

The global rate of heavy metal pollution is rapidly increasing in different habitats. *Anopheles* malaria vector species appear to tolerate many aquatic habitats with metal pollutants, despite their normal proclivity for 'clean' water (i.e., generally water free of organic matter). Investigations were conducted to establish whether there are biological costs for tolerance to heavy metals in *Anopheles gambiae* Giles *sensu stricto* (Diptera: Culicidae), and to assess the potential impact of heavy metal pollution on mosquito ecology. *Anopheles gambiae* s.s. were selected for cadmium, copper or lead tolerance through chronic exposure of immature stages to solutions of the metals for three successive generations. Biological costs were assessed in the fourth generation by horizontal life table analysis. Tolerance in larvae to cadmium (as cadmium chloride,  $\text{CdCl}_2$ ), copper (as copper II nitrate hydrate,  $(\text{Cu}(\text{NO}_3)_2 \cdot 2 \cdot 5\text{H}_2\text{O})$ ) and lead (as lead II nitrate,  $(\text{Pb}(\text{NO}_3)_2)$ ), monitored by changes in LC50 concentrations of the metals, changed from, 6.07, 12.42 and 493.32  $\mu\text{g/L}$  to 4.45, 25.02 and 516.69  $\mu\text{g/L}$ , respectively, after 3 generations of exposure. The metalselected strains had a significantly lower magnitude of egg viability, larval and pupal survivorship, adult emergence, fecundity and net reproductive rate than the control strain. The population doubling times were significantly longer and the instantaneous birth rates lower in most metalselected strains relative to the control strain. Our results suggest that although *An. gambiae* s.s. displays the potential to develop tolerance to heavy metals, particularly copper, this may occur at a significant biological cost, which can adversely affect its ecological fitness.