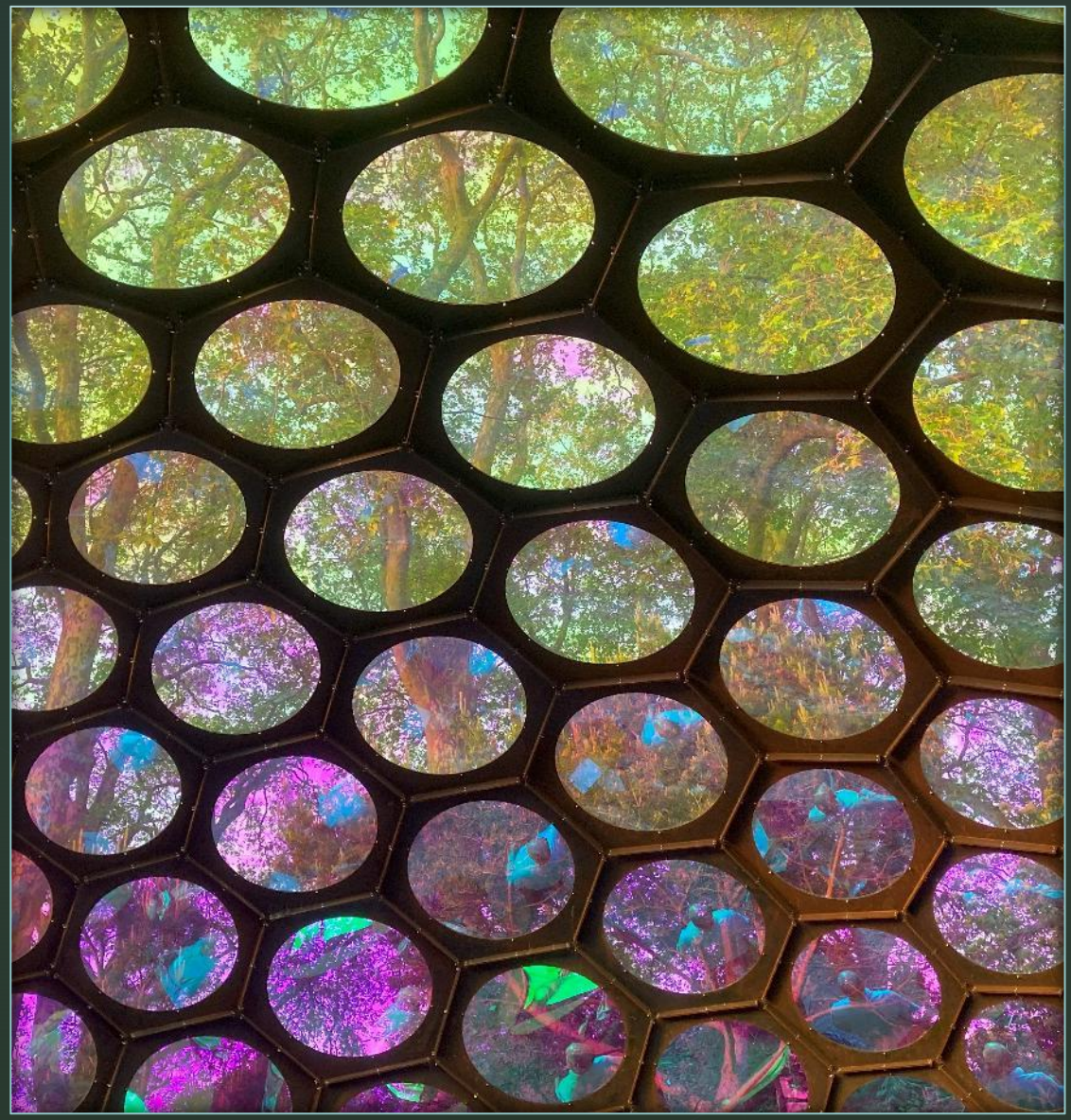
Understanding Aphid Host Plant Location For Improved Monitoring

