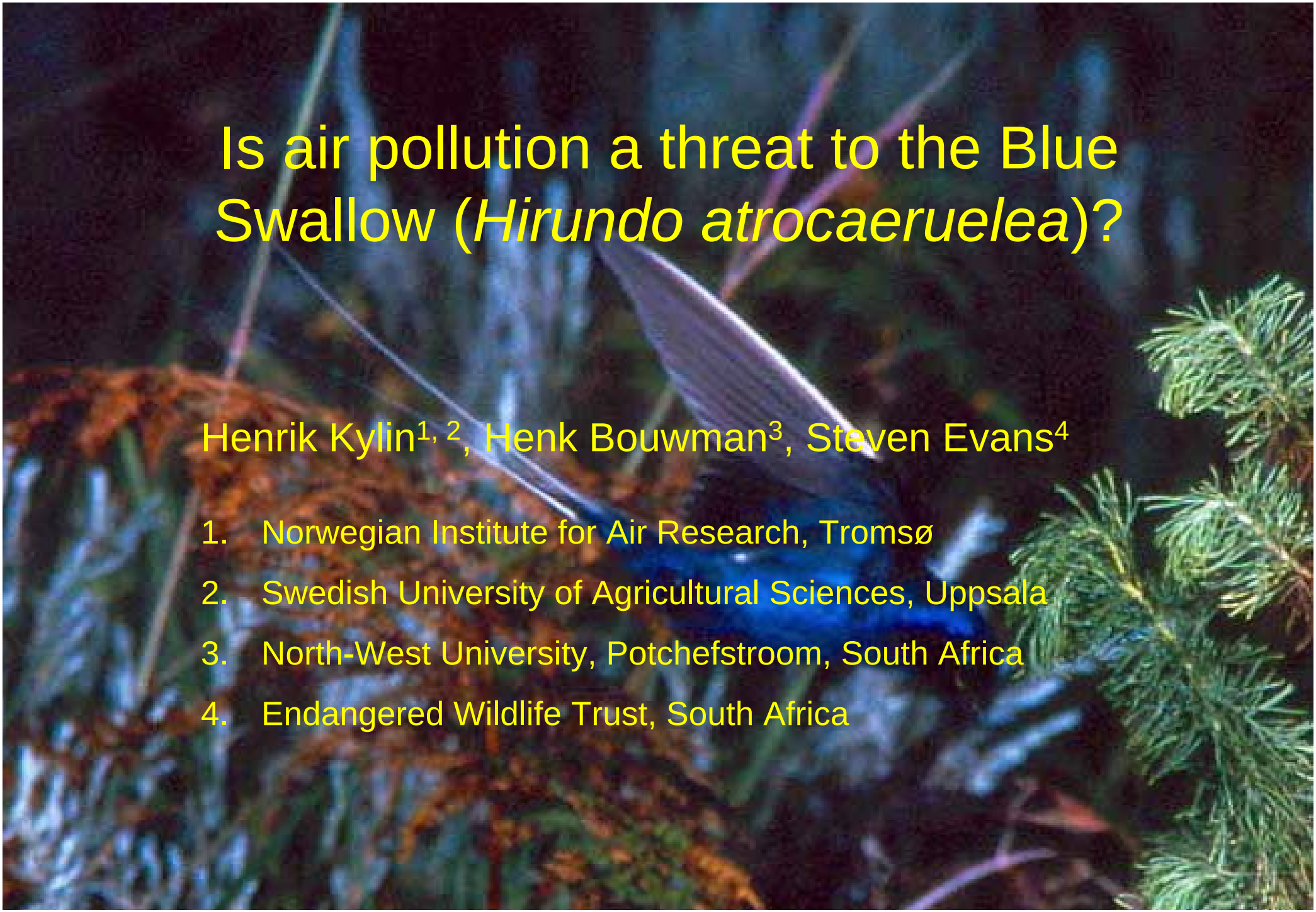

Is air pollution a threat to the Blue Swallow (*Hirundo atrocaeruelea*)?

