

## Tekst 2

### Living solar cells power sun-loving hornet



BENEATH its yellow and brown stripes, the oriental hornet packs a power cell that would turn the Energizer bunny green with envy. This insect is known for being able to trap sunlight, and now we know more about how it's done.

More than 40 years ago, Jacob Ishay of Tel Aviv University in Israel noticed that unlike other similar insects, worker oriental hornets (*Vespa orientalis*) tend to be out and about in the midday sun. He went on to show that the insects – which live in underground nests hollowed out by armies of digging workers – can harvest solar energy through the hard cuticle covering their body.

Now a team led by Ishay's former student, Marian Plotkin, has shown how they do it. When Plotkin measured the reflectivity of the hornet's cuticle, he found it to be unusually absorbent, trapping 99 per cent of the sun's rays. Under a high-powered microscope, the yellow segments of the cuticle can be seen to be made up of layers of proteins and lipid, which form oval lumps at the surface. Plotkin believes this structure explains why the surface absorbs most light. The deeper layers of the cuticle also act to trap light, but it is not yet clear how.

The fact that the yellow cuticle sucks in the sun's rays is key, because at the base of the structure is a pigment called xanthopterin which can take in solar energy and convert it to electricity. To confirm this, the team built a mini solar panel that used xanthopterin to harvest light.

Why should a hornet need to charge itself up on solar energy? Last year Plotkin and Ishay (who has since died) showed that enzymes in the yellow cuticle perform metabolic functions similar to those of mammalian livers, and that they are more active when the insects were exposed to ultraviolet light. Plotkin believes the hornets may use the electricity they generate from solar radiation to drive the reactions catalysed by these enzymes.

The electricity might also give the hornets' wing muscles an extra jolt of energy. Anaesthetised hornets wake up faster, and immediately fly away, if ultraviolet light is shone on them. Solar power indeed. **Michael Marshall ■**

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Volgens de tekst slaat de oosterse horzel zonne-energie op in het gele deel van zijn opperhuid.

1p 2 Leg uit waarom de oosterse horzel juist het gele deel hiervoor gebruikt.