John Owen



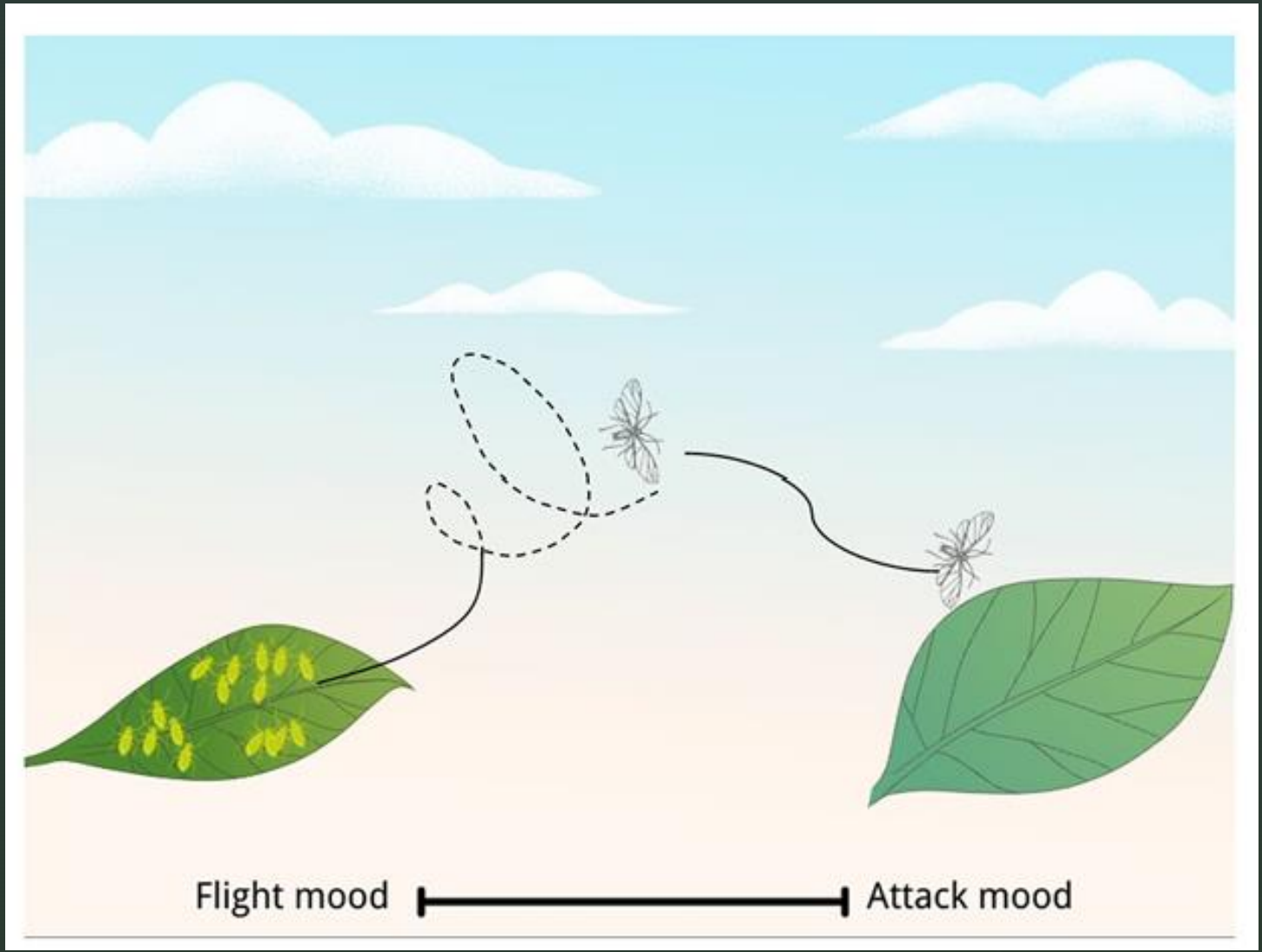
Why Aphids Migrate

Overpopulation

Declining Host Plant Quality

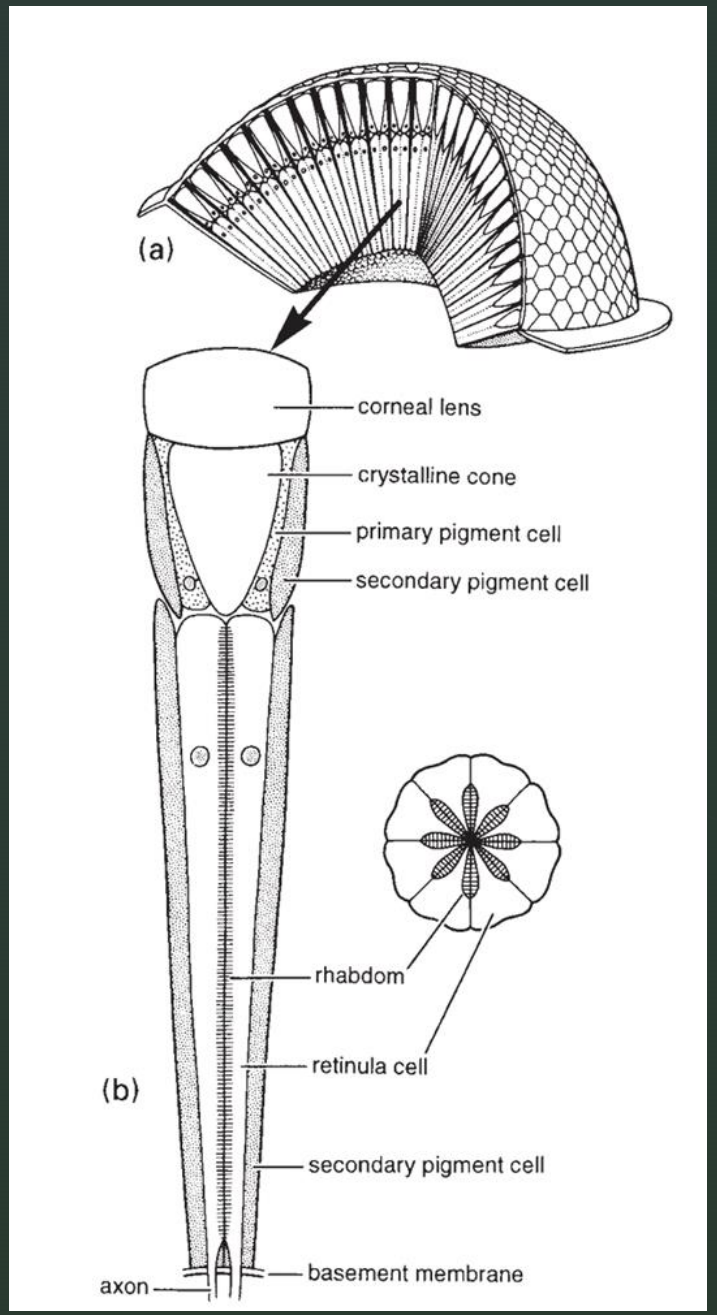
Maximise Survival

Escape Predation

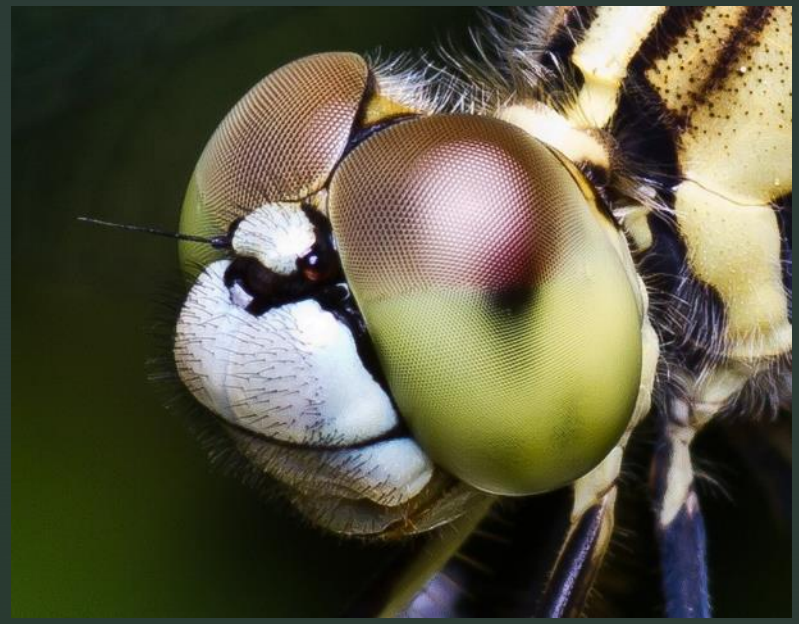


Liu, Renyun & Zhou, Ning & Yao, Yifei & Yu, Fanhua. (2022). An aphid inspired metaheuristic optimization algorithm and its application to engineering. Scientific Reports. 12. 18064.

10.1038/s41598-022-22170-8.



Gullan & Cranston - 2014



Yusoff Ahmad - https://www.flickr.com/photos/mya77/

Visual Cues

Pure Yellow (- UV Reflectance)