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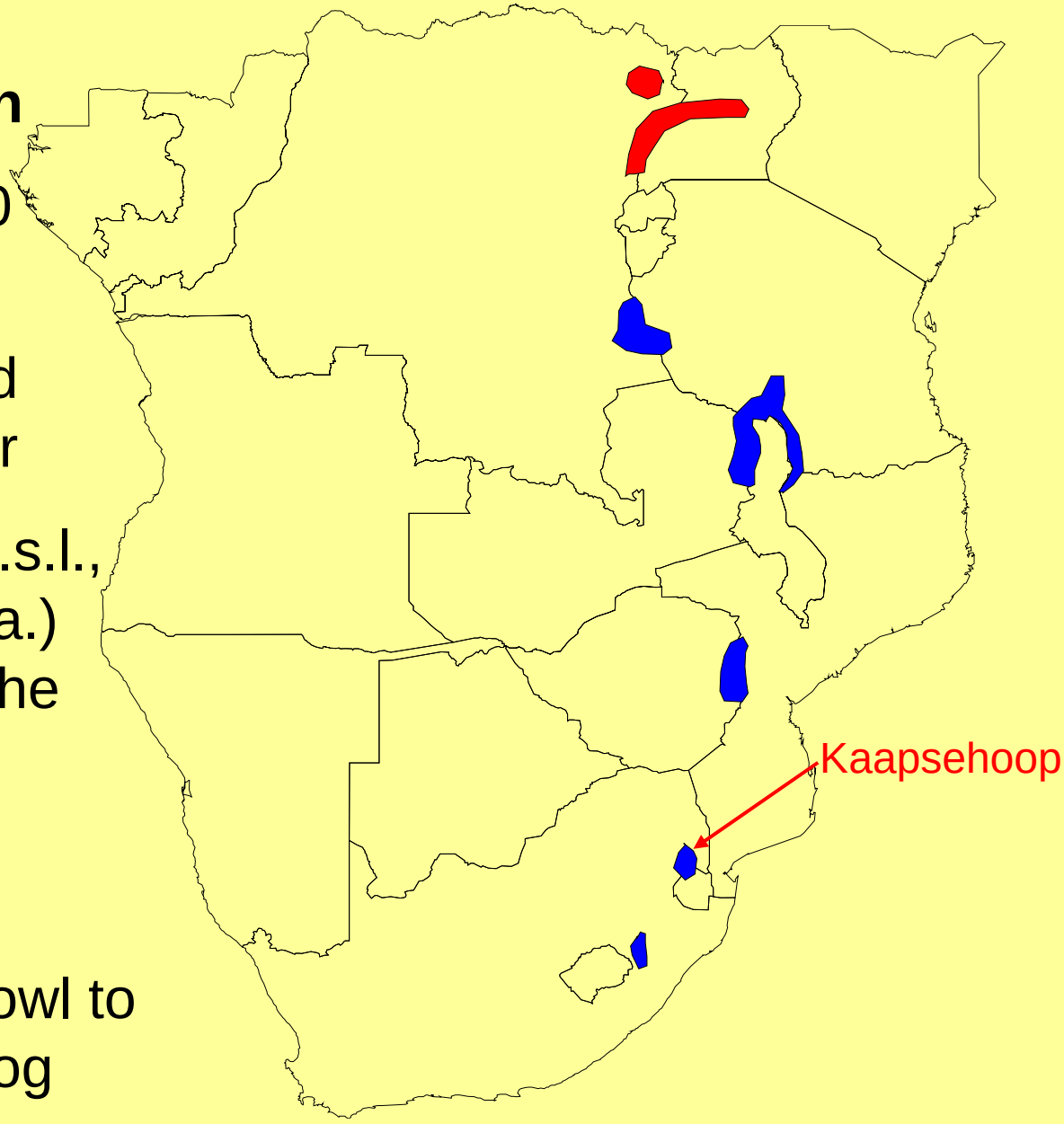
Blue Swallow distribution

