ↓3   |  |        |                |                       |   |
| 6103 | 30.5          | 5.8        | ↓2   | ↓2   | ↓2     |                |                       |   |
| 6104 | 29.5          | 5.8        | ↑2   |  |        |                |                       |   |
| 6204 | 32.4          | 5.7        | ↑5   |  |        | +              |                       |   |
| 6206 | 30.1          | 5.6        |  | ↓5   |        |                |                       |   |
| 6316 | 39.4          | 5.7        | ↑3   |  |        |                |                       |   |
| 6424 | 42.2          | 5.7        | ↑3   |  |        |                |                       |   |
| 7101 | 29.2          | 5.9        | ↓3   |  |        |                |                       |   |
| 8001 | 18.4          | 6.6        | ↓5   |  |        |                |                       |   |
| 8028 | 18.4          | 6.4        |  | ↓5   |        |                |                       |   |
| 8101 | 28.2          | 6.5        | ↓3   |  |        |                |                       |   |
| 8107 | 30.4          | 6.8        |  |  |        | ++             | Q59662                | Succinate dehydrogenase iron-sulfur protein |
| 8110 | 27.5          | 7.0        |  | ↑2   |        |                |                       |   |
| 8111 | 30.5          | 7.0        |  | ↑3   |        |                |                       |   |
| 8115 | 25.3          | 6.9        |  | ↑5   |        |                |                       |   |
| 8118 | 27.5          | 6.6        |  | ↑2   |        |                |                       |   |
| 8226 | 32.8          | 7.6        | ↓5   |  |        |                |                       |   |
| 9103 | 25.5          | ~ 8        | ↓3   |  |        |                |                       |   |

Supplementary Table 2. Continued

| SUMMARY                         |          |   |   |        |                |            |
|---------------------------------|----------|---|---|--------|----------------|------------|
| No. of up-/down-regulated spots |          |   |   |        | MS analysis    |            |
|                                 |          | NO <sub>3</sub> <sup>-</sup> vs. O <sub>2</sub> | O <sub>2</sub> + N <sub>3</sub> <sup>-</sup> vs. O <sub>2</sub> | Common | Analyzed (PMF) | Identified |
|                                 |          |   |   |        | 16             | 4          |
| Up                              | > 2 fold | 22  | 6   | 1      |                |            |
|                                 | > 3 fold | 19  | 4   | 1      |                |            |
|                                 | > 5 fold | 15  | 3   | 1      |                |            |
| Down                            | < 2 fold | 15  | 5   | 2      |                |            |
|                                 | < 3 fold | 11  | 2   | 0      |                |            |
|                                 | < 5 fold | 6   | 2   | 0      |                |            |

In the columns marked terminal electron acceptors and azide effects, the spot quantity under described growth conditions was compared with the one under aerobic growth. All others notes are as in supplementary Table 1.