⬇

Orange

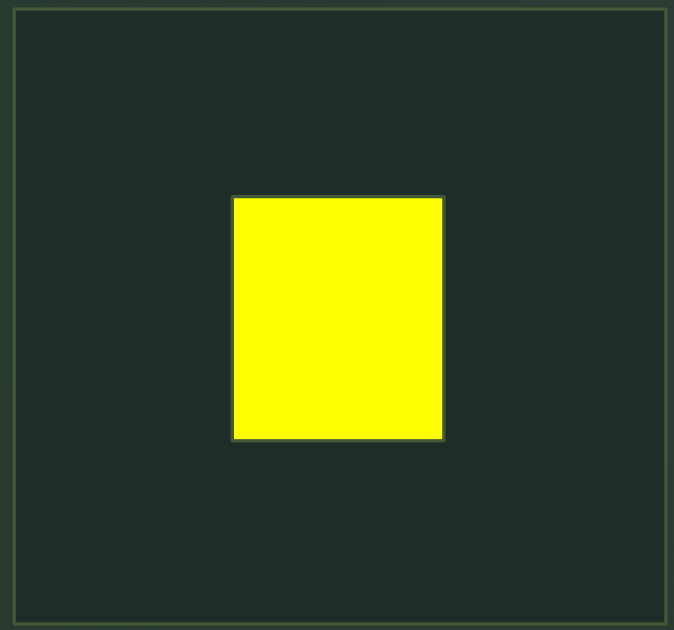
⬇

Yellow/Green

⬇

Green

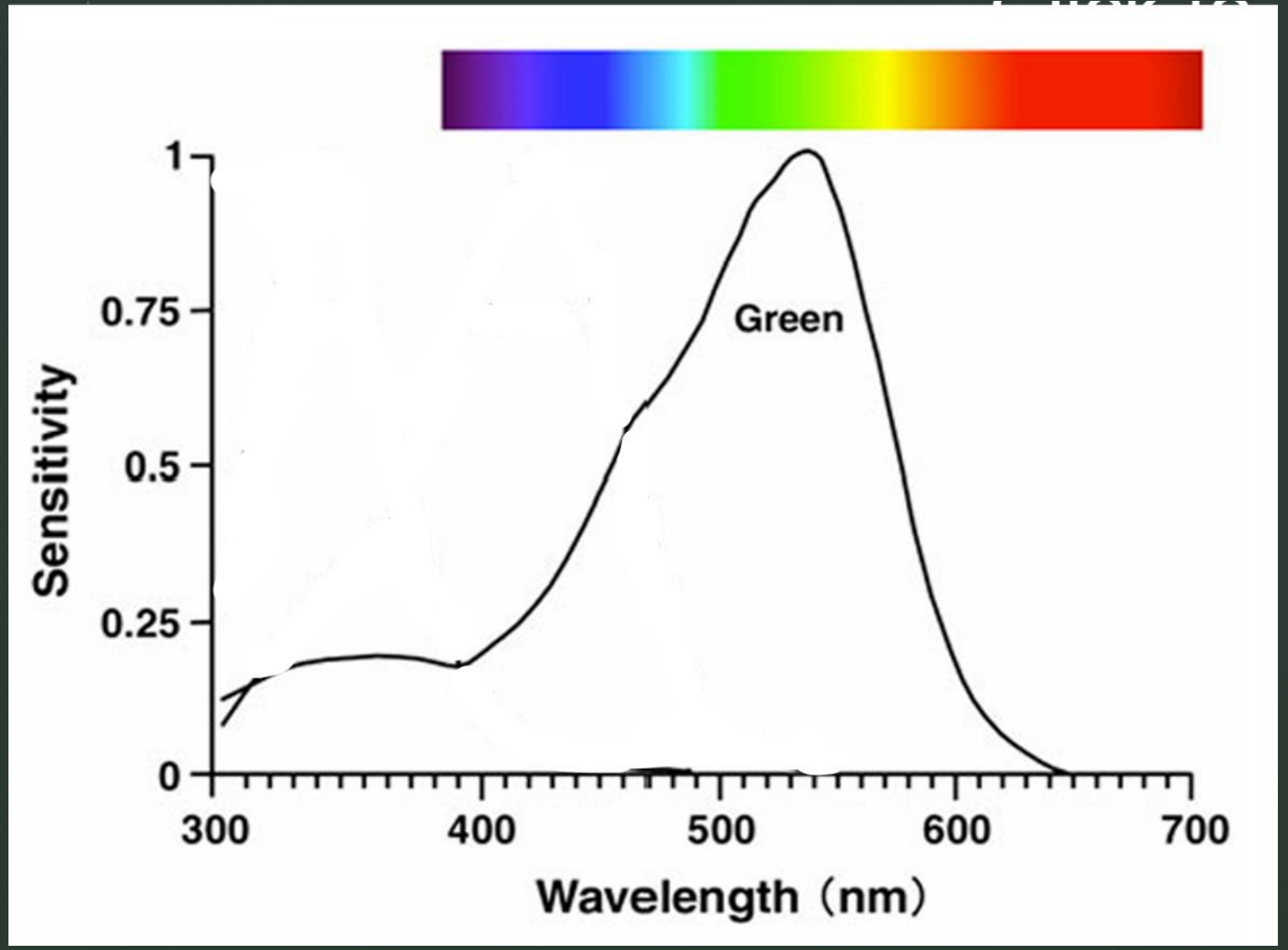
~~Red, Blue, Purple, White.~~



oregonstate.edu/ua/ncs/archives/2003/apr/new-concerpts-co...

