Plants growing within the rocks devoid of soil were collected and identified as *Barleria acuminata*, *Ficus nervosa* and *Ficus mollis*. A total of 29 bacteria were isolated from their roots of which 1 strain (RB1) was isolated from *B. acuminata*, 13 strains (RB2-RB14) were isolated from *F. nervosa* and 15 strains (RB15-29) were isolated from *F. mollis*. These rhizoplane bacteria were characterized and taxonomically identified based on their biochemical, molecular characteristics and phylogenetic tree analyses as *Enterobacter asburiae* (RB1), *E. hormaechei* (RB3, RB11, RB12, RB13, RB18 and RB20), *E. aerogenes* (RB6, RB16, RB19, RB21, RB22 and RB25), *Burkholderia multivorans* (RB4, RB5, RB7, RB8, RB9 and RB10), *Pseudomonas plecoglossicida* (RB14, RB23, RB24, RB26, RB27, RB28 and RB29), *Cronobacter malonicicus* (RB15) and *Klebsiella pneumoniae* (RB17). Based on the presence of different minerals and elemental abundances, rock samples collected from Mahabalipuram, Thoranamalai of Western Ghats and Gingee were identified as garnetiferous felsic granulite, gabbro and biotite granite respectively. All these rock samples were found to be acidic. Rhizoplane bacteria of rock living plants had the potential to weather different rocks such as granite, limestone and marble which belong to igneous, sedimentary and metamorphic rock types respectively. Microbial weathering of biotite granite, felsic granulite and gabbro by strains, RB9, RB15, RB21 and RB24 show distinct patterns of mineralogical and chemical changes. Each bacterial strain had unique signature in altering the major and trace element abundances of a given rock. Rhizoplane bacteria reported in this study exhibited an array of plant growth-promoting traits such as phosphate solubilization, production of IAA, ACC deaminase, HCN and siderophores. Rhizoplane bacteria also exhibited a broad-spectrum antifungal
activity against major phytopathogenic fungi and antibacterial activity against human bacterial pathogens. In addition, the rhizoplane bacteria reported in this study produced organic acids such as cis-aconitic acid, ascorbic acid, quinic acid, succinic acid, lactic acid, formic acid and fumaric acid and industrially important enzymes such as cellulase (RB5, RB15, RB17 and RB28), DNase (RB4, RB5, RB7, RB9, RB10, RB15 and RB17), protease (RB17) and xylanase (RB5, RB9, RB10 and RB17). Interestingly, strains, RB1, RB2 and RB3 had the prospective to bioreduce the gold chloride into gold nanoparticles and strains, RB6, RB7, RB9 and RB11 synthesized silver nanoparticles from silver nitrate. The synthesized nanoparticles were thoroughly characterized by XRD, FT-IR, SEM-EDAX and TEM. Results confirmed the presence of face centered cubic (fcc) crystalline structure of the gold and silver nanoparticles which were stabilized by enzymes and proteins secreted by rhizoplane bacteria. The gold nanoparticles were found to be spherical with an average size of 65 nm and while the silver nanoparticles were anisotropic in shape with an average size of 15 nm. Considering their innate functional potentials, the rhizoplane bacteria of rock living plants reported in this study can be used as bioinoculants to promote plant growth in arid and semi-arid environments as well as be considered as potential sources for bioactive compounds, industrial enzymes and biogenic metal nanoparticles.