



Nature of Life literatures

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Abstract: There are many methods to deliver the transcription factors into target cells to generate iPSCs. The first method is retrovirus or lentivirus transduction. The problem of this technique is the genome integration of virus DNA which could possibly alter differentiation potential or other malignant transformation. The second method is adenoviral vectors to induce iPSC. The advantage of adenovirus vector based expression is that the transgenes will not integrate into the house genome, thus reduces the risk of tumorigenesis. The third one is a plasmid based transfection that can avoid the genome integration also. Recently, the Cre-recombinase excisable systems are used in iPSC induction and subsequent transgene removal making the iPSC technology closer to clinic applications.

[Mark Herbert. **Nature of Life literatures.** *Rep Opinion* 2020;12(11):35-71]. ISSN 1553-9873 (print); ISSN 2375-7205 (online). <http://www.sciencepub.net/report>. 9. doi: [10.7537/marsroj121120.09](https://doi.org/10.7537/marsroj121120.09).

Key words: DNA; eternal; life; stem cell; universe

1. Introduction

There are many methods to deliver the transcription factors into target cells to generate iPSCs. The first method is retrovirus or lentivirus transduction. The problem of this technique is the genome integration of virus DNA which could possibly alter differentiation potential or other malignant transformation. The second method is adenoviral vectors to induce iPSC. The advantage of adenovirus vector based expression is that the transgenes will not integrate into the house genome, thus reduces the risk of tumorigenesis. The third one is a plasmid based transfection that can avoid the genome integration also. Recently, the Cre-recombinase excisable systems are used in iPSC induction and subsequent transgene removal making the iPSC technology closer to clinic applications.

Adler, J. (2011). "My life with nature." *Annu Rev Biochem* **80**: 42-70.

After a childhood in Germany and being a youth in Grand Forks, North Dakota, I went to Harvard University, then to graduate school in biochemistry at the University of Wisconsin. Then to Washington University and Stanford University for postdoctoral training in biochemistry and genetics. Then at the University of Wisconsin, as a professor in the Department of Biochemistry and the Department of Genetics, I initiated research on bacterial chemotaxis. Here, I review this research by me and by many, many others up to the present moment. During the past few years, I have been studying chemotaxis and related behavior in animals, namely in *Drosophila* fruit flies,

and some of these results are presented here. My current thinking is described.

Andrulis, E. D. (2011). "Theory of the origin, evolution, and nature of life." *Life (Basel)* **2**(1): 1-105.

Life is an inordinately complex unsolved puzzle. Despite significant theoretical progress, experimental anomalies, paradoxes, and enigmas have revealed paradigmatic limitations. Thus, the advancement of scientific understanding requires new models that resolve fundamental problems. Here, I present a theoretical framework that economically fits evidence accumulated from examinations of life. This theory is based upon a straightforward and non-mathematical core model and proposes unique yet empirically consistent explanations for major phenomena including, but not limited to, quantum gravity, phase transitions of water, why living systems are predominantly CHNOPS (carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur), homochirality of sugars and amino acids, homeoviscous adaptation, triplet code, and DNA mutations. The theoretical framework unifies the macrocosmic and microcosmic realms, validates predicted laws of nature, and solves the puzzle of the origin and evolution of cellular life in the universe.

Arber, W. (2005). "Dual nature of the genome: genes for the individual life and genes for the evolutionary progress of the population." *IUBMB Life* **57**(4-5): 263-266.

Biological evolution is here postulated to be driven coordinately by the products of specific

evolution genes and by non-genetic elements such as the intrinsic properties of matter and random encounter with environmental factors. Evolution genes are supposed to have their own evolutionary history in which second-order selection was exerted at the population level. The products of evolution genes can act as generators of genetic variations and/or as modulators of the frequency of genetic variation. Three major natural strategies, each with a number of specific mechanisms contribute to the overall spontaneous production of genetic variants. Each of these three strategies contributes its own specific quality to genetic variation. The difficulties of experimentally investigating these strategies and a wider discussion of some of the postulates within the scientific community are outlined. Finally, the general relevance of the postulated duality of the genome for our world view is briefly mentioned.

Baklien, B., et al. (2016). "When everyday life becomes a storm on the horizon: families' experiences of good mental health while hiking in nature." *Anthropol Med* **23**(1): 42-53.

Hiking in nature is often presented as a yearning for lost harmony premised on an alleged divide between nature as authentically healthy and society as polluted. This paper's aim is to question this strict divide and the strong belief in nature as having an innate health-providing effect, the biophilia hypothesis, by examining what Norwegian families with young children experience when walking in the forest. Twenty-four conversations with families during a hiking trip in the forest were recorded, and the data were analysed with Giorgi's descriptive phenomenological research method. The paper introduces the general descriptive meaning structure of the phenomenon 'family-hiking with young children'. It shows that a hiking trip clears space for the family in their everyday lives which is largely dominated by relations with non-family members at both work and leisure. The families experience that they actively generate a different existence with a sense of here-and-now presences that can strengthen core family relations and also provide the opportunity to pass down experiences that can be recollected and realized by future generations. This experience is complex and constituted by social practices, which indicate that the biophilia hypothesis seems to be an insufficient explanation of why families go hiking in nature. Nature rather represents a peaceful background that allows for the perpetuation of the family as a social institution and the recreation of cohesion in everyday life.

Battersby, A. R. (1994). "How nature builds the pigments of life: the conquest of vitamin B12." *Science* **264**(5165): 1551-1557.

In part because humans cannot synthesize vitamin B12 and must obtain it from organisms that produce it and because B12 deficiency leads to pernicious anemia, it has been important to understand how microorganisms build this quite complex substance. As shown here, an interdisciplinary attack was needed, which combined the strengths of genetics, molecular biology, enzymology, chemistry, and spectroscopy. This allowed the step-by-step synthetic pathway of B12 to be elucidated, and this approach has acted as a model for future research on the synthesis of substances in living organisms. One practical outcome of such an approach has been the improved availability of B12 for animal feedstuffs and human health.

Batt-Rawden, K. B. and G. Tellnes (2005). "Nature-culture-health activities as a method of rehabilitation: an evaluation of participants' health, quality of life and function." *Int J Rehabil Res* **28**(2): 175-180.

The dramatic increase in sickness absence and disability pensions in recent years are negative side-effects of our welfare society. Among others, people certified as long-term sick are offered participation in a programme of health-promoting activities (salutogenesis) in Asker, Norway. The aim of this study was to evaluate health, quality of life and function among participants included in a programme of community-based nature-culture-health activities. A qualitative evaluation study in 2003 included 30 men and 16 women aged 30-79 years old participating in 12 different health-promoting activities at the Nature-Culture-Health (NaCuHeal) Centre. The group activities were hiking, physical activities, gardening, music, singing, painting, dancing, dialogue groups for men or women, ethics, painting and local history. Around two-thirds of the participants reported to have improved their health status, quality of life and function, particularly when given the opportunity to utilize their own abilities and creativity. Belonging to a themed group seems to play a significant role in increasing self-efficacy and self-esteem. The majority of participants reported improved health, quality of life and functionality when considering returning to work due to their experiences in the NaCuHeal groups. Increasing the population's participation in health-promoting outdoor and cultural activities seem to be a useful method for enhance complete rehabilitation.

Baumard, N. and C. Chevallier (2015). "The nature and dynamics of world religions: a life-history approach." *Proc Biol Sci* **282**(1818): 20151593.

In contrast with tribal and archaic religions, world religions are characterized by a unique emphasis on extended prosociality, restricted sociosexuality, delayed gratification and the belief that these specific behaviours are sanctioned by some kind of supernatural justice. Here, we draw on recent advances in life history theory to explain this pattern of seemingly unrelated features. Life history theory examines how organisms adaptively allocate resources in the face of trade-offs between different life-goals (e.g. growth versus reproduction, exploitation versus exploration). In particular, recent studies have shown that individuals, including humans, adjust their life strategy to the environment through phenotypic plasticity: in a harsh environment, organisms tend to adopt a 'fast' strategy, pursuing smaller but more certain benefits, while in more affluent environments, organisms tend to develop a 'slow' strategy, aiming for larger but less certain benefits. Reviewing a range of recent research, we show that world religions are associated with a form of 'slow' strategy. This framework explains both the promotion of 'slow' behaviours such as altruism, self-regulation and monogamy in modern world religions, and the condemnation of 'fast' behaviours such as selfishness, conspicuous sexuality and materialism. This ecological approach also explains the diffusion pattern of world religions: why they emerged late in human history (500-300 BCE), why they are currently in decline in the most affluent societies and why they persist in some places despite this overall decline.

Bekaert, D. V., et al. (2018). "Archean kerogen as a new tracer of atmospheric evolution: Implications for dating the widespread nature of early life." *Sci Adv* 4(2): eaar2091.