World population app.1500 pairs

Nests in sinkholes, disused aardvark burrows or similar

Nesting habitat >1000 m a.s.l., high rainfall (>1000 mm p.a.) mist-belt grassland along the eastern escarpment of the Southern African Plateau

Plumage almost as water repellent as that of water fowl to be able to forage in dens fog

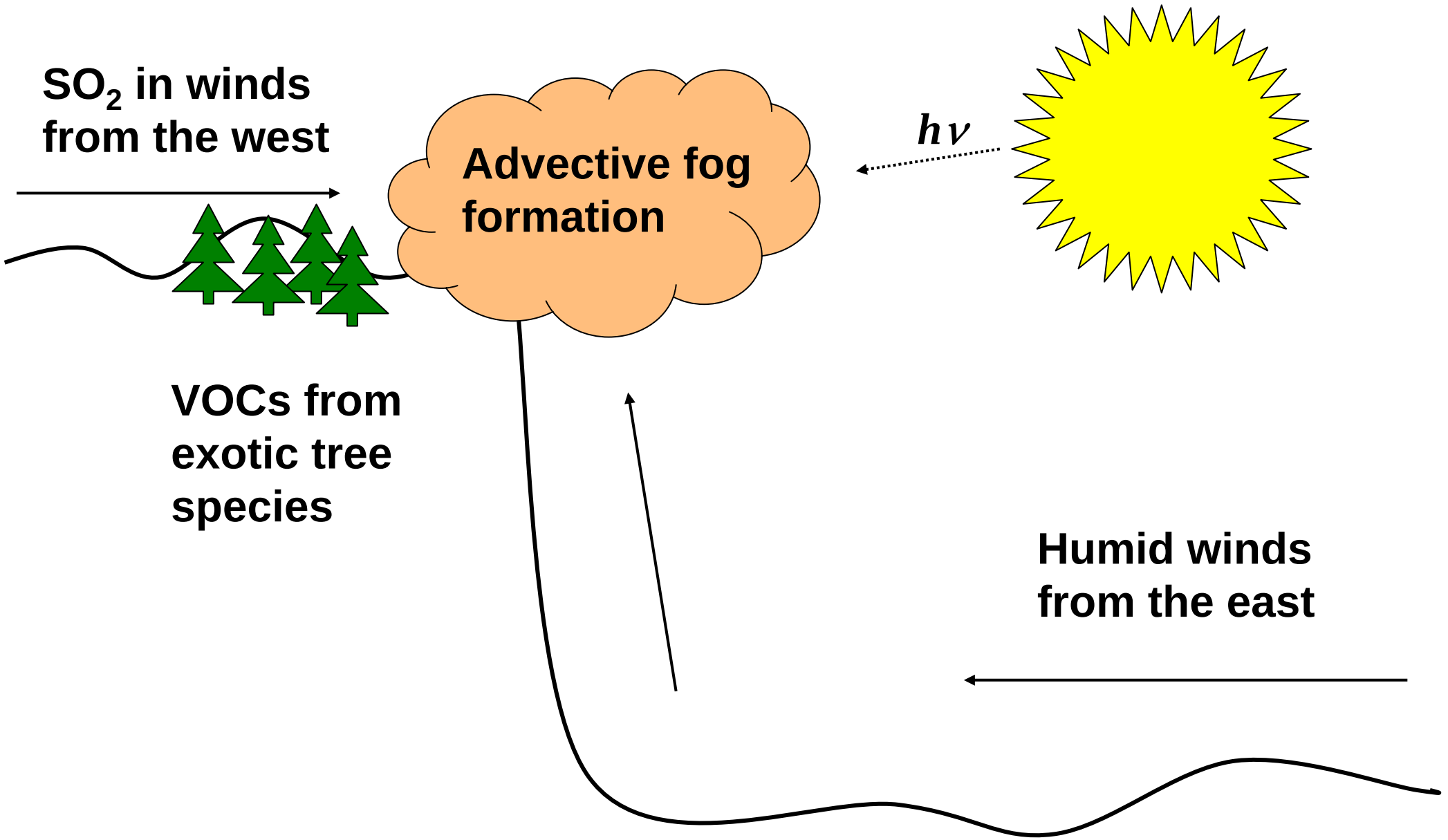


Threats

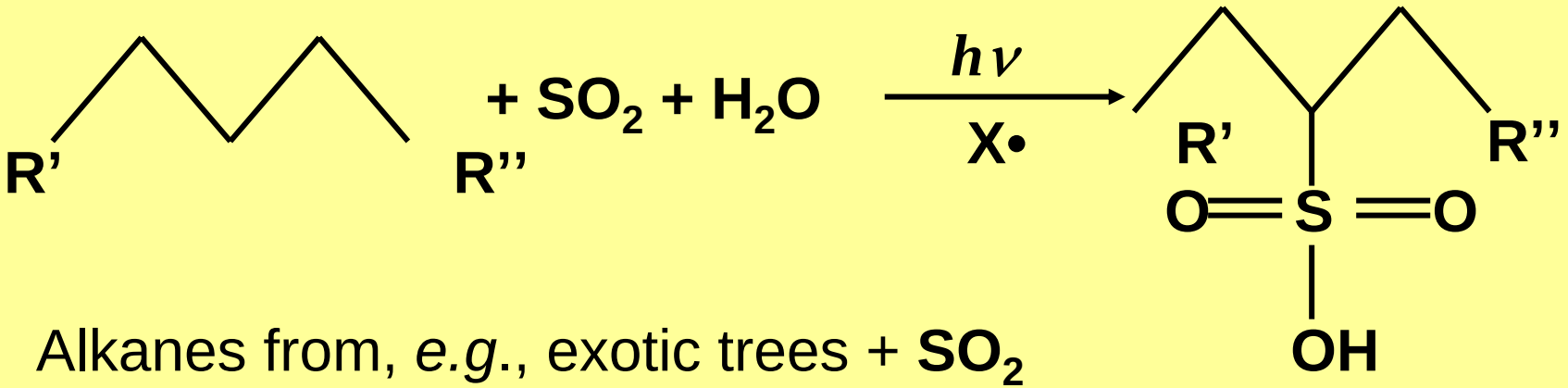
- **Habitat destruction (*e.g.*, expanding agriculture, planting of exotic trees)**
- **Land claims for artisan gold mining**
- **Air pollution?**

Hypothesis

Changes in the chemical environment in the fog banks due to air pollution, UV induced reactions of SO_2 from the Johannesburg area and organics from exotic trees, reduces the water repellence of the plumage making it more difficult for the swallows to forage efficiently in the fog. If the swallows cannot forage properly, it will be difficult for them to collect sufficient energy to rear the young.


SO_2 in winds from the west
Advective fog formation
$h\nu$
VOCs from exotic tree species
Humid winds from the east

Possible chemical reaction



Alkanes from, *e.g.*, exotic trees + **SO_2** from industrial sources + fog water + a radical may form sulphonic acids

