

Remarkable Jumpers

Paul Hillyard

JUMPING spiders (family Salticidae) are daytime hunters. Their takeoff thrust comes from the last two pairs of legs while the first two reach out ahead for the landing. Jumps are mostly over short distances but can be up to twenty times the spider's length. The so-called flying spider of Australia (*Saitis volans*) has winglike extensions along the body that enable it to glide during leaps.

Jumping spiders have sufficient visual awareness to be able to turn and look at a person who looks at them. They can also see in color—their pretty markings are displayed during courtship. Two of their eight eyes, the central front pair, are large and can recognize objects. Despite the small size of most jumping spiders, the central eyes are based on long tubes that work like miniature telephoto systems.

Having detected movement with the other eyes, a jumping spider turns to bring its central eyes to bear on the object. A jumper stalks its prey slowly, like a cat. The prey consists of insects such as flies, but also other spiders. When sufficiently close, the spider lowers its body, fastens a dragline to the surface, and then leaps onto the prey. But the spider does not necessarily approach in a straight line. It may detour and temporarily lose sight of the quarry. In fact, detouring suggests a remarkable problem-solving ability for a spider. ("Why did the fly fly?" asked the old English riddle. Perhaps it was not realized how correct the answer was: "Because the spider spied her.")

Jumping spiders also have the honor of holding the spider world altitude record. Major Hingston collected in the 1920s a number of specimens at 22,000 feet on Mount Everest. Two species were named many years later by Fred Wanless as *Euophrys everestensis* and *Euophrys omnisuperstes*. According to Hingston:

There was no sign of any other small creature at 22,000 feet; at this altitude all kinds of plant life had been left behind thousands of feet below. Finding the spiders by turning over stones was a great labor, partly on account of the exhaustion experienced at this altitude and partly because the stones were all frozen to the ground.

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Since that initial discovery, it has been found that these *Euophrys* species feed on tiny creatures that are part of a food chain based on plant material blown up from lower altitudes.

Most of the 4,400 species of jumping spiders live in the tropics; the family is highly diversified. One of the most extraordinary species is *Portia fimbriata* of tropical Australia. Because of its wide repertoire of hunting tactics it seems to be the cleverest of all spiders. *Portia* hunts in many different ways, including invading the webs of other spiders—which is most unusual. Typically, hunting spiders move with great difficulty in webs, and webbuilding spiders are ill at ease in the webs of other kinds. But not *Portia*—it can move about and capture prey in all sorts of webs. It can even spin its own web, which is also irregular for a jumping spider. Sometimes *Portia* builds its web adjacent to another spider so that when the neighbor follows an insect in hot pursuit across *Portia's* web, it can be attacked.

Portia is not pretty or colorful; in its cryptic posture it has a very curious, hunched appearance that looks nothing like a normal spider. In a web it is easily mistaken for a piece of rubbish; when walking it makes slow, jerky movements. But *Portia's* jumps are quite impressive. The female measures about half an inch and can jump directly upward as much as four to six inches. Upon landing, *Portia* either freezes or runs about four inches and then freezes. When invading the webs of other spiders, *Portia* makes vibrations to deceive the occupant. If it comes out expecting an insect, *Portia* leaps onto it. When bitten, the victim usually runs some distance but becomes paralyzed after ten to thirty seconds. Sometimes, however, the host becomes alarmed by the strange vibes and hastily decamps.

When stalking normal jumping spiders, a particularly strange posture is adopted by *Portia*, one that is not used when pursuing a fly. Researchers Jackson and Hallas found that the jumping spider quarry did not recognize the slowly approaching *Portia* as another salticid, or any sort of potential predator, or even as another animal.

Predation by spiders on other species of spiders is a dangerous occupation but *Portia* has a secret weapon; its exceptional vision. It can distinguish mates and prey at distances of up to 10 inches, a 3-inch advantage over other jumpers. Not only is *Portia* the sharpest-eyed of all spiders, but also, according to M. F. Land, its optical resolution is superior to all other terrestrial invertebrates, most of which have compound eyes. *Portia's* principal eyes are of the simple type and comparable with our

own, but what is most remarkable is the tiny space they occupy. The size of the retinal receptors are close to the theoretical minimum, given the physical properties of light.