Understanding the composition of the Archean atmosphere is vital for unraveling the origin of volatiles and the environmental conditions that led to the development of life. The isotopic composition of xenon in the Archean atmosphere has evolved through time by mass-dependent fractionation from a precursor comprising cometary and solar/chondritic contributions (referred to as U-Xe). Evaluating the composition of the Archean atmosphere is challenging because limited amounts of atmospheric gas are trapped within minerals during their formation. We show that organic matter, known to be efficient at preserving large quantities of noble gases, can be used as a new archive of atmospheric noble gases. Xe isotopes in a kerogen isolated from the 3.0-billion-year-old Farrel Quartzite (Pilbara Craton, Western Australia) are mass fractionated by 9.8 ± 2.1 per mil (per thousand) (2σ) per atomic mass unit, in line with a progressive evolution toward modern atmospheric values. Archean atmospheric Xe

signatures in kerogens open a new avenue for following the evolution of atmospheric composition through time. The degree of mass fractionation of Xe isotopes relative to the modern atmosphere can provide a time stamp for dating Archean kerogens and therefore narrowing the time window for the diversification of early life during the Archean eon.

Bellec, L., et al. (2014). "Characterization of the life cycle and heteromeric nature of the macronucleus of the ciliate *Chilodonella uncinata* using fluorescence microscopy." *J Eukaryot Microbiol* 61(3): 313-316.

Only a limited number of studies exist on the life cycles of nonmodel ciliates such as *Chilodonella uncinata* (Cl: Phyllopharyngea). The handful of papers on this taxon indicate the presence of a heteromeric macronucleus, marked by separate DNA-rich and DNA-poor regions. Here, we study the life cycle of *C. uncinata* using confocal laser scanning microscopy with 4',6-diamidino-2-phenylindole staining, which allows us to differentiate nuclear dynamics of the micronucleus and the macronucleus during life-cycle stages. We photo-documented various stages and confirmed aspects of the development of the new macronucleus previously characterized by electron microscopy. We further reveal the heteromeric structure of the macronucleus with Z-stacks and three-dimensional (3D) reconstructions. We find no evidence for the presence of an endosome at the center of the macronucleus during vegetative growth. In addition to illustrating the life cycle of this ciliate, the approaches developed for this study will enable additional comparative analyses of nuclear dynamics using fluorescence microscopy.

Bergstrom, A., et al. (2012). "Nature of bacterial colonization influences transcription of mucin genes in mice during the first week of life." *BMC Res Notes* 5: 402.

BACKGROUND: Postnatal regulation of the small intestinal mucus layer is potentially important in the development of adult gut functionality. We hypothesized that the nature of bacterial colonization affects mucus gene regulation in early life. We thus analyzed the influence of the presence of a conventional microbiota as well as two selected monoclonizing bacterial strains on the transcription of murine genes involved in mucus layer development during the first week of life. Mouse pups (N = 8/group) from differently colonized dams: Germ-free (GF), conventional specific pathogen free (SPF), monoclonized with either *Lactobacillus acidophilus* NCFM (Lb) or *Escherichia coli* Nissle (Ec) were analyzed by qPCR on isolated ileal tissue sections from postnatal days 1 and 6 (PND1, PND6) after birth with respect to: (i) transcription of specific genes

involved in mucus production (Muc1-4, Tff3) and (ii) amounts of 16S rRNA of *Lactobacillus* and *E. coli*. Quantification of 16S rRNA genes was performed to obtain a measure for amounts of colonized bacteria. RESULTS: We found a microbiota-independent transcriptional increase of all five mucus genes from PND1 to PND6. Furthermore, the relative level of transcription of certain mucus genes on PND1 was increased by the presence of bacteria. This was observed for Tff3 in the SPF, Ec, and Lb groups; for Muc2 in SPF; and for Muc3 and Muc4 in Ec and Lb, respectively. Detection of bacterial 16S rRNA genes levels above the qPCR detection level occurred only on PND6 and only for some of the colonized animals. On PND6, we found significantly lower levels of Muc1, Muc2 and Muc4 gene transcription for Lb animals with detectable *Lactobacillus* levels as compared to animals with *Lactobacillus* levels below the detection limit. CONCLUSIONS: In summary, our data show that development of the expression of genes encoding secreted (Muc2/Tff3) and membrane-bound (Muc1/Muc3/Muc4) mucus regulatory proteins, respectively, is distinct and that the onset of this development may be accelerated by specific groups of bacteria present or absent at the mucosal site.

Bertrand, M. R. and M. L. Wilson (1996). "Microclimate-dependent survival of unfed adult *Ixodes scapularis* (Acari: Ixodidae) in nature: life cycle and study design implications." *J Med Entomol* **33**(4): 619-627.

Microclimate and other abiotic factors may be important in determining the survival of arthropod vectors, yet the impact of such variables rarely has received careful examination. The impacts of habitat, microclimate, and experimental confinement on survival rates of unfed adult blacklegged ticks, *Ixodes scapularis* Say, were studied in field enclosures in southcentral and northwestern Connecticut. At both locations, 2 enclosures were placed in each of 3 different habitats (field, forest canopy, and forest/field edge). Forty wild-caught adult ticks (20 males, 20 females) were placed in each enclosure. At one site, another 40 ticks were confined to nylon mesh bags placed inside each enclosure. Soil temperature, ground-level air temperature and relative humidity were measured within each habitat. The number of ticks surviving within each enclosure was monitored 1 or 2 times per week. Ticks that were confined in nylon bags had a lower survival rate than ticks that were able to move freely within the enclosures. Ticks survived longer in edge and forest habitats than in open fields, which were characterized by greater extremes in air temperature, soil temperature, relative humidity, and vapor pressure deficit than the other 2 habitats. The mean daily survival rates of free-ranging *I. scapularis*

were negatively related to air temperature, vapor pressure deficit, and the coefficient of variation of relative humidity.

Bleidorn, W., et al. (2010). "Nature and nurture of the interplay between personality traits and major life goals." *J Pers Soc Psychol* **99**(2): 366-379.

Modern personality theories differ in their assumptions about the structure and etiology of the interplay between personality traits and motivational constructs. The present study examined the genetic and environmental sources of the interplay between the Big Five and major life goals concurrently and across time in order to provide a more decisive evaluation of the conflicting assumptions stated in the five-factor theory as opposed to socioanalytic conceptions. Traits and goals were assessed twice across a 5-year period in a sample of 217 identical and 112 fraternal twin pairs from the Bielefeld Longitudinal Study of Adult Twins. About 30% of the variance in agency and communion life goals was genetic; the remaining variance was due to nonshared environmental effects, whereas shared environmental effects were negligible. Both heritable and environmental variance in goals could partly be accounted for by genetic and nonshared environmental effects on personality traits. Across time, we revealed reciprocal genetic and environmental effects between traits and life goals. In sum, our findings yield partial support for both of the 2 competing personality theories, suggesting a readjusted picture of the interplay between traits and goals.

Blos, P. (1980). "The life cycle as indicated by the nature of the transference in the psychoanalysis of adolescents." *Int J Psychoanal* **61**(Pt 2): 145-151.

Brasier, M. (2015). "Deep questions about the nature of early-life signals: a commentary on Lister (1673) 'A description of certain stones figured like plants'." *Philos Trans A Math Phys Eng Sci* **373**(2039).

In 1673, Martin Lister explored the preservation of 'St Cuthbert's beads' plus other fossil crinoid remains from approximately 350 Ma Carboniferous limestone in northern England. He used taphonomic evidence (transport, disarticulation, burial and cementation) to infer an origin as petrified plant remains, in contrast with his views expressed elsewhere that fossil mollusc shells could have formed abiogenically, by 'plastic forces' within rock. Lister also observed pentagonal symmetry, now seen as characteristic of living echinoderm skeletons. A postscript from John Ray supports Lister's 'taphonomic' observations and accepts the biogenicity of these fossil 'vegetables'. Ray then concluded with a

prophecy, predicting the discovery of comparable living fossils in remote ocean waters. These early discussions compare with current debates about the character of candidate microfossils from the early Earth and Mars. Interesting biomorphs are now tested against the abiogenic null hypotheses, making use of features such as those pioneered by Lister, including evidence for geological context, rules for growth and taphonomy. Advanced techniques now allow us to extend this list of criteria to include the nanoscale mapping of biology-like behaviour patterns plus metabolic pathways. Whereas the science of palaeobiology once began with tests for biogenicity, the same is now true for geobiology and astrobiology. This commentary was written to celebrate the 350th anniversary of the journal *Philosophical Transactions of the Royal Society*.

