



Reinventing the Wheel

The wheel is iconic for human innovation. Indeed, we pride ourselves for being so incredibly clever as to have invented something as revolutionary as this. Who invented the wheel? If we envisage some stone-age person of Flintstones fame to have had that telling Eureka moment upon turning the first wheel on Planet Earth, we are wrong. Animals sprung this idea long before people did, and three such animals occur right here in the Namib.

As every Namib toktokkie knows, most natural surfaces are too bumpy to allow wheels to roll. Smooth surfaces are required to travel with wheels. People construct roads that are smooth enough to allow wheels to roll, but in nature such smoothness is rare. However, there is one kind of surface in the Namib that is quite smooth: dunes. Lo and behold, there are no less than three Namib dune spiders that can wheel using different methods of propulsion.

The “classic”, which has been known since the mid-70s, is the abundant Golden Wheel Spider and its rare cousin, the White Wheel Spider. Both occur only in the dunes between the Swakop and Orange Rivers. Remarkable are the spiders’ intricately woven silk-lined burrows going a metre deep into dune slip-faces. When dug out or when their burrows are disturbed, these spiders are completely exposed on the dune surface. With nowhere to hide, they can put up quite a fight. But this is of no use when faced with a Pompilid Wasp, a specialist hunter of the Wheel Spider with a highly precise sting which paralyses the spider, enabling the wasp to lay an egg onto it, and to bury it in the sand where a wasp larva will gorge itself on the unlucky spider. The only recourse for the spider, when faced with this formidable wasp, is to vanish. It throws itself sideways into a cartwheel, which spins too fast for the wasp to see, and rolls away down the slope where the spider can quickly dig a new burrow to disappear before the wasp can find it. This gravity-driven wheel is very effective for the spider to escape immediate danger.

A tiny jumping spider uses wind power to drive its cartwheel across open dune sand. With a passing gust of wind, the spider throws itself sideways and spins at something like 90-200 rotations per second, wheel rotation speeds the Formula-1 racers can only dream of. By cartwheeling at such speed, these tiny spiders quickly cover long distances to new foraging grounds.

The irony is that wheels, the very things making these spiders so successful, are currently its Nemesis. Every time dune-driving vehicles flatten their burrows, spiders incur very high energetic costs of rebuilding silk-lined tunnels, which in themselves represent technological marvels, and spiders eventually perish when faced with the umpteenth rebuild.

Zophosis moralesi emphasises the value of observing nature. If we had only long ago noticed spiders wheeling, it would not have been necessary for people to have eventually reinvented the wheel.

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