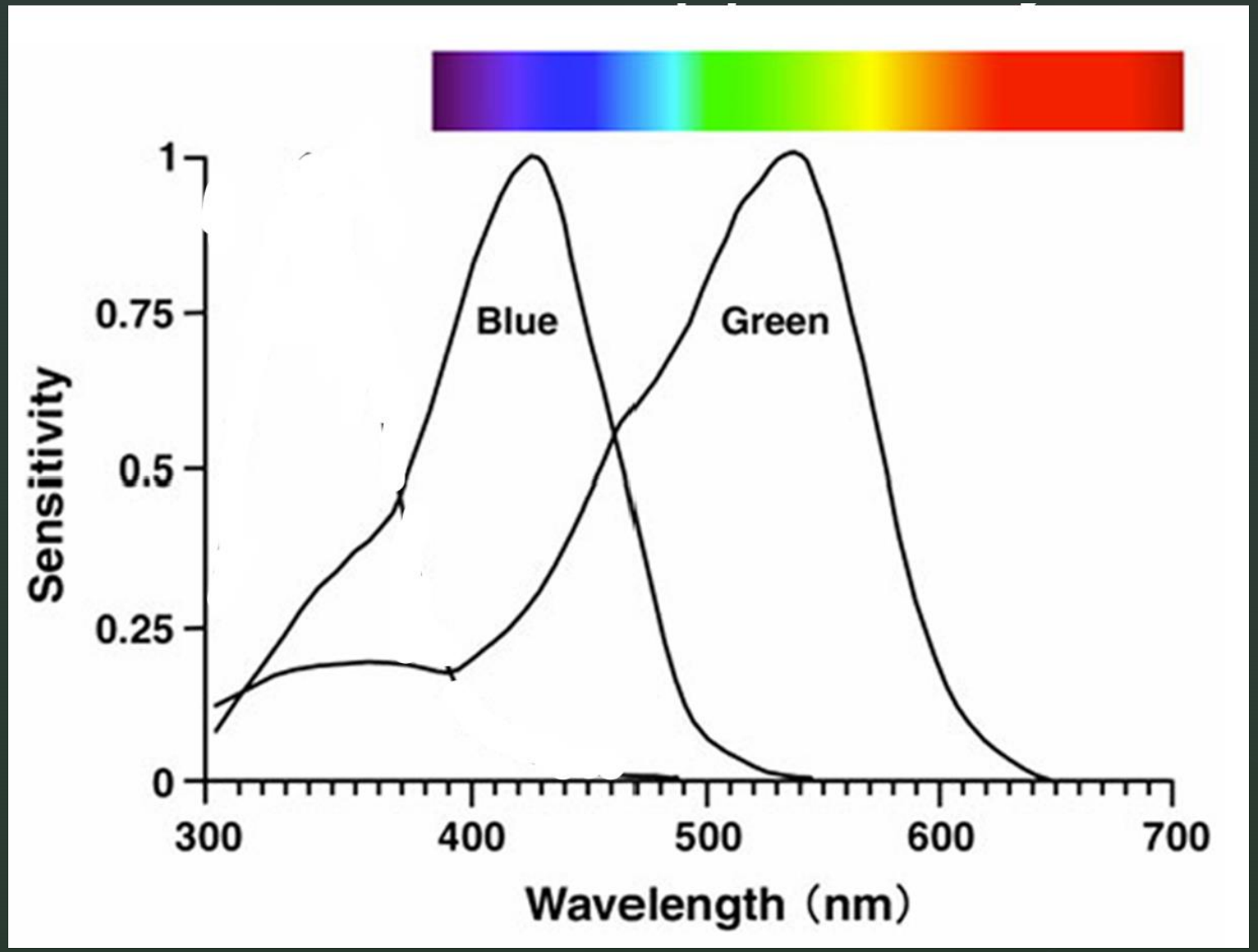
Shimoda - 2013

Colour Opponency

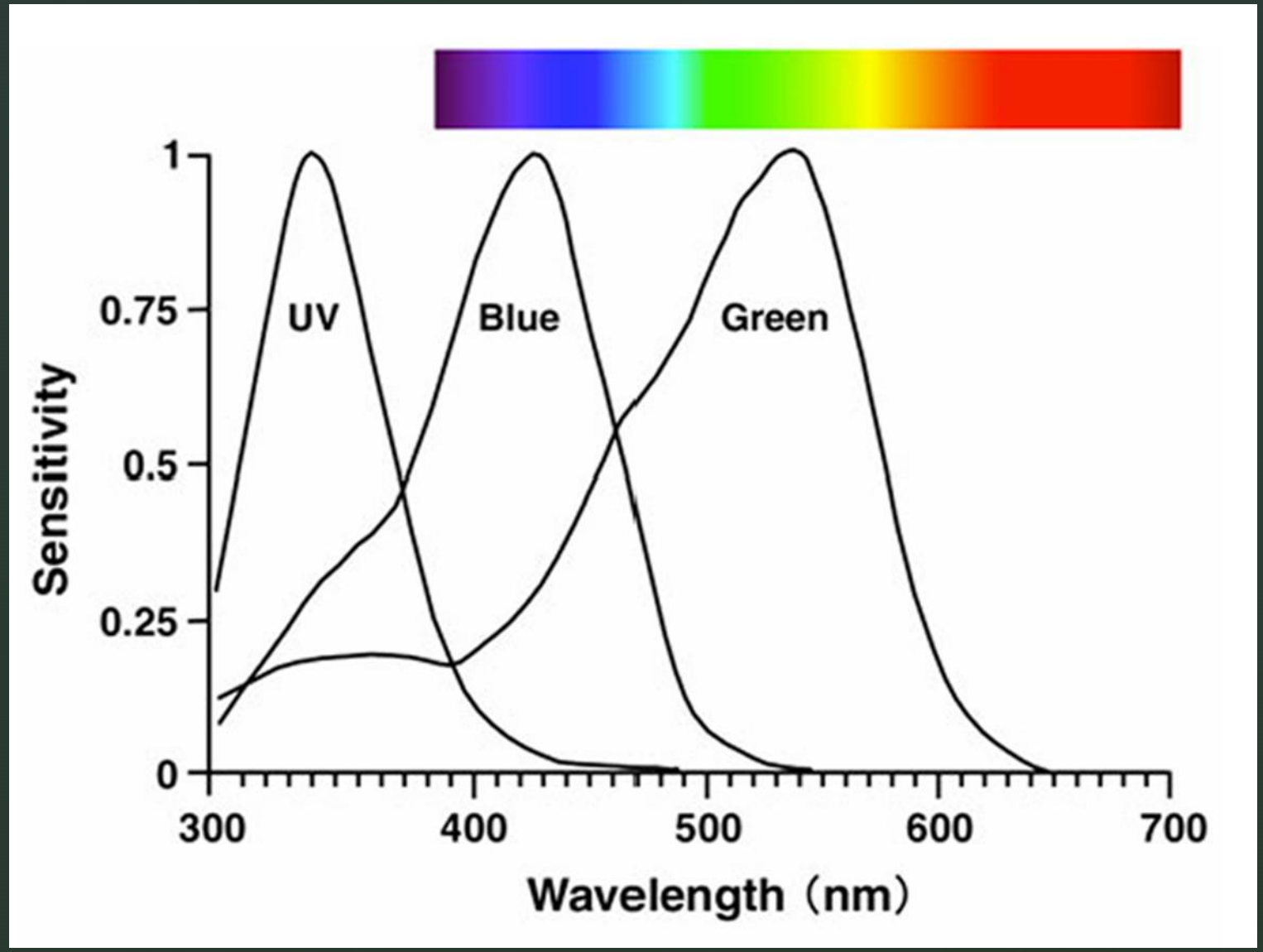


Shimoda - 2013

Colour Opponency