Briggs, D. E. (2015). "Extraordinary fossils reveal the nature of Cambrian life: a commentary on Whittington (1975) 'The enigmatic animal *Opabinia regalis*, Middle Cambrian, Burgess Shale, British Columbia'." *Philos Trans R Soc Lond B Biol Sci* **370**(1666).

Harry Whittington's 1975 monograph on *Opabinia* was the first to highlight how some of the Burgess Shale animals differ markedly from those that populate today's oceans. Categorized by Stephen J. Gould as a 'weird wonder' (*Wonderful life*, 1989) *Opabinia*, together with other unusual Burgess Shale fossils, stimulated ongoing debates about the early evolution of the major animal groups and the nature of the Cambrian explosion. The subsequent discovery of a number of other exceptionally preserved fossil faunas of Cambrian and early Ordovician age has significantly augmented the information available on this critical interval in the history of life. Although *Opabinia* initially defied assignment to any group of modern animals, it is now interpreted as lying below anomalocaridids on the stem leading to the living arthropods. This commentary was written to celebrate the 350th anniversary of the journal *Philosophical Transactions of the Royal Society*.

Brooks, C. M. (1983). "The nature of life and the nature of death." *JUOEH* **5**(2): 133-145.

Life is defined as a "condition" that distinguishes animals and plants from inorganic materials and dead organisms. Life is comprised of processes and is a maintained state. The most sophisticated form of life is man and our thought focuses upon the nature of the life and death of man. Man demonstrates three lives or aspects of life: Life of the body--the physical, life of the mind and life of the spirit. Physical life is basic existence; the mind contributes effectiveness and scope; the spiritual entity contributes maximum living.

Physiology: The existence of life physical is demonstrated by the presence of functions. Living tissues and organisms exhibit: Irritability: the ability to be excited or detect stimuli and to respond thereto; Growth and reproduction: this consists of the power of multiplication and duplication, regeneration and differentiation; Adaptability: permitting both change and maintenance of balances (homeostasis); and finally and most characteristic of all is Metabolism: the transformation of energy and the use of materials. These properties, however, can be retained for a while by tissues after death of the organism so there is another mystery of life which we understand only in part. Life consists of structure and processes operating under integrative control. This integrative power is the secret we do not understand--we know it confers all the life properties, the continuous flow of processes related to the organism's need for survival. Death is failure not so much of process but of integrative drive and coordination--but, of course, structure and process can fail too, destroying integrated activity. The total organism is under integrative control by brain and mind, the autonomic nervous system and by the neuroendocrine-endocrine complex, all acting in unison. These physical processes contribute to the existence of the life of the mind and spirit and are in turn powerfully affected by intellect and morale. However, we do not understand the driving force which converts inorganic matter, organizes it and then propels it into life. Life seems to be only a continuation of a heritage--life creating life. Philosophy: The life of the mind requires acquisition of knowledge, curiosity, cultivation of the power to reason, use of thought and contemplation, all under discipline. True life of the mind may not exist and may cease to be even though physical existence may be present. Somewhat the same can be said of the life of the spirit; it also is not automatically genetically granted in completed form. (ABSTRACT TRUNCATED AT 400 WORDS)

Brooks, D. R. (2000). "The nature of the organism. Life has a life of its own." *Ann N Y Acad Sci* **901**: 257-265.

The question of closure in biological systems is central to understanding the origins of the biological variation and complexity upon which various forms of selection act. Much of evolutionary theory, especially in the second half of the twentieth century, is concerned with the consequences of environmental selection acting on bio-diversity, but neglects questions of the origin of that diversity. This has permitted us to act as if an explanation of consequences was the ultimate explanation in biology. However, Darwin understood that evolution was both information driven and information constrained. The

link between evolutionary constraints and closure can be profitably explored by starting with Darwin's notion of the primary of "the nature of the organism" over "the nature of the conditions" articulated in the sixth edition of *Origin of Species*. Contemporary ideas of self-organization, emergence, complexity, and inherent (developmental and phylogenetic) constraints can be seen as an elaboration and refinement of Darwin's views if we adopt the following perspective: (1) information is cheap, not costly, to produce, but may have costly consequences; and (2) information is produced by systems that are informationally closed but remain thermodynamically open.

Buckley, T. (2015). "The complex nature of practice and research in end of life and bereavement care in the critical care environment." *Aust Crit Care* **28**(2): 57.

Burgui Burgui, M. (2015). "[Hans Jonas: Nature Conservation, Conservation of Life]." *Cuad Bioet* **26**(87): 253-266.

This article discusses three of the problems that the German philosopher Hans Jonas studied. The first one addresses the need for a specific ethic dedicated to the moral dimension of environmental problems, from a different perspective to the traditional. The second problem is crucial in the discussion on environmental ethics: the value of the nature. Does the nature have an intrinsic value or an instrumental value only (to satisfy the interests of the human being)? The thesis of Jonas, which claimed that nature is a good in itself, were further elaborated here. And the third problem is the derivation of moral norms and the role of man in this ethic that recognizes a good in itself in nature. According to Jonas, the human being is not diminished by recognizing the intrinsic value of nature, since the man's uniqueness and value are unquestionable. From these three central issues, the paper highlights the importance of seeking the links between bioethics and environmental ethics to address the current environmental, social and economic crisis.

Butters, M. A., et al. (2004). "The nature and determinants of neuropsychological functioning in late-life depression." *Arch Gen Psychiatry* **61**(6): 587-595.

CONTEXT: Cognitive impairment in late-life depression (LLD) is highly prevalent, disabling, poorly understood, and likely related to long-term outcome. OBJECTIVES: To determine the characteristics and determinants of neuropsychological functioning LLD. DESIGN: Cross-sectional study of groups of LLD patients and control subjects. SETTING: Outpatient, university-based depression research clinic. PARTICIPANTS: One hundred

patients without dementia 60 years and older who met DSM-IV criteria for current episode of unipolar major depression (nonpsychotic) and 40 nondepressed, age- and education-equated control subjects. MAIN OUTCOME MEASURES: A comprehensive neuropsychological battery. RESULTS: Relative to control subjects, LLD patients performed poorer in all cognitive domains. More than half exhibited significant impairment (performance below the 10th percentile of the control group). Information processing speed and visuospatial and executive abilities were the most broadly and frequently impaired. The neuropsychological impairments were mediated almost entirely by slowed information processing (beta =.45-.80). Education (beta =.32) and ventricular atrophy (beta =.28) made additional modest contributions to variance in measures of language ability. Medical and vascular disease burden, apolipoprotein E genotype, and serum anticholinergic did not contribute to variance in any cognitive domain. CONCLUSIONS: Late-life depression is characterized by slowed information processing, which affects all realms of cognition. This supports the concept that frontostriatal dysfunction plays a key role in LLD. The putative role of some risk factors was validated (eg, advanced age, low education, depression severity), whereas others were not (eg, medical burden, age at onset of first depressive episode). Further studies of neuropsychological functioning in remitted LLD patients are needed to parse episode-related and persistent factors and to relate them to underlying neural dysfunction.

Byock, I. R. (1996). "The nature of suffering and the nature of opportunity at the end of life." *Clin Geriatr Med* **12**(2): 237-252.

Encountering a patient who is suffering in the midst of terminal illness is an all-too-common occurrence for clinicians who care for the elderly. This article explores the personal experience of suffering in the context of life-limiting illness. The concept of personhood is used to illuminate the nature of suffering. Clinical observation documents that some persons experience a subjectively heightened sense of well-being as they die. The concept of personhood and the model of life-long human development is applied to the explication of this apparent paradox, enabling an understanding of the nature of opportunity at the end of life.

Cairns-Smith, A. G. (1966). "The origin of life and the nature of the primitive gene." *J Theor Biol* **10**(1): 53-88.

Campos, R. E. and L. P. Lounibos (2000). "Life tables of *Toxorhynchites rutilus* (Diptera: Culicidae) in nature in southern Florida." *J Med Entomol* **37**(3): 385-392.

Stage-specific survivorship curves were constructed for the immature stages of a native, predatory mosquito, *Toxorhynchites rutilus* (Coquillett), by regular censuses in the summer and fall of water-holding treeholes and tires. Survival from egg to adult ranged from 1.8 to 5.6%, and survivorship patterns were significantly heterogeneous between seasons and container types. The probability of death was highest in the first and fourth larval instars. Rainfall and drought were relatively unimportant risk factors during this study, but the probabilities of disappearance of eggs and first and fourth instars were significantly higher in the presence of large conspecifics, suggesting that cannibalism is a major source of mortality.

Cauldwell, K. and P. Stone (2015). "The changing nature of end of life care." *Indian J Med Paediatr Oncol* **36**(2): 94-98.