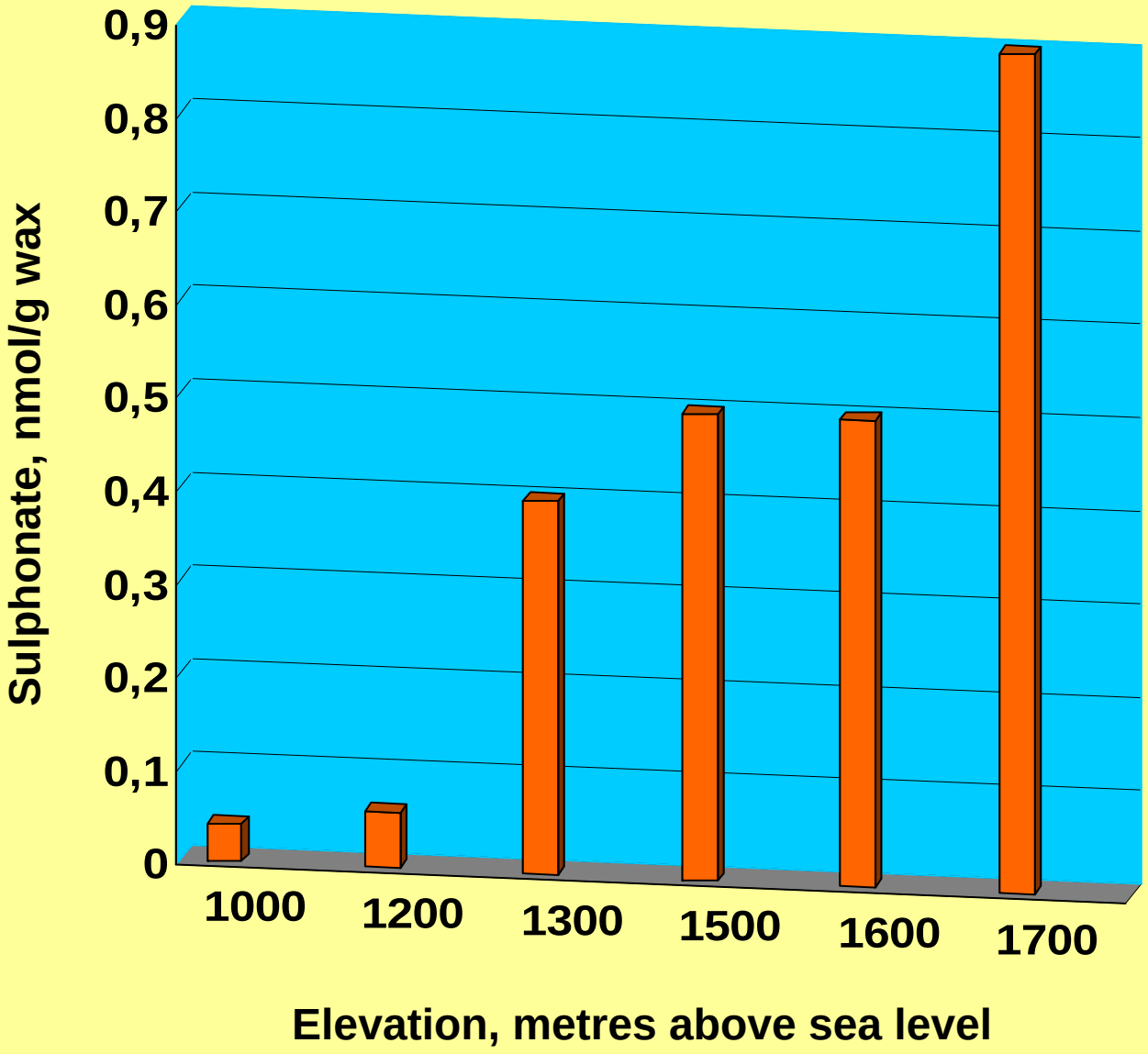
Hydroxyl radicals **OH•** are common in the air and responsible for initiating many reactions with organic chemicals

Sulphonic acids are strong detergents!

Method

- Vegetation, mostly pine needles, sampled from 1700-1000 m a.s.l., and from control sites from other areas of SA
- Surface wax extracted with DCM
- Wax separated into neutral and acidic compounds
- Acids treated with trifluorodiazoethane
- Quantification with DI-MS using NCI-SIM m/z=167, with heptafluorobutyl-PTS as IS (m/s=267)

Sulphonate concentrations



Discussion

- The sulphonates are formed at higher elevations because of the higher humidity, more intense UV, and, perhaps, because of the proximity to exotic trees, and higher SO_2–concentrations than at lower elevations

Conclusion

Our results are no absolute proof that air pollution is a problem, but they are a sufficiently strong indication for air pollution to seriously be taken into account in species management plans. Air pollution is part of the habitat destruction together with, *e.g.*, planting of exotic trees and potential gold mining.