

All movies are available on the *Nature Communications* website as well as on the 'EpiPhysX'

**YouTube channel:** <https://www.youtube.com/channel/UCQwkb9mFahbopvMAVfJoPcA>

Supplementary Movie S1: <http://youtu.be/YIRiCwHIUd8>

Supplementary Movie S2: <http://youtu.be/XdQvtP8EKrM>

Supplementary Movie S3: <http://youtu.be/C8NRLP1KDWQ>

Supplementary Movie S4: <http://youtu.be/YSH7EmXFMac>

Supplementary Movie S5: <http://youtu.be/bs4ARkk3whc>

## Legends of supplementary movies

### Supplementary Movie 1

*In vivo* colour change in a *F. pardalis* adult male under excitation upon presentation of another adult male in its vision field. The original video is stabilised and accelerated 8 times. The first frame of the movie is shown in the lower-right for a better visualisation of the extend of colour change.

### Supplementary Movie 2

Colour change is fully reversible: *in vivo* colour change in a *F. pardalis* adult male under relaxation after a male-male combat. Males are much less mobile after than during a combat such that the movie is much more stable. The original video is accelerated 8 times. The first frame of the movie is shown in the lower-left for a better visualisation of the extend of colour change.

### Supplementary Movie 3

*In vivo* colour change in a *F. pardalis* adult male under excitation upon presentation of another adult male in its vision field. The original video is stabilised and accelerated 3 times. The first frame of the movie is shown in the upper-right for a better visualisation of the extend of colour change. Note that this male is dominated by the male in its vision field, hence, colour change is mild.

### Supplementary Movie 4

*Ex vivo* colour change of an adult male *F. pardalis* white skin sample induced by increasing osmolarity of the medium from 236 mOsm to 944 mOsm. The original video is accelerated 30x. The inset shows a 10x magnification of a single cell. This experiment indicates that individual S-iridophores experience a gradual shift in colour across the whole visible spectrum.

### Supplementary Movie 5

Simulation of RGB colour shift at the surface of the first Brillouin zone of the FCC lattice of S-iridophores when gradually reducing the crystal lattice parameter ( $a$ ) from 480 to 233 nm. The simulated colours closely match those observed *in vivo* (Figure 1b in main text, Supplementary Movies 1-3) and during osmotic shock experiments (Figure 2c in main text, Supplementary Movie 4).