Good end of life care (EOLC) for patients with incurable cancer is becoming a greater priority for oncologists in recent years. Frameworks such as the Liverpool Care Pathway (LCP) have often been helpful in guiding good care at the end of life. However, in the past year, the LCP has been phased out of use in the United Kingdom (UK), following concerns that it was poorly implemented. This review describes the LCP's origins in the UK, its strengths and limitations, and the concerns that prompted a review of its use. It describes the recommendations for change made by an independent review, and the alternative strategies now being developed in the UK to guide good EOLC. Although the LCP is still being widely used worldwide, the lessons learned from the UK can be widely applied in other countries.

Chen, B. B. and W. Han (2019). "Environmental unpredictability, economic inequality, and dynamic nature of life history before, during, and after the Industrial Revolution." *Behav Brain Sci* **42**: e196.

It is emphasized that environmental predictability is another important condition that plays roles in slow strategies that are related to innovation; that economic inequality, except as measured by Gross Domestic Product (GDP) per capita, influences innovation; and that switching global life history from a slow to a fast strategy is a response adopted in response to new challenges during the post-Industrial Revolution period.

Chen, X., et al. (2015). "Developmental investigation of the domain-specific nature of the life

satisfaction construct across the post-school transition." *Dev Psychol* **51**(8): 1074-1085.

This study evaluated the nature of the life satisfaction construct with an emphasis on the comparison between a global or domain-specific operationalization during the transition from adolescence to adulthood. A combination of person-centered and variable-centered methods were used to analyze 7 waves of data covering the postschool transition from a sample of 24,721 youth participating in Longitudinal Study of Australian Youth (LSAY) between 1998 and 2010. Evidence for the increasing importance of a domain-specific approach as adolescents entered adulthood was provided by: (1) factor analyses identifying a 3-factor model covering achievement, family, and leisure satisfaction that proved invariant across time waves; (2) factor mixture analyses showing shape-related differences between profiles (i.e., within-profile differences between domains) that increased as young people moved into adulthood.

Chen, Y. C., et al. (2019). "Activity Patterns and Health Outcomes in Later Life: The Role of Nature of Engagement." *Gerontologist* **59**(4): 698-708.

BACKGROUND AND OBJECTIVES: The health benefit of activity participation at older ages is documented in the current literature. Many studies, however, only explored the health benefits of engaging in a few activities and did not examine mechanisms connecting activity participation to health. We investigated the pathway between activity and health by testing the mediation role of the nature of engagement (physical, cognitive, and social) on physical, mental, and cognitive health of older adults. **RESEARCH DESIGN AND METHODS:** We analyzed data of 6,044 older adults from the 2010 and 2012 Health and Retirement Study linked with 2011 Consumption and Activity Mail Survey. We used latent class analysis to identify the patterns of participating in 33 activities as well as patterns of nature of engagement, and examined how these patterns were associated with cognition, depressive symptoms, and self-rated health in later life. **RESULTS:** Meaningful patterns of activity (high, medium, low, passive leisure, and working) and the nature of activity engagement (full, partial, and minimal) were identified. High and working groups, compared to the passive leisure group, showed better health and cognition outcomes. The nature of engagement mediated the relationship between activity patterns and health, especially for older adults who were either full or partially engaged. **DISCUSSION AND IMPLICATIONS:** The nature of engagement may play a more important role than the activity itself in relation to health. Identifying the heterogeneity in

activity engagement in later life is critical for tailoring interventions and designing programs that can improve the health of older adults.

Coley, J. M. (1807). "Case of an Enlarged and Tuberculated Liver, a Part of Which Having Formed a Pulsating Tumour in the Epigastrium, Was Mistaken for an Aneurism; Accompanied with an Exquisitely Painful Enlargement of the Hip, the True Nature of Which, Also, Could Not Be Ascertained during Life; but Was Afterwards Found to Have Been Occasioned by an Extensive Caries of the Joint." *Med Phys J* **18**(106): 485-493.

Cramond, F., et al. (2016). "Protocol for a retrospective, controlled cohort study of the impact of a change in Nature journals' editorial policy for life sciences research on the completeness of reporting study design and execution." *Scientometrics* **108**: 315-328.

In recent years there has been increasing concern about the rigor of laboratory research. Here we present the protocol for a study comparing the completeness of reporting of in vivo and in vitro research carried in Nature Publication Group journals before and after the introduction of a change in editorial policy (the introduction of a set of guidelines for reporting); and in similar research published in other journals in the same periods.

Davila-Flores, A. M., et al. (2013). "Facilitated by nature and agriculture: performance of a specialist herbivore improves with host-plant life history evolution, domestication, and breeding." *Oecologia* **173**(4): 1425-1437.

Plant defenses against herbivores are predicted to change as plant lineages diversify, and with domestication and subsequent selection and breeding in the case of crop plants. We addressed whether defense against a specialist herbivore declined coincidentally with life history evolution, domestication, and breeding within the grass genus *Zea* (Poaceae). For this, we assessed performance of corn leafhopper (*Dalbulus maidis*) following colonization of one of four *Zea* species containing three successive transitions: the evolutionary transition from perennial to annual life cycle, the agricultural transition from wild annual grass to primitive crop cultivar, and the agronomic transition from primitive to modern crop cultivar. Performance of corn leafhopper was measured through seven variables relevant to development speed, survivorship, fecundity, and body size. The plants included in our study were perennial teosinte (*Zea diploperennis*), Balsas teosinte (*Zea mays parviglumis*), a landrace maize (*Zea mays mays*), and a hybrid maize. Perennial teosinte is a perennial,

iteroparous species, and is basal in *Zea*; Balsas teosinte is an annual species, and the progenitor of maize; the landrace maize is a primitive, genetically diverse cultivar, and is ancestral to the hybrid maize; and, the hybrid maize is a highly inbred, modern cultivar. Performance of corn leafhopper was poorest on perennial teosinte, intermediate on Balsas teosinte and landrace maize, and best on hybrid maize, consistent with our expectation of declining defense from perennial teosinte to hybrid maize. Overall, our results indicated that corn leafhopper performance increased most with the agronomic transition, followed by the life history transition, and least with the domestication transition.

de Frias, C. M. and E. Whyne (2015). "Stress on health-related quality of life in older adults: the protective nature of mindfulness." *Aging Ment Health* **19**(3): 201-206.

OBJECTIVES: The current study examined whether the link between stress and health-related quality of life was buffered by protective factors, namely mindfulness, in a sample of middle-aged and older adults. **METHODS:** In this cross-sectional study, 134 healthy, community-dwelling adults (ages 50-85 years) were recruited from Dallas, TX. The participants were screened for depressive symptoms and severity (using the Patient Health Questionnaire [PHQ-9]). All participants completed measures of self-reported health status (i.e. SF36v2: mental and physical health composites), life stress (using the Elders Life Stress Inventory [ELSI]), and trait mindfulness (i.e. Mindful Attention Awareness Scale). **RESULTS:** Hierarchical regressions (covarying for age, gender, and education) showed that life stress was inversely related to physical and mental health. Mindfulness was positively related to mental health. The negative effect of life stress on mental health was weakened for those individuals with higher levels of trait mindfulness. **CONCLUSIONS:** The results suggest that mindfulness is a powerful, adaptive strategy that may protect middle-aged and older adults from the well-known harmful effects of stress on mental health.

Demirel, N., et al. (2014). "On the nature of pleural involvement in necrotizing pneumonia: a report of two cases of life threatening late complications." *Pediatr Pulmonol* **49**(3): E90-95.

Suppurative complications of pneumonia such as empyema, lung abscess, pyopneumothorax, and necrotizing pneumonia (NP) are uncommon in children. Over the last decade an increasing incidence of NP has been reported. *Streptococcus pneumoniae* continues to be the predominant causative organism of NP, and while sporadic cases were reported prior to

routine administration of heptavalent pneumococcal vaccine, a marked increase in NP appears to relate to replacement pneumococcal strains. Pleural involvement is almost universal in NP, and the course of pleural disease often determines its duration and outcome, particularly as it relates to complication of bronchopleural fistula. Cavities are formed in NP within the lung parenchyma and in the pleural space as the fibrosing pleural process organizes. The similarity of the radiologic appearance of parenchymal and pleural space cavities often makes the differentiation of pneumatocele versus residua of loculated pneumothorax challenging. The prevailing perception from most reports on childhood NP is of a favorable outcome with conservative approach. We report two pediatric cases with pneumonia who presented with prolonged fever despite antibiotic treatment, eventually diagnosed with NP. After stabilization on prolonged IV antibiotics, and weeks after discharge, they presented with unexpected acute respiratory failure due to a life-threatening tension air collection. In this article we discuss the nature of NP, its typical presentation, benign course and outcome, albeit its potential to cause serious late complications in the light of our recent experiences. Increasing awareness of such complications will result in more careful follow-up and in providing appropriate recommendations to parents of patients recovering from NP.

