

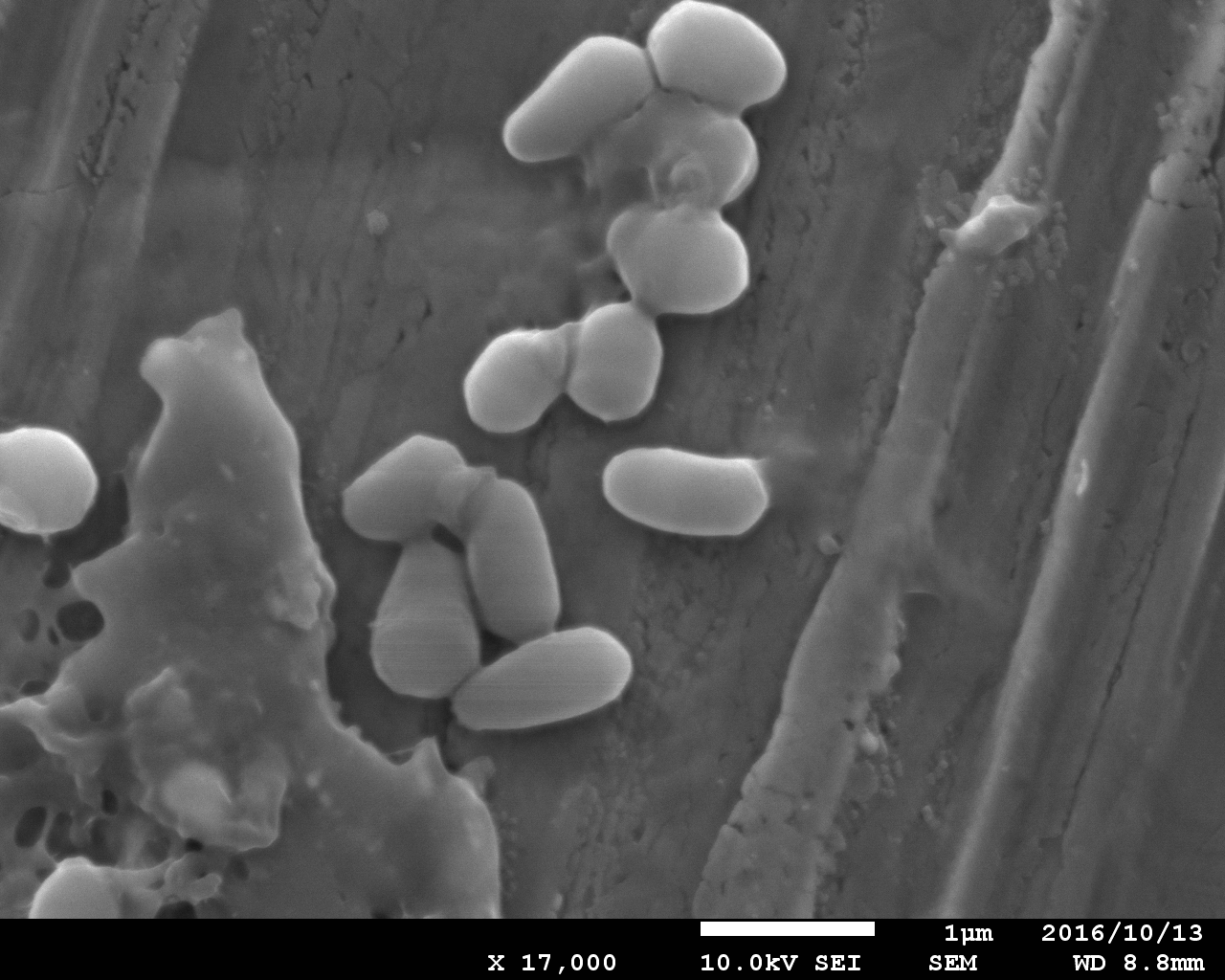
(c)

