Over 30 receptor-like-kinases contain a guanylate cyclase (GC) catalytic centre embedded within the C terminal region of their kinase domain in the model plant Arabidopsis. A number of the kinase GCs contain both functional kinase and GC activity \textit{in vitro} and the natural ligands of these receptors stimulate increases in cGMP within isolated protoplasts. We have also identified mammalian proteins that contain the novel GC centre embedded within kinase domains. One example is the interleukin receptor associated kinase 3 (IRAK3). Here we compare the GC functionality of the mammalian protein IRAK3 with the cytoplasmic domain of the plant prototype molecule, the phytosulfokine receptor 1 (PSKR1). We have developed homology models of these molecules and undertaken \textit{in vitro} experiments to compare their functionality and structural features. Importantly, recombinant IRAK3 produces cGMP at levels comparable to those produced by PSKR1, and HEK293T cells transfected with IRAK3 produced significantly larger levels of cGMP than control cells indicating that IRAK3 contains GC activity. PSKR1 kinase and GC activity is reciprocally modulated by calcium and we are currently investigating how calcium affects IRAK3-GC activity. Our findings raise the possibility that kinase-GCs may switch between downstream cGMP-mediated or kinase-mediated signalling cascades to elicit desired outputs to particular stimuli. The challenge now lies in understanding the interaction between the GC and kinase domains and how these molecules utilize their dual functionality within cells.