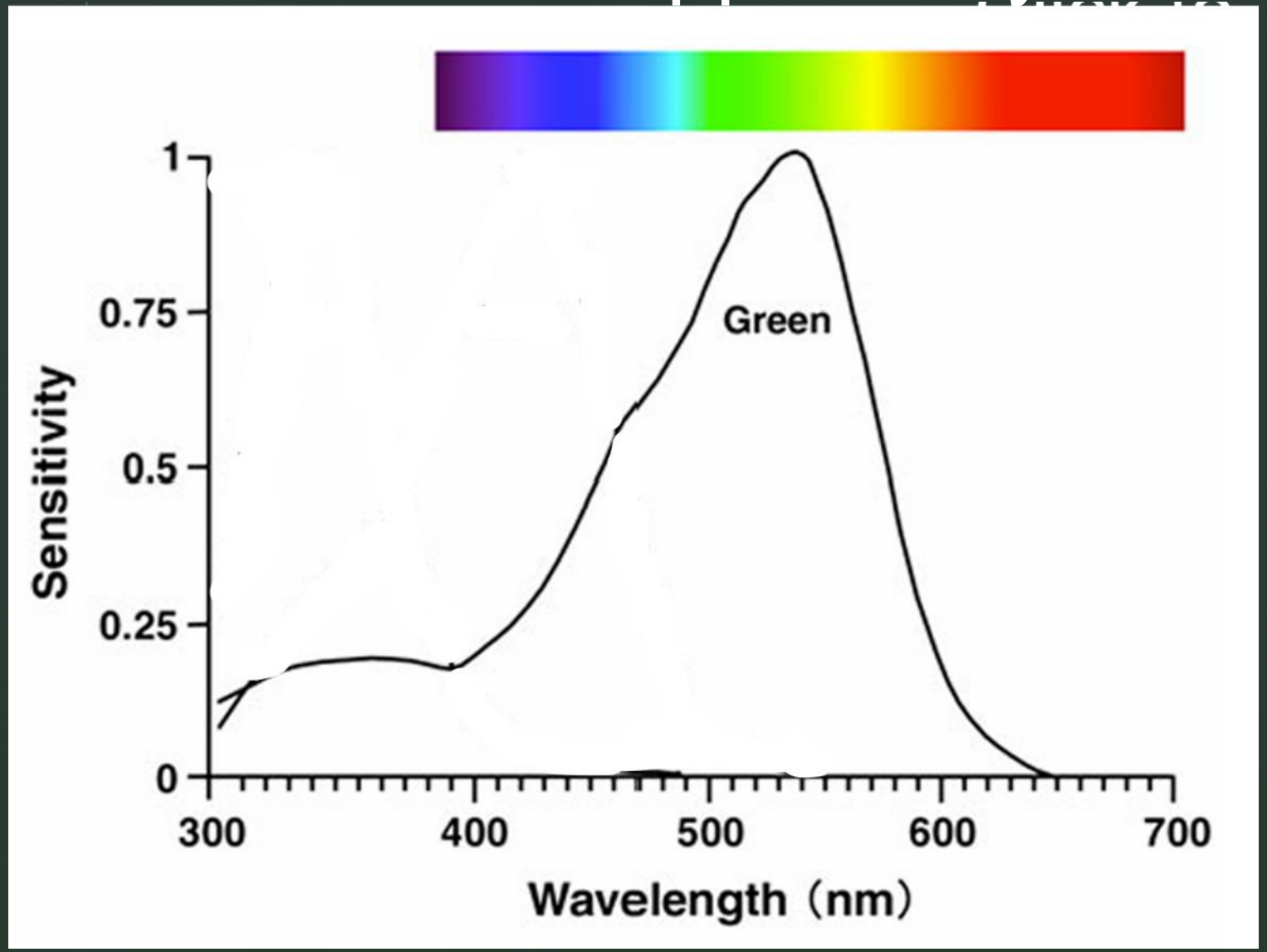


Shimoda - 2013



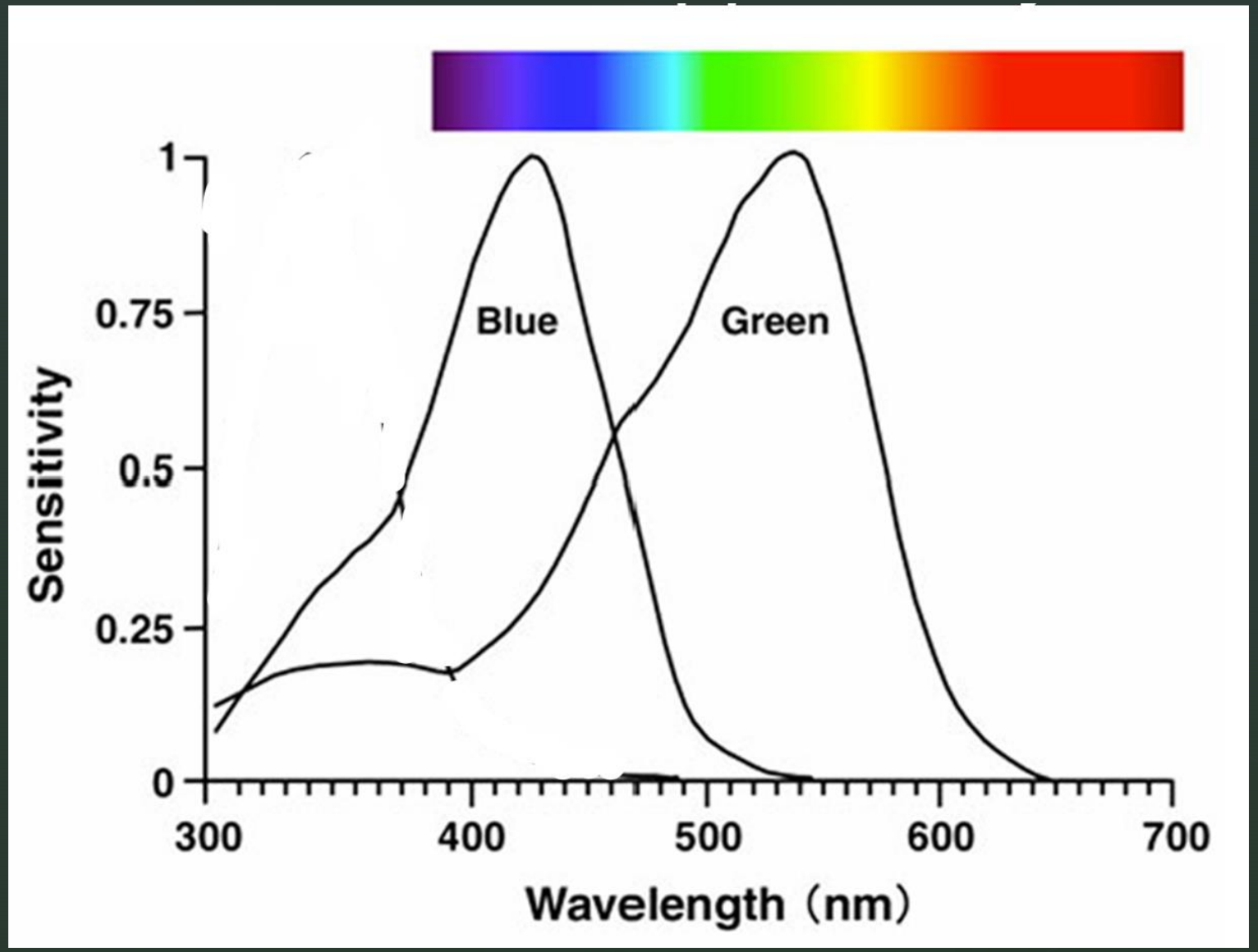
Shimoda - 2013

Colour Opponency



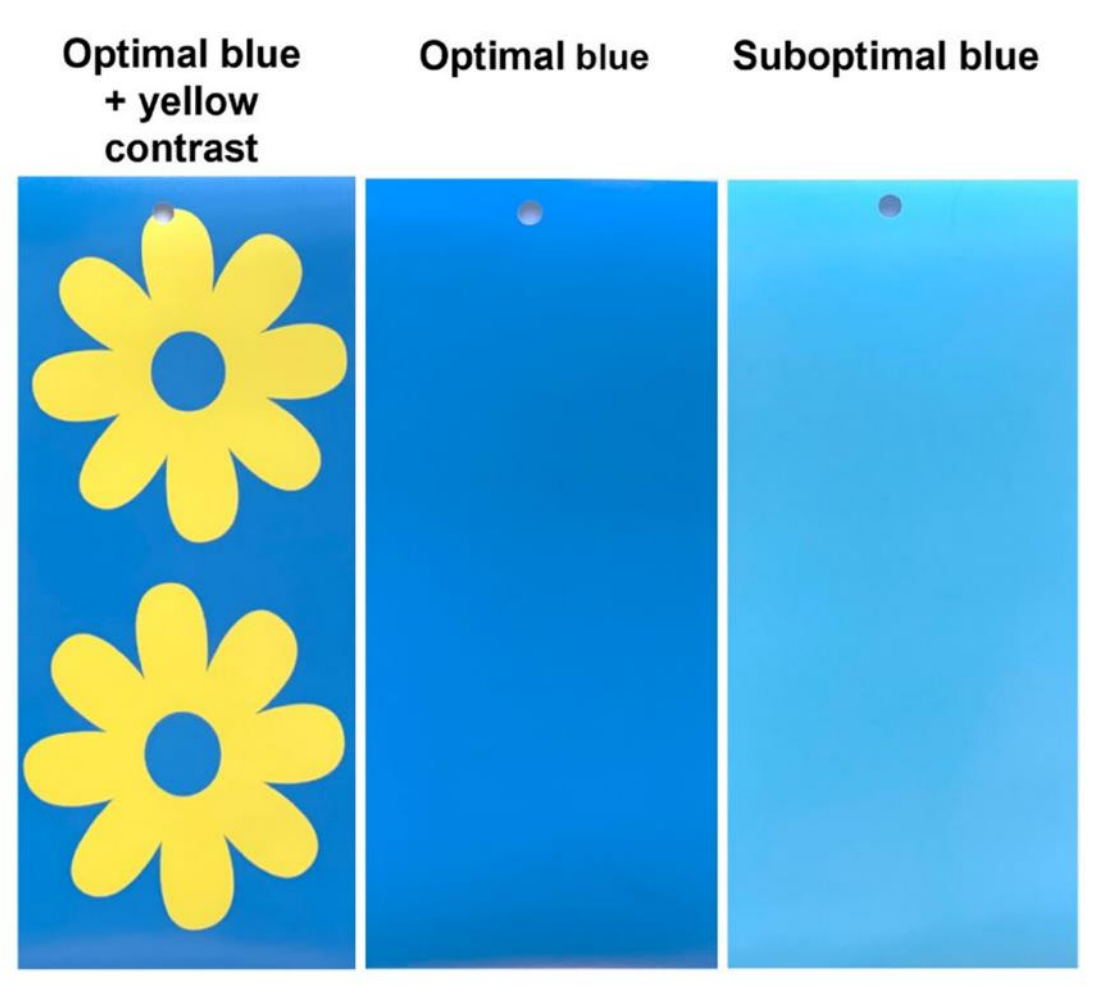