Ebeturk, E. (2018). "Animal life and mind in Hobbes's philosophy of nature." *Hist Philos Life Sci* **40**(4): 69.

This paper explores Thomas Hobbes's account of animal life and mind. After a critical examination of Hobbes's mechanistic explanation of operations of the mind such as perception and memory, I argue that his theory derives its strength from his idea of the dynamic interaction of the body with its surroundings. This dynamic interaction allows Hobbes to maintain that the purposive disposition of the animal is not merely an upshot of its material configuration, but an expression of its distinctive bodily history. In support of Hobbes, I show how this is complemented by his account of the unity and continuity of the animal body in terms of a unification through the self-preserving drive that originates in perception. Nonetheless, I argue that Hobbes's philosophy of animal life and mental faculties is hindered by a kind of epiphenomenalist perspective that is embedded in his materialist framework, and this perspective leaves the status of ideas and mental content unclear. I explain why Hobbes's dynamic theory, founded upon the reciprocal determination of moving bodies, supports his idea of animal development and habituation while failing to account for the reflexivity of the mind.

Eckenhoff, M. F. and P. Rakic (1988). "Nature and fate of proliferative cells in the hippocampal dentate gyrus during the life span of the rhesus monkey." *J Neurosci* **8**(8): 2729-2747.

The nature of proliferative cells in the subgranular zone (SGZ) of the hippocampal region and the fate of their progeny was analyzed by 3H-thymidine (3H-TdR) autoradiography combined with immunocytochemistry at the light and electron microscopic levels in 18 rhesus monkeys ranging in age from late gestation to 17 years. Our analysis indicates that, during the last quarter of gestation and the first 3 postnatal months, the SGZ produces both glial and neuronal cells. These 2 major classes of cells originate from the 2 precursor lines and, following their mitotic division, migrate to the granular layer. During the juvenile period (4-6 months of age), neuronal production tapers off and most postmitotic cells remaining within the SGZ differentiate into glial elements. In postpubertal animals (3 years and older), the 3H-TdR-labeled cells in the dentate gyrus belong to several non-neuronal classes. The largest group was immunoreactive to the glial fibrillary acidic protein (GFAP) at both the light and electron microscopic levels, indicating their astrocytic nature. The remaining 3H-TdR-labeled, GFAP-negative cells had ultra-structural characteristics of either microglia, oligodendroglia, or their progenitory stem cells. Therefore, there is a continuing addition and/or turnover of the glial cells in the dentate gyrus of sexually mature monkeys, but, in contrast to the massive neurogenesis reported in adult rodents, the production of new neurons could not be detected after puberty. The significance of a stable population of neurons in the hippocampal formation of mature primates is discussed in relation to its possible function in memory.

Egel, R. (2012). "Primal eukaryogenesis: on the communal nature of precellular States, ancestral to modern life." *Life (Basel)* **2**(1): 170-212.

This problem-oriented, exploratory and hypothesis-driven discourse toward the unknown combines several basic tenets: (i) a photo-active metal sulfide scenario of primal biogenesis in the porespace of shallow sedimentary flats, in contrast to hot deep-sea hydrothermal vent conditions; (ii) an inherently complex communal system at the common root of present life forms; (iii) a high degree of internal compartmentalization at this communal root, progressively resembling coenocytic (syncytial) super-cells; (iv) a direct connection from such communal super-cells to proto-eukaryotic macro-cell organization; and (v) multiple rounds of micro-cellular escape with streamlined reductive evolution-leading to

the major prokaryotic cell lines, as well as to megaviruses and other viral lineages. Hopefully, such nontraditional concepts and approaches will contribute to coherent and plausible views about the origins and early life on Earth. In particular, the coevolutionary emergence from a communal system at the common root can most naturally explain the vast discrepancy in subcellular organization between modern eukaryotes on the one hand and both archaea and bacteria on the other.

Federspil, G. and N. Siculo (1994). "The nature of life in the history of medical and philosophic thinking." *Am J Nephrol* **14**(4-6): 337-343.

The vitalistic doctrine of Aristotle and Galen, in which the soul is an indissoluble part of the body, was undisputed throughout most of the Middle Ages. The first radical change came with Telesio, who developed philosophic naturalism in which the soul has a reality of its own, though it is connected to the body. The definitive change came with Descartes, who believed that all biologic phenomena can be explained by the laws of mechanics, and only man is distinguished by the possession of a soul. For the next 300 years, this mechanistic view would be challenged by a new vitalism, in which the 'vital force' has an existence in its own right.

Fisher, C. M. (1982). "Late-life chronic peripheral neuropathy of obscure nature." *Arch Neurol* **39**(4): 234-235.

Fontaine, R. (1994). "The facts of life. The nature of the female contribution to generation according to Judah ha-Cohen's Midrash ha-Hokhma and contemporary texts." *Medizinhist J* **29**(4): 333-362.

Forslund, K., et al. (2017). "Gearing up to handle the mosaic nature of life in the quest for orthologs." *Bioinformatics*.

The Quest for Orthologs (QfO) is an open collaboration framework for experts in comparative phylogenomics and related research areas who have an interest in highly accurate orthology predictions and their applications. We here report highlights and discussion points from the QfO meeting 2015 held in Barcelona. Achievements in recent years have established a basis to support developments for improved orthology prediction and to explore new approaches. Central to the QfO effort is proper benchmarking of methods and services, as well as design of standardized datasets and standardized formats to allow sharing and comparison of results. Simultaneously, analysis pipelines have been improved, evaluated, and adapted to handle large datasets. All this would not have occurred without the

long-term collaboration of Consortium members. Meeting regularly to review and coordinate complementary activities from a broad spectrum of innovative researchers clearly benefits the community. Highlights of the meeting include addressing sources of and legitimacy of disagreements between orthology calls, the context dependency of orthology definitions, special challenges encountered when analyzing very anciently rooted orthologies, orthology in the light of whole-genome duplications, and the concept of orthologous versus paralogous relationships at different levels, including domain-level orthology. Furthermore, particular needs for different applications (e.g. plant genomics, ancient gene families, and others) and the infrastructure for making orthology inferences available (e.g. interfaces with model organism databases) were discussed, with several ongoing efforts that are expected to be reported on during the upcoming 2017 QfO meeting.

Forterre, P., et al. (1992). "The nature of the last universal ancestor and the root of the tree of life, still open questions." *Biosystems* **28**(1-3): 15-32.

The nature of the last universal ancestor to all extent cellular organisms and the rooting of the universal tree of life are fundamental questions which can now be addressed by molecular evolutionists. Several scenarios have been proposed during the last years, based on the phylogenies of ribosomal RNA and of duplicated proteins, which suggest that the last universal ancestor was either an RNA progenote or an hyperthermophilic prokaryote. We discuss these hypotheses in the light of new data on the evolution of DNA metabolizing enzymes and of contradictions between different protein phylogenies. We conclude that the last universal ancestor was a member of the DNA world already containing several DNA polymerases and DNA topoisomerases. Furthermore, we criticize current data which suggest that the rooting of the universal tree of life is located in the eubacterial branch and we conclude that both rooting the universal tree and the nature of the last universal ancestor are still open questions.

Fountoulakis, K. N., et al. (2011). "Life events and dementia: what is the nature of their relationship?" *Psychiatry Res* **190**(1): 156-158.

The current study analyzed the life events reported by 1271 demented patients vs. 140 cognitively healthy elderly subjects. The Life Change Unit (LCU) method was used to quantify the results. When all the events were included in the analysis, the two groups had similar LCU scores (61.26 vs. 63.42). However, when events causally related to dementia (e.g. stroke) are excluded, demented patients were found to experience half of the LCU load in

comparison to controls (30.70 vs. 63.42). In both groups the level of LCU load is far below 100 which is the threshold suggested for the induction of psychosomatic disorders. Conclusively, the current study suggests that there is no causal role for life events in the etiopathogenesis of dementia. On the contrary, demented patients even the last few months before the clinical onset of dementia experience low life-events-related stress, possibly because of subclinical impairment which is already present.

Fuller-Iglesias, H. R., et al. (2015). "The complex nature of family support across the life span: Implications for psychological well-being." *Dev Psychol* **51**(3): 277-288.

This study examines the complex role of family networks in shaping adult psychological well-being over time. We examine the unique and interactive longitudinal influences of family structure (i.e., composition and size) and negative family relationship quality on psychological well-being among young (ages 18-34), middle-aged (ages 35-49), and older adults (ages 50+). A sample of 881 adults (72% White; 26% Black) was drawn from the longitudinal Social Relations, Age, and Health Study. Structural equation modeling indicated that among young and middle-aged adults, increasing family negativity was associated with increases in depressive symptoms over time. In contrast, among older adults, lowered proportion of family in network and an increasing number of family members in the network (i.e., family size) were associated with decreases in depressive symptoms. These findings were moderated by family negativity. Among older adults with low family negativity, having a lower proportion of family and larger family size were associated with decreasing depressive symptoms, but there was no effect among those reporting high family negativity. Overall, these results contribute to an increased understanding of the complex, developmental nature of how family support influences well-being across the life span and highlights unique age differences.