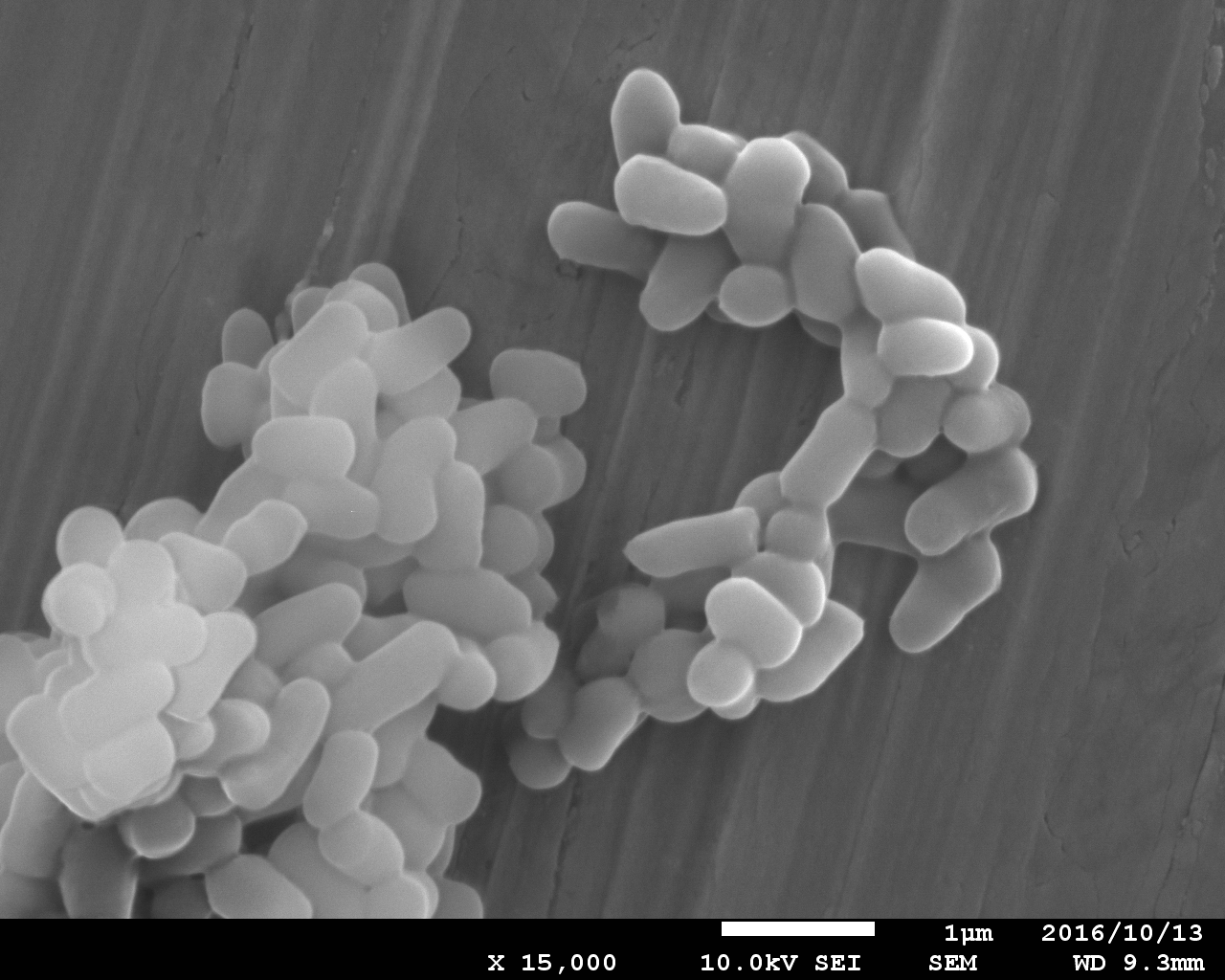
(b)

