IPRGC and MYOPIA: P. HEILIG

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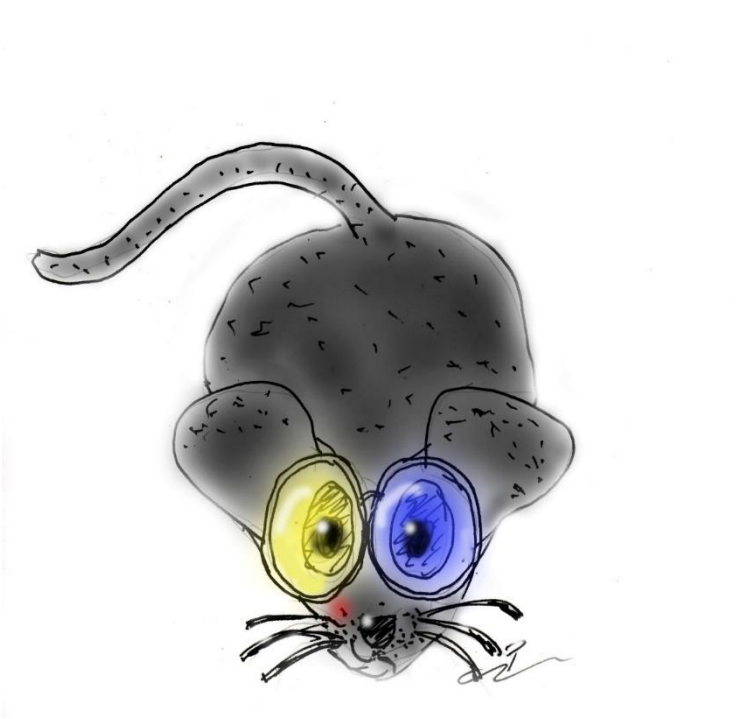


Intrinsic-photosensitive-melanopsin-retinal ganglion cells (ipRGC), physiologically and morphologically heterogeneous, have an astonishing influence on: pupil, biorhythm, vigilance, mood, learning, body temperature, migraine, contrast, colour vision and *'myopiagenesis'*.

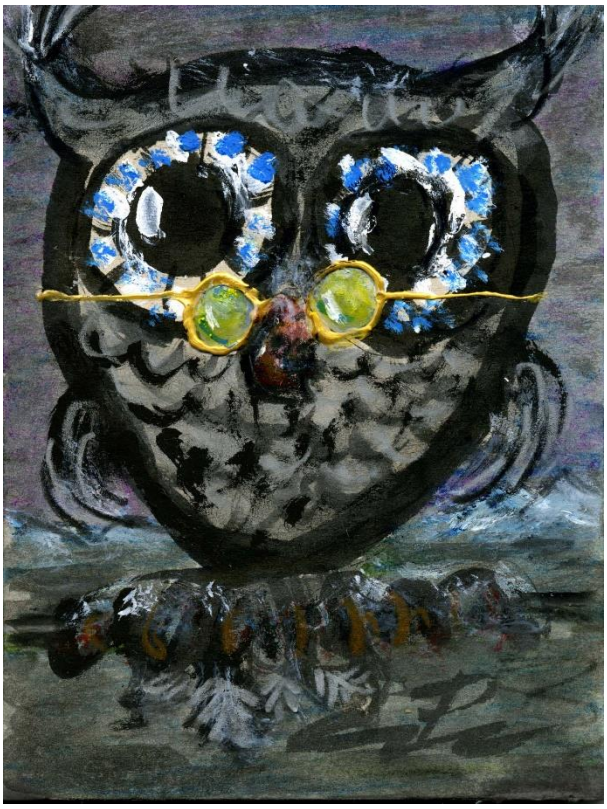
Their projections reach about fifty cortical regions.

ipRGCs are connected via '*ON-pathway systems* with dopaminergic amacrine cells thus controling bulb length growth. Increased retinal dopamine reduces the incidence of myopia. Reduced retinal dopamine levels increase the susceptibility to myopia, # (as demonstrated experimentally).

Significantly altered b-wave amplitudes and '*implicit-times' of the electroretinogram* (ERG) were recorded - depending on bulb axis lengths.

The ERG reflects '*on-pathway activities'* thereby documenting such functional disorders at early stages.

Increased affinity of dopamine receptors has an adverse effect on bulb axis lengths and chronobiology: "*positive association between morning melatonin concentration and the magnitude of myopia, with myopes demonstrating up to three times greater melatonin concentration than non-myopes*"(Chakraborty et al. 2022). The 'threads converge' in the ipRGCs - these 'retinal key cells'.