Gaukroger, S. (2016). "Kant and the nature of matter: Mechanics, chemistry, and the life sciences." *Stud Hist Philos Sci* **58**: 108-114.

Kant believed that the ultimate processes that regulate the behavior of material bodies can be characterized exclusively in terms of mechanics. In 1790, turning his attention to the life sciences, he raised a potential problem for his mechanically-based account, namely that many of the operations described in the life sciences seemed to operate teleologically. He argued that the life sciences do indeed require us to think in teleological terms, but that this is a fact about us, not about the processes themselves. Nevertheless,

even were we to concede his account of the life sciences, this would not secure the credentials of mechanics as a general theory of matter. Hardly any material properties studied in the second half of the eighteenth century were, or could have been, conceived in mechanical terms. Kant's concern with teleology is tangential to the problems facing a general matter theory grounded in mechanics, for the most pressing issues have nothing to do with teleology. They derive rather from a lack of any connection between mechanical forces and material properties. This is evident in chemistry, which Kant dismisses as being unscientific on the grounds that it cannot be formulated in mechanical terms.

Gauthier, D. M. and V. A. Swigart (2003). "The contextual nature of decision making near the end of life: hospice patients' perspectives." *Am J Hosp Palliat Care* **20**(2): 121-128.

Mr. C. was diagnosed with lung cancer seven months ago. The cancer then spread to his brain. He was fully aware that the physicians were treating his symptoms, not the disease, however, discussions regarding the goals of treatment did not occur. He continued the treatment regimen of chemotherapy and radiation therapy. While at home one evening, he fell and fractured his femur. His mobility and independence were at once greatly compromised. While recovering in the hospital, he made the decision to opt out of curative treatment. He stated, "I want to go home, play with my cat, smoke cigarettes, and be with my friends when they can visit." What are the processes by which adults with life-threatening conditions make decisions about their care? What is the context of these decisions? The purpose of this study was to describe the process of decision making for adults with a terminal illness.

Gonzalez-Bulnes, A., et al. (2016). "Nature and Nurture in the Early-Life Origins of Metabolic Syndrome." *Curr Pharm Biotechnol* **17**(7): 573-586.

The combination of genetic background together with food excess and lack of exercise has become the cornerstone of metabolic disorders associated to lifestyle. The scenario is furthermore reinforced by their interaction with other environmental factors (stress, sleeping patterns, education, culture, rural versus urban locations, and xenobiotics, among others) inducing epigenetic changes in the exposed individuals. The immediate consequence is the development of further alterations like obesity and metabolic syndrome, and other adverse health conditions (type-2 diabetes, cardiovascular diseases, cancer, reproductive, immune and neurological disorders). Thus, having in mind the impact of the metabolic syndrome on the worldwide public health,

the present review affords the relative roles and the interrelationships of nature (genetic predisposition to metabolic syndrome) and nurture (lifestyle and environmental effects causing epigenetic changes), on the establishment of the metabolic disorders in women; disorders that may evolve to metabolic syndrome prior or during pregnancy and may be transmitted to their descendants.

Hanes, R. J., et al. (2015). "Allocation Games: Addressing the Ill-Posed Nature of Allocation in Life-Cycle Inventories." *Environ Sci Technol* **49**(13): 7996-8003.

Allocation is required when a life cycle contains multi-functional processes. One approach to allocation is to partition the embodied resources in proportion to a criterion, such as product mass or cost. Many practitioners apply multiple partitioning criteria to avoid choosing one arbitrarily. However, life cycle results from different allocation methods frequently contradict each other, making it difficult or impossible for the practitioner to draw any meaningful conclusions from the study. Using the matrix notation for life-cycle inventory data, we show that an inventory that requires allocation leads to an ill-posed problem: an inventory based on allocation is one of an infinite number of inventories that are highly dependent upon allocation methods. This insight is applied to comparative life-cycle assessment (LCA), in which products with the same function but different life cycles are compared. Recently, there have been several studies that applied multiple allocation methods and found that different products were preferred under different methods. We develop the Comprehensive Allocation Investigation Strategy (CAIS) to examine any given inventory under all possible allocation decisions, enabling us to detect comparisons that are not robust to allocation, even when the comparison appears robust under conventional partitioning methods. While CAIS does not solve the ill-posed problem, it provides a systematic way to parametrize and examine the effects of partitioning allocation. The practical usefulness of this approach is demonstrated with two case studies. The first compares ethanol produced from corn stover hydrolysis, corn stover gasification, and corn grain fermentation. This comparison was not robust to allocation. The second case study compares 1,3-propanediol (PDO) produced from fossil fuels and from biomass, which was found to be a robust comparison.

Hindmarsh, P. C., et al. (1990). "The application of deconvolution analysis to elucidate the pulsatile nature of growth hormone secretion using a variable

half-life of growth hormone." *Clin Endocrinol (Oxf)* **32**(6): 739-747.

A deconvolution analysis model to calculate pituitary growth hormone (GH) secretion rate from measured serum GH concentration has been developed. This uses an iterative method of 'curve-stripping' based on an estimate of the half-life. The model has been applied to serum GH profiles and demonstrates that GH secretion occurs in discrete bursts with quiescent periods between secretory episodes, an 'on-off' phenomenon. The model can clearly dissect complicated concentration profiles such as the serum GH concentration response to growth hormone releasing hormone. The estimate was derived from calculating the half-life of serum GH in 10 subjects following an intravenous bolus injection of 50 mU of biosynthetic human growth hormone (b-hGH) and following infusions of the exogenous hormone (3 mU/kg/h) for 15, 30, 60 and 180 min. Endogenous GH secretion was suppressed by a continuous infusion of somatostatin (1-14). An asymptotic relationship between the duration of GH infusion and the GH half-life was established. A half-life of 15.3 min was achieved after exposure to GH for 60 min and a maximum half-life of 15.7 min after 180 min exposure.

Hunter, M. R., et al. (2019). "Urban Nature Experiences Reduce Stress in the Context of Daily Life Based on Salivary Biomarkers." *Front Psychol* **10**: 722.

Stress reduction through contact with nature is well established, but far less is known about the contribution of contact parameters - duration, frequency, and nature quality. This study describes the relationship between duration of a nature experience (NE), and changes in two physiological biomarkers of stress - salivary cortisol and alpha-amylase. It is the first study to employ long-term, repeated-measure assessment and the first evaluation wherein study participants are free to choose the time of day, duration, and the place of a NE in response to personal preference and changing daily schedules. During an 8-week study period, 36 urban dwellers were asked to have a NE, defined as spending time in an outdoor place that brings a sense of contact with nature, at least three times a week for a duration of 10 min or more. Their goal was compliance within the context of unpredictable opportunity for taking a nature pill. Participants provided saliva samples before and after a NE at four points over the study period. Before-NE samples established the diurnal trajectory of each stress indicator and these were in line with published outcomes of more closely controlled experiments. For salivary cortisol, an NE produced a 21.3%/hour drop beyond that of the hormone's 11.7% diurnal drop. The

efficiency of a nature pill per time expended was greatest between 20 and 30 min, after which benefits continued to accrue, but at a reduced rate. For salivary alpha-amylase, there was a 28.1%/h drop after adjusting for its diurnal rise of 3.5%/h, but only for participants that were least active sitting or sitting with some walking. Activity type did not influence cortisol response. The methods for this adaptive management study of nature-based restoration break new ground in addressing some complexities of measuring an effective nature dose in the context of normal daily life, while bypassing the limitations of a clinical pharmacology dose-response study. The results provide a validated starting point for healthcare practitioners prescribing a nature pill to those in their care. This line of inquiry is timely in light of expanding urbanization and rising healthcare costs.

Jacobson, J. I. (1989). "On the electro-magnetic nature of life." *Panminerva Med* **31**(4): 151-165.

Man has wondered since the dawning of thought about the origin and the meaning of the spark of life. How does life work and what is the difference between life and non-life? This paper wonders about the part that electromagnetism plays in the life process. It proposes a new insight into the relation of in vivo electromagnetic fields and gravitational fields and discusses such manifestations as solitons, the quantum hall effect, gravity waves, biological strings, biologically closed electric circuits, phonons and the piezoelectric nature of living tissue. It proposes a new and fundamental form of resonance, called Jacobson resonance. The system unifies quantum genetic characters and associated structures with electromagnetic field interaction energies. The result is the reorientation of atomic crystal lattice structures of organic molecules critical to the sustenance of life. A new treatment methodology is proposed for genomic, viral and trophic factor disorders essentially in terms of the potential efficacy of the magnetic force to reorient the spin angular momenta of electrons and protons; to therein rearrange atomic and molecular magnetic domains regulating homeostasis on microscopic, mesoscopic and macroscopic levels through biological amplification of quantum interactions. Finally it proposes that the equation, $mc^2 = BvI$ coulomb, may indeed represent the achievement of fourfold physical unification, the unification of physics and medicine, and resultant production of a thorough understanding of what may be the most fundamental natural law of the universe representing the ultimate goal of Einsteinian equivalence and relativistic field theory.

