



Fig 1 – Cladogram of 1 of 3 most parsimonious (MP) trees recovered from phylogenetic analyses of the nuc-25S-rDNA, mit-12S-rDNA, and mit-atp6-DNA combined sequences. Tree length = 4967; CI = 0.287, RI = 0.566, RC = 0.163. Basidiomata morphology: ♣ = ramarioid; ♣ = club; 🍄 = cantharelloid-gomphoid; ⬆ = stink horn; ♥ = sequestrate; 🌌 = earth-star; 🍄 = cannon ball; ☀ = odontoid/resupinate. Transition to a terricolous substrate affinity is indicated by the symbol ⬆. Clamp connections are indicated with the following symbols: ● = clamp connection present; ○ = clamp connections absent; ◐ = clamp connections present in some species while absent in others.

Geastrales, Gomphales, Hysterangiales, and Phallales

The results of the three combined loci support the hypothesis of a Geastrales–Hysterangiales–Phallales relationship to the Gomphales (Colgan *et al.* 1997; Hibbett *et al.* 1997; Humpert *et al.* 2001; Giachini 2004; Hosaka *et al.* 2006). Both Bayesian MC³ and bootstrap values indicate a consistent and confident resolution for the evolutionary placement of Geastrales, Hysterangiales, and Phallales in relation to the Gomphales. The

placement of the three genera sampled for the Hysterangiales (Gallucea, Hysterangium, and Protuber) indicates a close relationship of the Hysterangiales to the Gomphales (Fig 1). Hysterangium, represented by North American species, was recovered as monophyletic, disagreeing with the work of Hosaka *et al.* (2006). Our study, however, sampled a much smaller portion of the order, as well as only three loci compared to five of Hosaka *et al.* (2006); accordingly we accept their conclusion that Hysterangium is paraphyletic. We sampled four genera of