'*Unphysiological*' artificial light influences the ipRGCs and the *master clocks* of the *suprachiasmatic nuclei* (SCN) as an undesired *'chronodisruptive factor*.

'SCN-*zeitgeber'* (oscillators or metronomes) send their impulses to the '*molecular clocks*' in almost all tissues and cells of the body.

Experimental damage to the SCNS "*results in behavioural and molecular circadian arrhythmicity*"(Kimberley et al 2020).

It would be instructive to learn how this manifests itself in detail on a molecular biological basis, as a "*potential association between retinal circadian clocks and myopia*" (Chakraborty et al. 2022).

Myopia progression may be prevented, provided that ipRGCs and dopaminergic systems are intact.

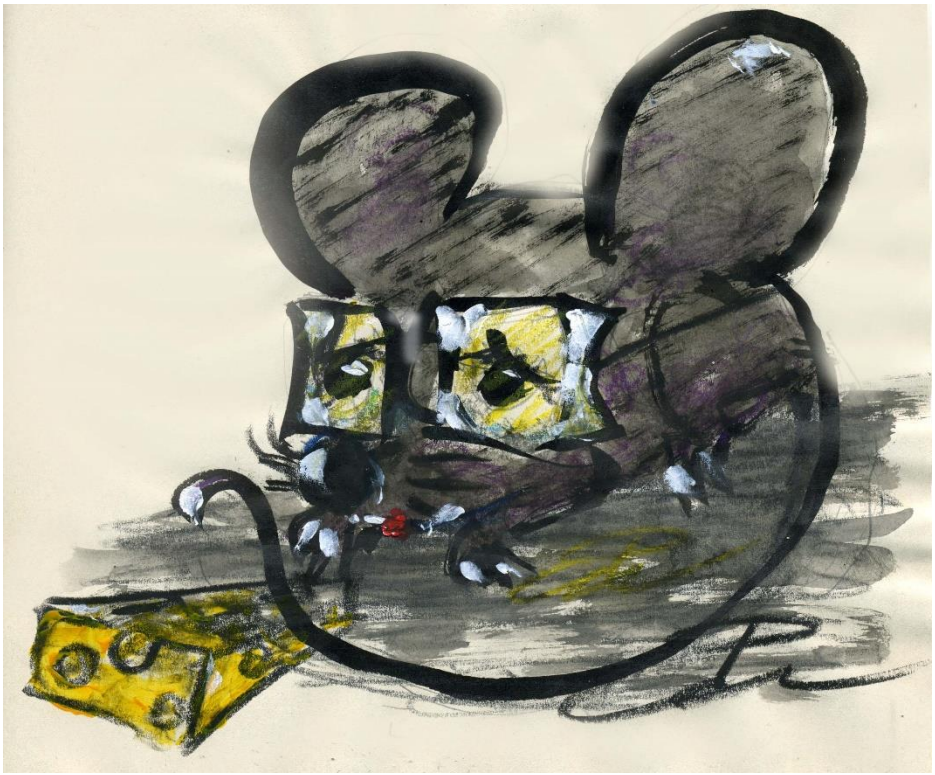
Short-wave light came too much to the fore as a possible factor, but:
"It is likely that a broad range of ambient light exposure during development, including both dim and bright light, is necessary for healthy ocular growth"(Landis et al. 2021).

Unphysiological artificial retinal light exposure, caused by displays, monitors (smartphone, TV, PC, tablets, etc.) and incorrectly developed light sources of motor vehicles, e-scooters, LED headlights, daytime running lights (DRL), sports field- and snow slope illumination etc. are a potential threat.

Light-spectra, intensities (and exposure time) of artificial light sources require revision regarding eye health, contrast vision, road safety, chronobiology and, last but not least, myopia prophylaxis.

The increasing '*myopia dilemma*' is also linked to '*chronodisruptions*', hyposomnia, agnypia and dysphoria*.

Smartphone light late at night, PC, TV, tablets etc. in continuous use, light bombardments in road traffic, dazzling daytime running lights etc. stress receptors, ipRGCs, interneurons, mitochondria and microglia: '*Müller glia-derived PRss56*' and the interactions with retinal pigment epithelium/Bruch's membrane (https://ub.meduniwien.ac.at/blog/?p=30977).



The human *Lens Crystallina* gradually turns yellow - with age, an almost '*teleological*' reaction in times of mis-developed artificial light management.

