

## **Soil-feeding termites: biology, microbial associations and digestive mechanisms**

### **Abstract**

Soil-feeding species are found in 3 subfamilies of higher termites and constitute 67% of all genera. The habit, which may have evolved several times, is principally associated with lowland humid equatorial rainforests, but there are some savanna forms. Soil-feeders can generally be distinguished from wood-feeders by intestinal morphology, the stable isotope ratios of C and N, and by the higher activity of certain elements of the gut flora, notably methanogens and organisms able to ferment reduced and recalcitrant substrates, including aromatics. Soil-feeders emit more methane as free gas, but do not appear to fix N<sub>2</sub> in significant amounts. Organic material passing through the gut is further humified, with enrichment in total C, N and fulvic acid compared with parent soil, while humic acid is depleted. Mound materials and galleries made using faeces show enhanced cation exchange capacity, with a redistribution and stabilization of soil organic matter (SOM) and an increase in available phosphorus. Bacterial activity is stimulated in fresh faeces and may contribute to further processing of organic matter. The full range of substrates degraded by soil-feeders is not known: two possibilities discussed are 1) that a range of compounds including polysaccharides are degraded to a limited extent by a generalist gut flora and 2) that a specialized symbiont population degrades reduced substrates such as tannin-protein complexes and polyaromatics.