Shimoda - 2013

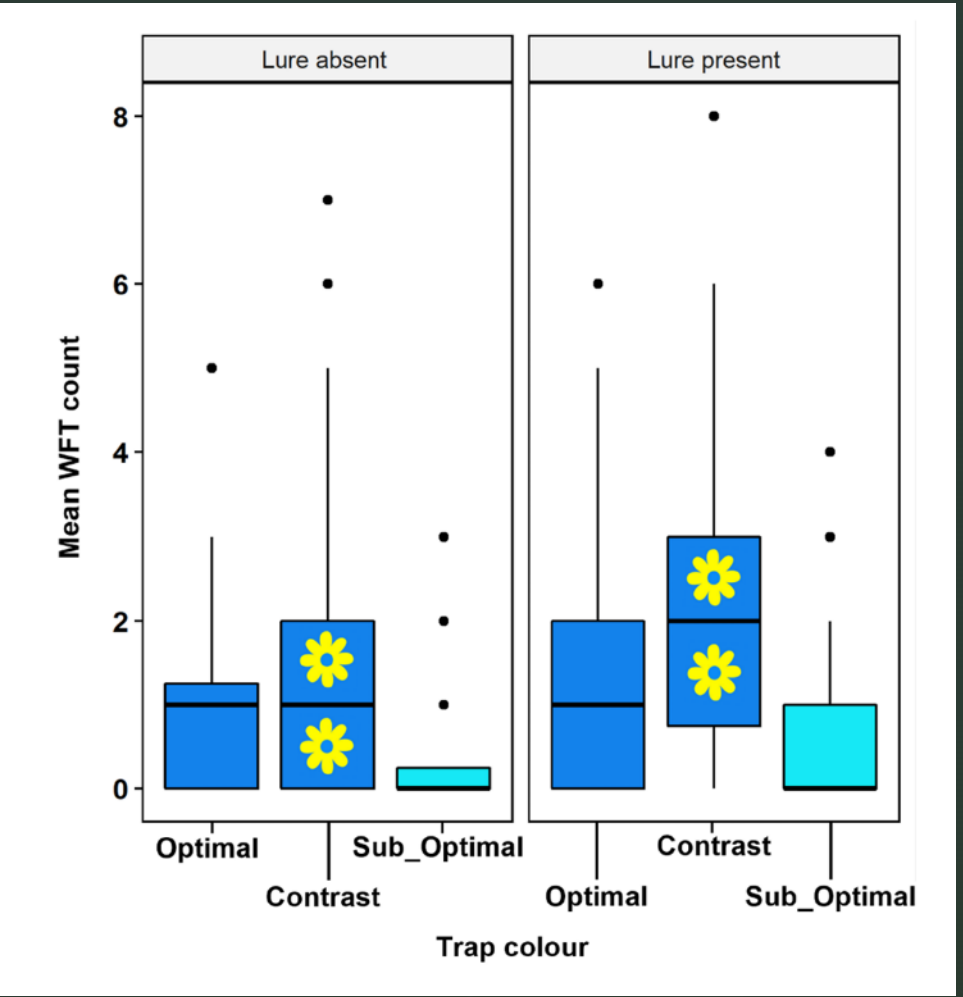
Colour Opponency



Shimoda - 2013

Sticky Traps for Western Flower Thrips





Dearden et al - 2013

Olfactory Cues

- Carvone - Carrot willow aphid (*Cavarielta aegopodii*)
- Primary host location
- Positive and negative Anemotaxis
- Arrestment
- Reduced landing behaviour