The invariable evolutionary retinal adaptation to daylight spectra requires industrial adaptation, inevitably - not vice versa.

The *'physiological blue central scotoma'* (*Maxwell's spot*), a particularly convincing example, questions all the overdosed blue-'enriched' light stagings.

Blue font, often used for important headlines for example, is counterproductive (https://ub.meduniwien.ac.at/blog/?p=31486).

Bright font against dark background is preferable, protecting the retina and delaying or possibly preventing the 'office eye syndrome.'

Yellow tinted intraocular lenses – similar to the aged lens crystallina – can improve contrast vision and reduce undesired glare effects – a fraction.

The fear of a general 'blue light deficiency' is totally unjustified. Our Brave New World will continue to radiate in a shortwave dominated artificial light halo forever - guaranteed by the phalanx of decision-makers with strange peculiarities: dogmatic, uncritical and un-correctable.

Inference:

Artificial light installations without *Blue Peak* have priority, now and in the future.

Yellow street lights and car headlights were not a mistake – in contrast to the still unsolved *Daytime Running Lights* (DRL) - problem.

Literature

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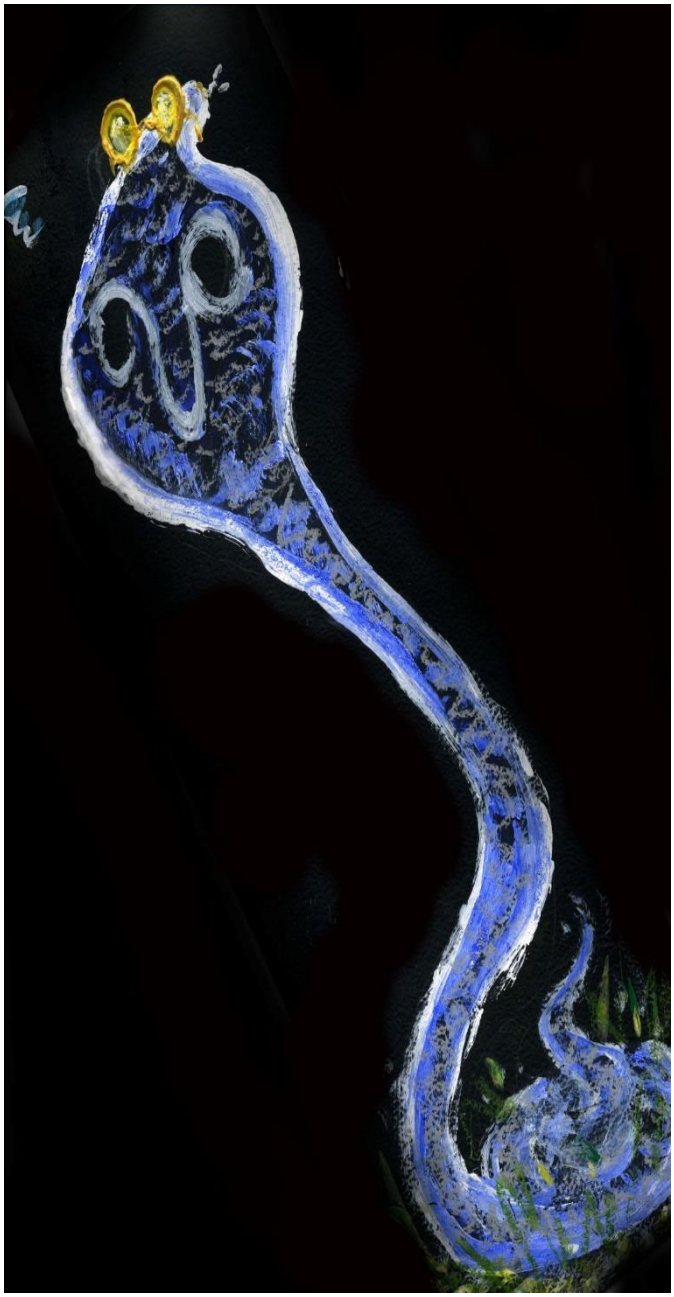
Suicide: second leading cause of death among adolescents". One of the complicit factors 'wrong light at the wrong time' is easier to correct than some other noxious ones that potentially endanger both health and psyche.
https://www.gesundheit.gv.at/aktuelles/welttag -der-psychischen-gesundheit.
incandescent: glowing-luminous (such as torches, candles, light bulbs, etc.)
isotropic - light radiating into all directions



beyond gender, conflict of interest: no.