Jeuken, J. W., et al. (2011). "The nature and timing of specific copy number changes in the course

of molecular progression in diffuse gliomas: further elucidation of their genetic "life story". *Brain Pathol* **21**(3): 308-320.

Up till now, typing and grading of diffuse gliomas is based on histopathological features. However, more objective tools are needed to improve reliable assessment of their biological behavior. We evaluated 331 diffuse gliomas for copy number changes involving 1p, 19q, CDKN2A, PTEN and EGFR (vIII) by Multiplex Ligation-dependent Probe Amplification (MLPA (R), Amsterdam, The Netherlands). Specifically based on the co-occurrence of these aberrations we built a model for the timing of the different events and their exact nature (hemi- --> homozygous loss; low-level gain --> (high-copy) amplification) in the course of molecular progression. The mutation status of IDH1 and TP53 was also evaluated and shown to correlate with the level of molecular progression. The relevance of the proposed model was confirmed by analysis of 36 sets of gliomas and their 39 recurrence (s) whereas survival analysis for anaplastic gliomas confirmed the actual prognostic relevance of detecting molecular malignancy. Moreover, based on our results, molecular diagnostic analysis of 1p/19q can be further improved as different aberrations were identified, some of them being indicative for advanced molecular malignancy rather than for favorable tumor behavior. In conclusion, identification of molecular malignancy as proposed will aid in establishing a risk profile for individual patients and thereby in therapeutic decision making.

Jourdane, J. (1977). "[The life cycle of *Microphallus gracilis* Baer, 1943, a parasite of *Neomys fodiens* in the Pyrenees. Modalities of the transmission of the Digenea in nature (author's transl)]." *Ann Parasitol Hum Comp* **52**(4): 403-410.

Microphallus gracilis develops to the sporocyst stage in the digestive gland of the snail *Bythinella reyniesii*. The xiphidio-cercaria monostomous, anenterous in type, is liberated in water and actively penetrates a Crustacea *Gammarus pulex* where it encysts. From the point of view of the transmission ecology, the natural focuses of *M. gracilis* are composed of two different areas: an area where the parasite multiplies coinciding with biotope *Bythinella* and an area limited to the length of the river where the parasite spreads.

Kalmijn, A. J., et al. (2002). "The physical nature of life." *J Physiol Paris* **96**(5-6): 355-362.

Life evolved from the primeval world of physics. Sensory systems inform animals of the natural environment, enabling them to conduct responsively. The discovery of weak, DC bioelectric fields in the vicinity of aquatic organisms and the role they play in

guiding sharks and rays to their prey have led to the recognition of fundamental, hitherto less well known, physical aspects of sensory biology. The inferred cybernetic algorithm of electric-field orientation in sharks and rays is highly effective and extremely robust. In orienting to the weak DC electric fields of ocean currents and to the earth's magnetic field, sharks and rays unwittingly practise the motional-electric principles that Einstein had in mind when he introduced the special theory of relativity. At the sense-organ, receptor-membrane, and ion-channel levels, the elasmobranch ampullae of Lorenzini operate on the basis of graded positive feedback driven by negative conductance, supposedly employing voltage-sensitive ion channels as the active, excitable elements. The electric sense of sharks and rays presents an exquisite implementation of the very biophysical principles that also govern the graded, much richer than all-or-none, integrative brain processes of animal and man.

Kirkwood, T. B. (2015). "Deciphering death: a commentary on Gompertz (1825) 'On the nature of the function expressive of the law of human mortality, and on a new mode of determining the value of life contingencies'." *Philos Trans R Soc Lond B Biol Sci* **370**(1666).

In 1825, the actuary Benjamin Gompertz read a paper, 'On the nature of the function expressive of the law of human mortality, and on a new mode of determining the value of life contingencies', to the Royal Society in which he showed that over much of the adult human lifespan, age-specific mortality rates increased in an exponential manner. Gompertz's work played an important role in shaping the emerging statistical science that underpins the pricing of life insurance and annuities. Latterly, as the subject of ageing itself became the focus of scientific study, the Gompertz model provided a powerful stimulus to examine the patterns of death across the life course not only in humans but also in a wide range of other organisms. The idea that the Gompertz model might constitute a fundamental 'law of mortality' has given way to the recognition that other patterns exist, not only across the species range but also in advanced old age. Nevertheless, Gompertz's way of representing the function expressive of the pattern of much of adult mortality retains considerable relevance for studying the factors that influence the intrinsic biology of ageing. This commentary was written to celebrate the 350th anniversary of the journal *Philosophical Transactions of the Royal Society*.

Kirkwood, T. B. and S. Melov (2011). "On the programmed/non-programmed nature of ageing within the life history." *Curr Biol* **21**(18): R701-707.

Understanding why and how senescence evolved is of great importance in investigating the multiple, complex mechanisms that influence the course of ageing in humans and other organisms. Compelling arguments eliminate the idea that death is generally programmed by genes for ageing, but there is still a widespread tendency to interpret data in terms of loosely defined 'age regulation', which does not usually make either evolutionary or mechanistic sense. This review critically addresses the role of natural selection in shaping ageing within the life history and examines the implications for research on genetic pathways that influence the life span. It is recognised that in exceptional circumstances the possibility exists for selection to favour limiting survival. In acknowledging that, at least in theory, ageing might occasionally be adaptive, however, the high barriers to validating actual instances of adaptive ageing are made clear.

Crkovic, K., et al. (2018). "An experience sampling study on the nature of the interaction between traumatic experiences, negative affect in everyday life, and threat beliefs." *Schizophr Res* **201**: 381-387.

Research suggests that trauma is associated with the development of psychotic experiences, such as paranoia, via affective processes. However, the empirical evidence on the exact mechanism is limited and it is unclear which aspects of trauma are relevant. Here we tested whether self-reported frequency of trauma, recurring trauma, age, and type of trauma are predictive of later threat beliefs in daily life and which role affective processes (self-reported negative affect and autonomic arousal) play in this association. We tested two often postulated mechanisms: mediation, with affective processes in everyday life explaining the association between trauma and threat beliefs; and moderation, with trauma strengthening the association between affective processes and threat beliefs in everyday life. Trauma was assessed at baseline with the Trauma-History-Questionnaire in 67 individuals with attenuated symptoms of psychosis. We then applied the experience-sampling-method during 24h to assess negative affect, heart rate and threat beliefs. Multilevel analysis showed that negative affect ($p < 0.001$) and heart rate ($p < 0.05$) were predictive of subsequent threat beliefs. There was no significant mediation effect from any trauma characteristic to threat beliefs via negative affect and heart rate. Trauma frequency ($p < 0.001$), age at first trauma ($p < 0.001$), as well as the presence of physical trauma ($p < 0.001$) moderated the path from negative affect to subsequent threat beliefs. Our findings indicate that more frequent trauma, trauma at young age and physical trauma strengthen the association from

negative affect to threat beliefs and could be relevant to determining the extent of vulnerability to psychosis.

Kuczynski, K. (2008). "Life-threatening illness and the nature of social support: brief research report." *J Psychosoc Oncol* **26**(3): 113-123.

Studies support the assumption that social connection and support are essential to adequately cope with a life-threatening illness. This exploratory study surveyed a small sample of cancer patients to ask them what they needed at the time of their initial diagnosis and what reactions to their illness that they perceived in others. The ability to clearly identify needs and reactions was deemed as important as the content of their responses. This study supports the premise that when asked cancer patients can identify their own needs and are clearly aware of others' reactions to their illness.

Kunath, U. and P. Fischer (1984). "[Radical nature and life expectancy in the surgical treatment of esophageal and cardiac carcinoma]." *Dtsch Med Wochenschr* **109**(12): 450-453.

Fifty-four patients with carcinoma of the oesophagus and cardia were selected to have either a two-cavity radical operation or blunt oesophagectomy without thoracotomy. Squamous-cell carcinomas were randomized for postoperative radiotherapy or none. Neither the two-cavity radical operation nor additional radiotherapy prolonged life expectancy. The results cast doubt on the effectiveness of local radical or curative surgery for carcinoma of the oesophagus and cardia. The only objective in the choice of treatment must be to decrease operative mortality and to make the course of the disease tolerable to the patient.

