HAVE SEEDS, WILL TRAVEL

Sub-Antarctic spikeballs & bird-eating trees

The relationships between birds and plants are among the most fascinating aspects of evolutionary biology and ecology. Birds utilise plants in all manner of ways – the most basic of these is for nest-building, but there are a multitude of other uses. And plants use birds too. Some of the relationships are quite balanced and mutually beneficial: pollinating flowers in return for a sugar hit from nectaries is a classic example. Dispersing seeds in exchange for a fruity meal is another archetypal plant strategy that benefits both plant and bird. Sometimes, however, plants get sneaky and take advantage of birds for their own ends, without providing the birds with anything in return, and even exacting costs on the hard-working birds.

ROSS WANLESS (4)

Above *A pair of courting Wandering Albatrosses at Prince Edward Island in the Indian Ocean. The darker female (on the left) sports three* Acaena *seedheads on her breast and more under her tail.*

Above, right *The bright red inflorescent spike of the herb* Acaena magellanica. *The plant, a common species on Southern Ocean islands, is believed to be dispersed by attaching its seeds to the feathers of seabirds, including albatrosses.*

Seabirds are unlikely to be the group that first springs to mind when discussing seed-dispersal mechanisms. But albatrosses (and petrels) are almost certainly the dispersal agents for an obscure group of plants belonging to the genus *Acaena*. These nondescript, low-lying herbs send up an impressive flower stalk in springtime. The inflorescences slowly mature into seedheads and, as they do, they look like spiky balls on tiny stalks. And that is exactly what they are – only the spikes have strategically recurved tips that hook into birds' feathers.

Any bird whose feathers come into contact with a spikeball will collect a load of seeds. Albatrosses, despite their famed site-fidelity (they often return to breed within 100 metres of the site where they hatched), do move between islands from time to time. This happens with apparently sufficient regularity to have allowed the evolution and radiation of *Acaena* into a circumpolar genus, with one or two species occurring on almost all sub-Antarctic islands. Some species, having 'arrived' on an island, have abandoned the procellariiform dispersal options. As a consequence they've lost their barbed spikes and are now confined to a few islands, with little hope of dispersing to others.

The supreme example of trickery from plants actually requires (or at least strongly promotes) the death of the unwitting seabirds in order to effect adequate dispersal. The technical term is lethal zoochory, but 'bird-eating trees' sounds a lot more intriguing!

The plants don't, of course, actually eat the seabirds in the way that parrots eat fruit or even in the manner of the famed Venus flytraps and pitcher plants, which ensnare and digest insects. But the *Pisonia* trees of tropical Indo-Pacific islands do ensnare seabirds and this frequently results in the birds' death. It may well be that the birds must die in order to do any good. The way it works is quite simple. The *Pisonia* seeds are coated in a sticky glue and have recurved little barbs all over them – perfect for attaching to seabird feathers. The glue makes them particularly troublesome to remove.

The trouble is that *Pisonia* trees are fairly bountiful and produce bunches of seeds. They often dominate islands, too. Perversely, in less enlightened times pisonias were chosen as pioneer species in many 'ecological restoration' projects to reintroduce native flora to islands that had been devastated by logging, guano scraping and general abuse. So several seabird colonies have to contend with what are probably artificially high densities of the very prolific *Pisonia*.

The bunches of sticky seeds rapidly become attached to the feathers of any bird that brushes past them while flapping awkwardly through the canopy (most seabirds are not the most agile or graceful flyers in confined spaces) or as they move around on the ground looking for nesting material. The seeds are so sticky that, if they catch in strategic places, such as under the bird's wings, they actually prevent it from flapping. They also impose a significant load on the birds, even when caught on the tail, which is, relatively speaking, not such a bad place from a flight perspective. The net result is that many birds get hopelessly ensnared and subsequently die through exhaustion or by being dispatched by scavenging land crabs.

Exactly why the *Pisonia* trees are so lethal remains an open question. The working hypothesis is that birds with a small to moderate load of *Pisonia* seeds may be able to fly away from their breeding island. However, with the additional effort of flapping against the force of glue gumming their underwings to their under-carriage or dragging a bunch of seeds stuck to their tail, some percentage of birds may become exhausted and seek respite on a nearby island. The chances are that these birds will die and in so doing provide a well-fertilised, moist and protected spot on the new island for *Pisonia* seed germination.

ROSS WANLESS □

Above *A Lesser Noddy* Anous tenuirostris *leaves Cousin Island in the Seychelles, with a few* Pisonia *seeds attached to its tail. This level of loading is ideal for getting seeds off the island; it tires a bird to the point that it makes landfall and dies somewhere else, thereby dispersing the* Pisonia *tree.*

Top *An angelic-looking Fairy Tern* Gygis alba *hopelessly ensnared in a mass of sticky* Pisonia *seeds. Small seabirds cannot remove the seeds in this state and will die on the island.*