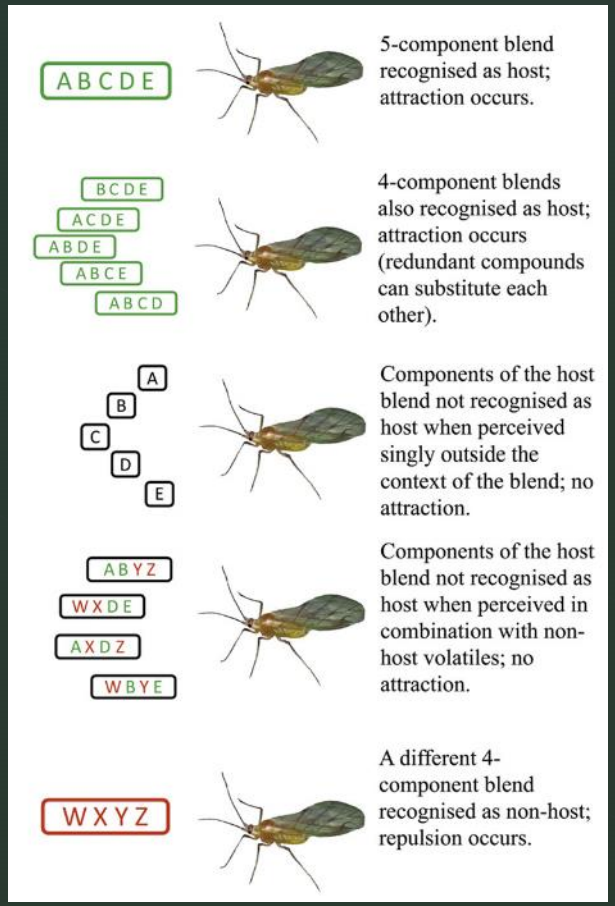
Host Specific Compounds

Alium species - dipropyl trisulphide

and diallyl disulphide

Brassicas - isothiocyanates

Blend of Ubiquitous Compounds



T.J.A.Bruce, J.A.Pickett/Phytochemistry72(2011)1605–161

Other Volatile Compounds

Semiochemicals

(*E*)-β-farnesene (Eβf)

Herbivore Induced Plant Volatiles

methyl salicylate (MeSA)

Host Selection

Stage 1: Pre-alighting Behaviour

Stage 2: Initial Plant Contact And Assessment Of Surface Cues Before Stylet Insertion

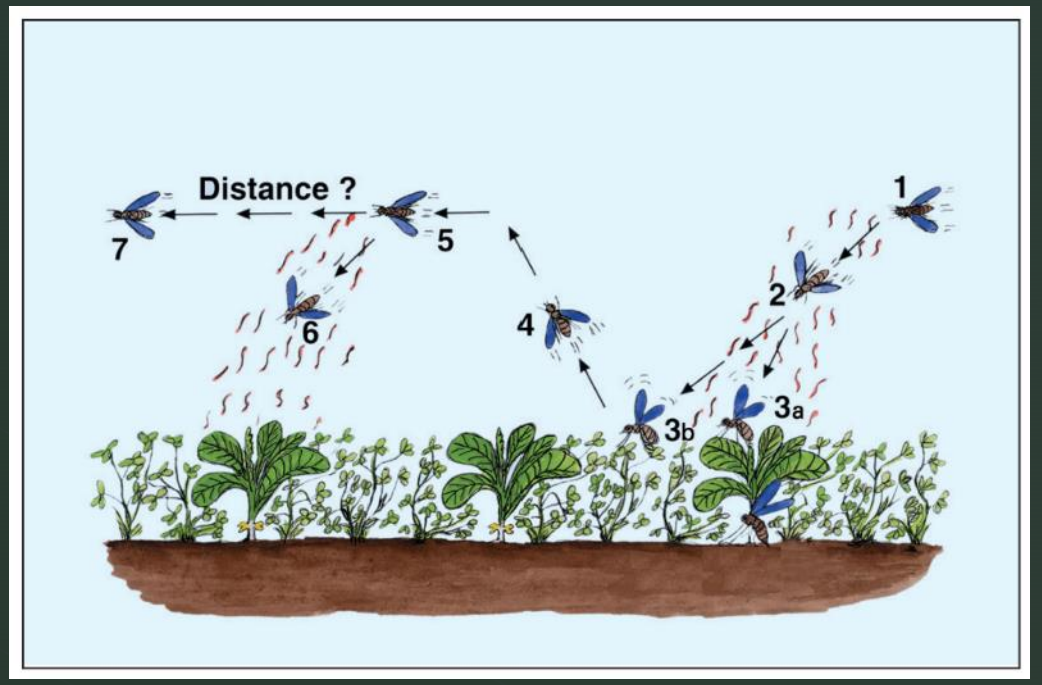
Stage 3: Probing The Epidermis

Stage 4: Stylet Pathway Activity

Stage 5: Sieve Element Puncture And Salivation

Stage 6: phloem Acceptance And Sustained Ingestion

Powell (2006)



Finch and Collier (2003)

Agritech + Add to myFT

Scientists test new biological alternatives to toxic pesticides

Ladybirds, food dye and fungi are all being pressed into the war on harmful insects

The beet goes on: 'camo-cropping' uses dye to make sugar beet crops harder for aphids to detect ©

Harper Adams University

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NIAB

UKRI Biotechnology and Biological Sciences Research Council

CTP Sustainable Agricultural Innovation

CUPGRA