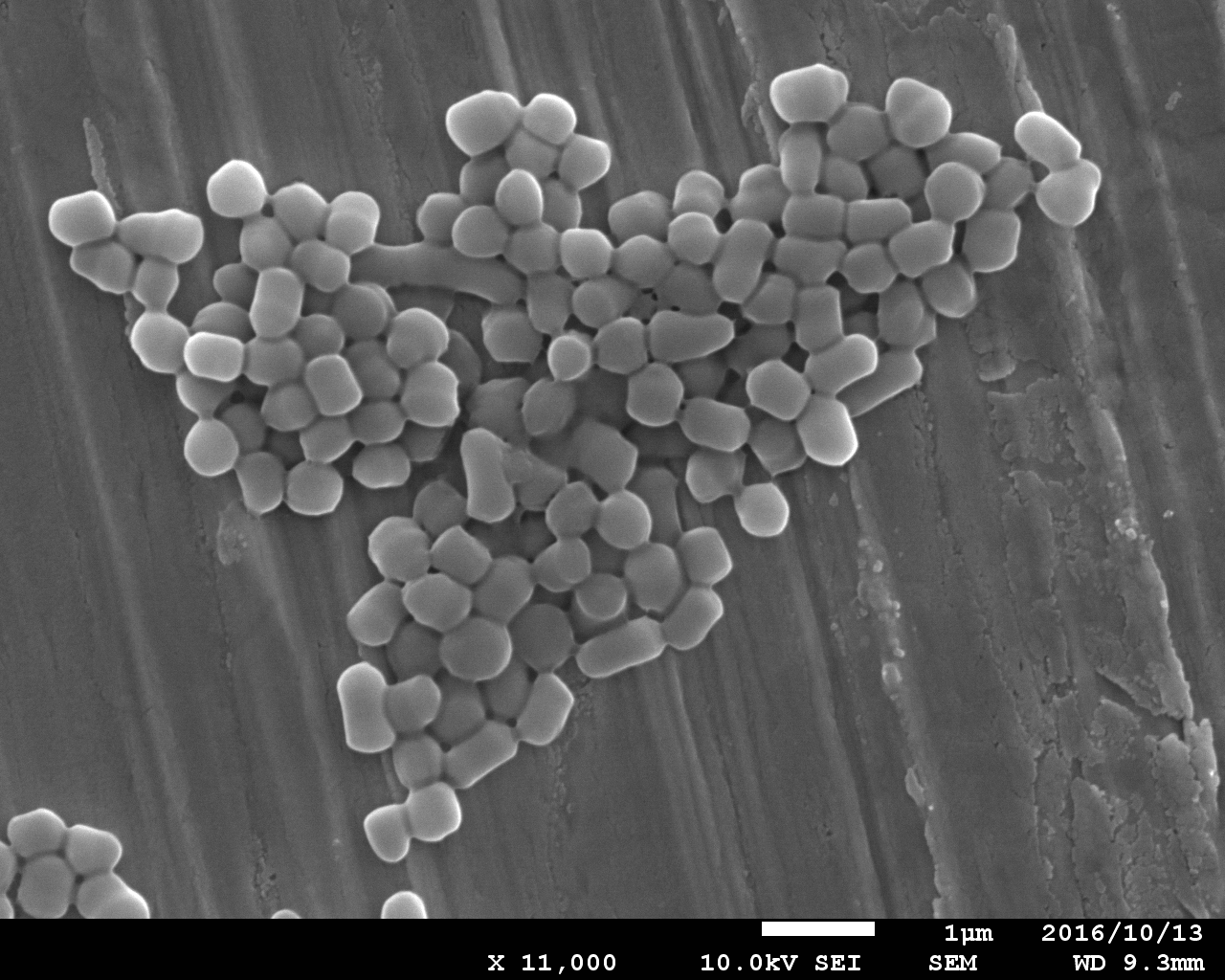
(a)

**Fig 1** Map of study area. **a** and **b** Location of the South Shetland Islands in relation to the southern South America and Antarctic Peninsula, and **c** King George Island within the South Shetland Islands, including the study sampling location and the permanent research stations on the island

**Fig. 2** Degradation of 0.5 g/L phenol by strains AQ5-05 (), AQ5-06 () and AQ5-07 ( ) at 10°C. The error bars represent the mean ± standard deviation for three replicates

(a)

(b)

(c)

**Fig. 3** Morphological study under SEM. **a** *Arthrobacter* sp. strain AQ5-05, **b** *Arthrobacter* sp*.* strain AQ5-06, **c** *Rhodococcus* sp. strain AQ5-07. Scale bars represent 1 μm

**Fig. 4** Effects of temperature on the growth of strains AQ5-05 (), AQ5-06 () and AQ5-07 () in phenol medium and phenol degradation by strains AQ5-05 (), AQ5-06 () and AQ5-07 (). The error bars represent the mean ± standard deviation for three replicates

**Fig. 5** Effects of salinity on the growth of strains AQ5-05 (), AQ5-06 () and AQ5-07 () in phenol medium and phenol degradation by strains AQ5-05 (), AQ5-06 () and AQ5-07 (). The error bars represent the mean ± standard deviation for three replicates

(a)

(b)

**Fig. 6** Effects of pH on the **a.** growth and **b**. phenol degradation of strains AQ5-05 (), AQ5-06 () and AQ5-07 () using an overlapping buffer system consisting of acetate () phosphate () and Tris-HCl () system in phenol medium. The error bars represent the mean ± standard deviation for three replicates

(a)

(b)

**Fig. 7** Effects of different nitrogen sources on the **a.** growth and **b.** phenol degradation of strains AQ5-05 (), AQ5-06 () and AQ5-07 (). The error bars represent the mean ± standard deviation for three replicates

**Fig. 8** Effects of ammonium sulphate concentration on the growth of strains AQ5-05 (), AQ5-06 () and AQ5-07 () in phenol medium and phenol degradation by strains AQ5-05 (), AQ5-06 () and AQ5-07 (). The error bars represent the mean ± standard deviation for three replicates