Figure 1. a) Categories of reproductive costs. b) Total accessory costs, seed costs, and failed tissue costs all scale isometrically with seed size ***(Trade-off 1)***. c) Plants can invest their seed energy in fewer big seeds or more small seeds. d) Plants with bigger seeds make a large investment in each seed and therefore want to optimize the chances of successful establishment for each seed. Part of their strategy will be to ensure each seed has “good” genes, achieved through selective post-pollination zygote abortion. This can only occur if there are surplus ovules, leading to the hypothesis, that larger-seeded species will have a higher ovule : seed ratio, e) expressed as seed set. f) This links with parental optimist-parental pessimist theory: Parental optimists are those species which produce disproportionate ovules relative to what they are able to provision (low seed set). In turn, these species have evolved to minimize pollen-attraction costs and invest more heavily in provisioning tissues ***(Trade-off 2)***. g) Linking these trade-off together, we hypothesize that big-seeded species invest disproportionately in provisioning tissues.

**Pollen-attraction costs**

**Provisioning costs** (Packaging, dispersal, and the seed)

**Seed costs**

**Failed tissue costs**, including both pollen-attraction and provisioning tissues

**Reproductive costs**

Seed size

Accessory costs

Seed costs

Failed tissue costs

Seed size

Scaled

seed

count

Seed set

Proportion of seed costs

to provisioning costs

Seeds (slope =-1)

Seed size

Seed set

Scaled

seed

count

Seeds (slope =-1)

Ovules (slope > -1)

Seed size

Seed size

Proportion of

seed costs to

provisioning costs

**a.**

**b.**

**c.**

Slope > 1

**d.**

**e.**

**f.**

**g.**

Slope = 1