

Role of the pineal gland in hibernators: a concept proposed to clarify why hibernators have to leave torpor and sleep

G. Kocsard-Varo*

Summary The contention that torpor during hibernation might not be a kind of sleep but a kind of sleep deprivation may be correct, as it can be conceptually explained. Sleep is part of life and cannot be part of the torpor state, which has no reactions. The state of torpor has a time limit and, if this is not observed, death follows by freezing. The evolutionary differences particularly in pineal gland physiology may explain the differences between the blueprints governing vital reflexes in humans and hibernators. © 2000 Harcourt Publishers Ltd

I found that the questions raised by Barnes¹ about sleep and hibernation in his paper entitled 'Sang Froid' are of fundamental importance because they need the formulation of new ideas in order to be explained.

There is a new trend of medical interest to debate the relationship between consciousness and brain physiology. The function of the pineal gland which is involved in the circadian cycle and in changes of consciousness during sleep comes into focus. In 1991² I proposed that the pineal gland is the master switch of life, turning on at birth the function of our blueprint of life and turning off when it ceased to function – causing death.

Brian Barnes is a biologist based in Alaska who has studied the physiological changes which occur in ground squirrels during their hibernation. These squirrels spontaneously chill to 26.8°F, the lowest body temperature recorded naturally by any living mammal or bird. Apparently the torpid state of hibernation is a strategy for conserving body energy and not cold and is not a continuous process. Every few weeks, the squirrels' body

temperature returns to a normal state. Apparently this thaw is related to the need for sleep and Barnes proposes that the torpor of hibernation is equivalent to sleep deprivation, albeit in a state of low metabolic activity. This hypothesis raises some fundamental questions particularly in the question of the changes of consciousness during sleep. The observations of Barnes on hibernation in ground squirrels based on his research data also provides me with the opportunity to extend my hypotheses concerning the physiological function of the pineal gland by suggesting a new approach to analyse the complexities of our blueprint of life and compare it to that found in a hibernator.

The difference in the blueprints between hibernators and humans is a function of their evolutionary level. The answer to why the hibernator has to escape torpor periodically to go to sleep can be explained by the differences in the evolutionary level of what a hibernator's life is designed for when compared to human life.

To approach conceptually the difference in the structure of the two blueprints my hypothesis is: the structure of a human blueprint is based on evolutionary laws which decree that all developmental stages have to be kept functioning in their original roles and integrated into a

Received 22 October 1998

Accepted 13 May 1999

Correspondence to: Steven Kossard, Skin and Cancer Foundation Australia, 277 Bourke Street, Darlinghurst NSW 2010, Australia. Phone: +612 9360 4480; Fax: +612 9331 1244

*Deceased November 1998

higher organisation. This function is automated on a biological masterchip into an operating system. The operating system is activated by biological switches triggering networked programs geared by emotional, environmental and cosmic influences. At this point the intuitive contention of R. Descartes, that consciousness, the soul, is not to be found in the brain can be explained conceptually.

My hypothesis is that the pineal gland which is involved in the circadian cycle and in changes of consciousness during sleep is not only a masterswitch of life but is also the masterchip of the automation of the blueprint of life. The pineal gland is biologically equipped as well to act as an extrasensory electronic receiver bound to our brain's electromagnetic activity. The pineal gland connects itself at birth first to the cosmos, activating our brain's capabilities and our extrasensory connections, including our connection to the world reflected by our ability to participate in life through our consciousness. Consciousness and the automation of the function of our blueprint are integrated and physiologically neither can function by itself. The contention of Descartes that consciousness or the soul is not to be found in our brain is mirrored in modern technology that is based on extrasensory electronic capabilities of machines and supports my hypothesis.

There is, however, a decisive difference between the automation of an electronic machine and that of our brains. If we turn on a television set and a channel, we see pictures. If we turn it off there is no trace left of the picture. We see only the equipment of a receiver. The difference is that one can turn the automation of an electronic machine on and off without causing harm to its function, but it is a fundamental evolutionary law of human life that its automation cannot be manipulated without consequences. In comparison, the structure of the blueprint of a hibernator is on an evolutionary level where life-function is switched back physiologically during hibernation to maintain life only without function. This is mirrored in the flat EEG during hibernation showing no function which characterises the state of torpor. As Barnes remarked, a human with a flat EEG is considered to be practically dead. Modern surgery utilising drugs, hypothermia and extracorporeal blood circulation can switch human automation back to a state of maintenance only. This however is restricted by certain time limits. If reanimation does not take place in time to reactivate the automation of life, death is inevitable. It follows that a hibernator has to escape the state of torpor by rewarming periodically to reactivate the automation system bound by certain time limits. The hibernator has to be warm in order to go to sleep because the laws of automation decree this. Sleep is part of the function of life and not of

maintenance. In order to switch on sleep, automation needs to be activated by rewarming.

The torpor of hibernation cannot be considered or compared to sleep, despite that they both have a most important facet of structure, namely the absence of thermoregulation during hibernation and sleep. Temperature regulation is a *sine qua non* for physiological human life when awake. Thermoregulation is responsible for the adaptation of the availability of energy substrates as well as oxygen as needed by temperature changes. Evolution has shown mercy to human species because extreme cold causes heart fibrillation and death before our tissues have had time to freeze. In contrast, a hibernator during hibernation is on an evolutionary level on which if its automation responsible for the upkeep of its temperature fails, there are no circulatory or tissue reactions geared to cause death. This is because circulatory and tissue reactions are geared to the function of life. Therefore during hibernation the tissues freeze to cause death if the automation responsible to upkeep temperature during hibernation fails as this is not preceded by death linked to cardiac or circulatory failure.

WHAT IS THE PHYSIOLOGICAL REASON FOR THE CIRCADIAN CYCLE AND SLEEP?

The circadian cycle and sleep is made necessary by the need of automation to be checked and tuned in order to be reliable. If biological switches responsible for autonomic balance – the ideal homeostatic state – were tuned when awake they would interfere with well being during sleep. Not only autonomic balance is checked and tuned, but breathing is also checked during sleep apnoea. The latter is integrated to lifesaving reflexes geared to the pontine-geniculate-occipital (PGO) spikes which have the function to recharge pineal function and reestablish breathing or wake us up from sleep apnoea. Death is caused when lifesaving reflexes cease to function. Another structural difference between our blueprint and that of a hibernator is that humans are physiologically obliged to eat. The function of our gastrointestinal tract and that of the splanchnic area are *sine qua non* for physiological health. This is integrated to the availability of vitamin C which is not made by the human body but gained by eating fresh fruits and vegetables. Mammals build vitamin C and store it. The lack of certain levels of vitamin C in the blood and tissues causes scurvy and death in humans despite the best genetic blueprint. In contrast, hibernators do not die from scurvy as mammals build vitamin C and store it. This suggests that the automation of our blueprint may be geared to certain levels of vitamin C in the blood and tissues and may be equally as important as our genetic endowment.

ACKNOWLEDGEMENTS

I want to express my gratitude to Brian M. Barnes for writing Sang Froid, which contained his clairvoyant questions based on his most meticulous research data. These provided me with a wonderful opportunity to write and proffer the preceding proposals.

REFERENCES

1. Barnes, B. M. Field Notes: Sang Froid. *The Sciences* 1996; **36**: 12–14.
2. Kocsard-Varo G. The physiological role of the pineal gland as the masterswitch of life. Turning on at birth breathing and geared to it the function of the autonomic nervous system. The cause of SIDS in this context. *Med Hypotheses* 1991; **34**: 122–126.