



< A CRITICAL REVIEW OF THE FUNCTION OF NEUROMELANIN AND AN ATTEMPT TO PROVIDE A UNIFIED THEORY >

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This paper provides a critical review of the numerous and various biological functions so far attributed to neuromelanin and an attempt to provide a unified theory based on the peculiar physical and chemical properties of the black particle (the neuromelanin cage). It is stressed that neuromelanin is not homogeneous, as is commonly accepted, but is made up of different substrate specific black pigments formed by the oxidation of o.diphenols or other oxygenated precursors (*substantia nigra* melanin, *locus coeruleus* melanin, retinal pigmented epithelium or ocular melanin, inner ear melanin, and so on). Ocular melanin is believed to protect the eye by trapping metals and free radicals. The paper shows that this unconfirmed mechanism is a rather fortuitous irreversible molecular accident, which at times may prove itself deleterious.

Albinism often leads to deafness in animals, indicating a genetic correlation. These two conditions appear to be correlated at a molecular level to eye/ ear pigmentation and suggest verifying this hypothesis in normal and albino human individuals.

Skin and ocular melanin are chemically different. However, they are both involved in light absorption/dissipation. The black particle structure (melanin cage) is believed to be fundamental to this process because there is a common bioelectric mechanism. The latter is worth of further investigation. It is also proposed checking how ocular melanin dissipates the excessive absorbed light (as heat or as current?). It has been claimed that inner ear melanin mutes acoustic waves.

This paper suggests investigating the underlying mechanism and also studying whether this pigment is bio-electrically involved in audio logy.

According to numerous authors, *Substantia nigra* melanin is only biological garbage. This view is rejected, and it is stressed that intracellular melanogenesis is a fundamental and genetically controlled physiological process.

It has been repeatedly claimed that the binding of iron, heavy metals, free radicals and harmful chemicals by *substantia nigra* melanin is fundamental to body detoxification/protection.

Presumably, such irreversible and generic binding mechanisms have no physiological foundation; it is suggested the alternative that, *substantia nigra* melanin acts as semiconductor, transmitting and modulating nervous impulses, in a reversible way. In

fact, *substantia nigra* melanin is absent or significantly scarce in two conditions of life in which the coordination of movement is either inefficient (newborn babies) or strongly compromised (Parkinson).

To check this assumption, further investigation of *nucleus caudatus*, *putamen*, *globus pallidus*, *substantia nigra pars compacta* and *reticulata*, *nucleus hypothalamicus* is recommended .

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