Lala, A. P. and E. A. Kinsella (2011). "A phenomenological inquiry into the embodied nature of occupation at end of life." *Can J Occup Ther* **78**(4): 246-254.

BACKGROUND: Occupational therapists propose that occupation is a basic human need across the lifespan. However, there is limited understanding of how occupation contributes to the end-of-life experience. **PURPOSE:** The purpose of this study was to examine the embodied nature of occupation at end of life from the perspectives of Canadians 60 years of age or older who are diagnosed with a terminal illness. **METHODS:** The study adopted a phenomenological methodological approach to conduct semi-structured interviews with eight participants. **FINDINGS:** Six themes were identified. Participants described orientations toward occupations that involved: living with death, reworking everyday life, being guided by the will of the body, giving priority to relationships, attending to the small things, and engaging existential

orientations. **IMPLICATIONS:** This study contributes to knowledge about occupation at end of life and offers a starting point to guide practice that is attentive to the lived dimensions of occupation at end of life.

Ledeen, R. W. and G. Wu (2015). "The multi-tasked life of GM1 ganglioside, a true factotum of nature." *Trends Biochem Sci* **40**(7): 407-418.

GM1 ganglioside occurs widely in vertebrate tissues, where it exhibits many essential functions, both in the plasma membrane and intracellular loci. Its essentiality is revealed in the dire consequences resulting from genetic deletion. This derives from its key roles in several signalosome systems, characteristically located in membrane rafts, where it associates with specific proteins that have glycolipid-binding domains. Thus, GM1 interacts with proteins that modulate mechanisms such as ion transport, neuronal differentiation, G protein-coupled receptors (GPCRs), immune system reactivities, and neuroprotective signaling. The latter occurs through intimate association with neurotrophin receptors, which has relevance to the etiopathogenesis of neurodegenerative diseases and potential therapies. Here, we review the current state of knowledge of these GM1-associated mechanisms.

Ledo, A. (2015). "Nature and Age of Neighbours Matter: Interspecific Associations among Tree Species Exist and Vary across Life Stages in Tropical Forests." *PLoS One* **10**(11): e0141387.

Detailed information about interspecific spatial associations among tropical tree species is scarce, and hence the ecological importance of those associations may have been underestimated. However, they can play a role in community assembly and species diversity maintenance. This study investigated the spatial dependence between pairs of species. First, the spatial associations (spatial attraction and spatial repulsion) that arose between species were examined. Second, different sizes of trees were considered in order to evaluate whether the spatial relationships between species are constant or vary during the lifetime of individuals. Third, the consistency of those spatial associations with the species-habitat associations found in previous studies was assessed. Two different tropical ecosystems were investigated: a montane cloud forest and a lowland moist forest. The results showed that spatial associations among species exist, and these vary among life stages and species. The rarity of negative spatial interactions suggested that exclusive competition was not common in the studied forests. On the other hand, positive interactions were common, and the results of this study strongly suggested that habitat associations were not the only cause of spatial attraction among species. If this is

true, habitat associations and density dependence are not the only mechanisms that explain species distribution and diversity; other ecological interactions, such as facilitation among species, may also play a role. These spatial associations could be important in the assembly of tropical tree communities and forest succession, and should be taken into account in future studies.

Maitre, N. L., et al. (2017). "The Dual Nature of Early-Life Experience on Somatosensory Processing in the Human Infant Brain." *Curr Biol* **27**(7): 1048-1054.

Every year, 15 million preterm infants are born, and most spend their first weeks in neonatal intensive care units (NICUs) [1]. Although essential for the support and survival of these infants, NICU sensory environments are dramatically different from those in which full-term infants mature and thus likely impact the development of functional brain organization [2]. Yet the integrity of sensory systems determines effective perception and behavior [3, 4]. In neonates, touch is a cornerstone of interpersonal interactions and sensory-cognitive development [5-7]. NICU treatments used to improve neurodevelopmental outcomes rely heavily on touch [8]. However, we understand little of how brain maturation at birth (i.e., prematurity) and quality of early-life experiences (e.g., supportive versus painful touch) interact to shape the development of the somatosensory system [9]. Here, we identified the spatial, temporal, and amplitude characteristics of cortical responses to light touch that differentiate them from sham stimuli in full-term infants. We then utilized this data-driven analytical framework to show that the degree of prematurity at birth determines the extent to which brain responses to light touch (but not sham) are attenuated at the time of discharge from the hospital. Building on these results, we showed that, when controlling for prematurity and analgesics, supportive experiences (e.g., breastfeeding, skin-to-skin care) are associated with stronger brain responses, whereas painful experiences (e.g., skin punctures, tube insertions) are associated with reduced brain responses to the same touch stimuli. Our results shed crucial insights into the mechanisms through which common early perinatal experiences may shape the somatosensory scaffolding of later perceptual, cognitive, and social development.

Malter, H. (2018). "Life Interrupted: The Nature and Consequences of Cryostasis." *Semin Reprod Med* **36**(5): 273-279.

Cryopreservation and associated cryostorage has become a well-established technique in both basic and clinical science. When the potentially lethal consequences of freezing itself are ameliorated,

existence at cryogenic temperatures seems to be a form of true viable stasis that can persist for long periods of time. Natural cryopreservation and revival after long-term periods in cryostasis is reality in many species. While some evidence exists for imperfections in artificial cryopreservation protocols and storage, these protocols are for the most part successful and compatible with efficient restoration of vitality in a variety of biomaterial after freezing. Clinical protocols in use for cryopreserving and storing gametes and embryos in human-assisted reproduction are similarly well proven and supported by a large body of basic science and clinical outcome data.

Mantin, M. (2017). "'His Whole Nature requires Development': Education, School Life and Deafness in Wales, 1850-1914." *Soc Hist Med* **30**(4): 727-747.

The history of deaf education has focused heavily on one major issue: the role of sign language and the rise of oralism as a means of suppressing the use of signs. This was a crucial debate which affected the lives of deaf children, informed social and cultural attitudes towards deafness and in many cases spurred resistance from deaf communities. However, other aspects of daily school life and the curriculum of Victorian and Edwardian deaf schools have rarely been commented upon. Focusing on the Cambrian Institution for the Deaf and Dumb, Wales' first deaf institution, this article will examine the teaching of writing and moral, religious and industrial education, all of which constructed an image of the intellectual and moral capabilities of the deaf child. The article will argue that deaf children were prescribed a moral and religious identity, and played an active role in wider Victorian and Edwardian discourses of education and childhood.

Marinkovic, S., et al. (2015). "Nature, life and mind. An essay on the essence." *Folia Morphol (Warsz)* **74**(3): 273-282.

BACKGROUND: Our long-standing scientific work and love to the fine art and nature for many years succeeded in making a unifying description of the three domains, at a time when a high specialisation in science, and even in art, has neglected the necessary entirety. MATERIALS AND METHODS: Some neurons of a rat cerebral cortex were labelled with true blue and photographed under a fluorescent microscope. A monkey brain was sectioned in the axial plane. Several slices of the human motor cortex were stained with cresyl violet. A cerebral hemisphere image was modified, and another image was created in Adobe Photoshop. RESULTS: Some 10 billion years after the Big Bang life appeared on the Earth, reaching its peak with development of the brain. The humans started exploration of the local nature to survive, and

the universe for psychological support. The antique philosophers Leucippes, Democritus and Heraclitus were the first to create a unifying atomic theory and to suggest the eternal movement of the matter. Newton and Kepler explained the movement of the celestial objects, whereas Einstein, Planck, Bohr, Hubbel, Howking and many others connected the quantum physics and elementary forces with the essence of the universe. Leonardo da Vinci, and later many others as well, united science and art. Philosophers and mathematicians created the phenomena which do not exist in nature. CONCLUSIONS: Nature designed the human brain, more complex than the universe itself, which in turn created millions of the artworks and scientific discoveries. The might of the mind in some domains overcomes the power of nature.

Marino, J. L., et al. (2014). "Nature and severity of menopausal symptoms and their impact on quality of life and sexual function in cancer survivors compared with women without a cancer history." Menopause **21**(3): 267-274.

OBJECTIVE: After cancer treatment, troublesome menopausal symptoms are common but poorly understood. Using standardized instruments, we measured differences in symptom nature, severity, impact on quality of life, and sexual function between cancer survivors and noncancer participants. METHODS: The Menopause Symptoms After Cancer Clinic operates within the general menopause service in a large women's hospital, providing menopause advice and management to women with menopausal symptoms and a cancer history. Menopausal symptoms were recorded using the Greene Climacteric Scale, past-week symptoms were recorded using the Functional Assessment of Cancer Therapy breast cancer subscale and endocrine symptom subscale, and sexual symptoms were recorded using Fallowfield's Sexual Activity Questionnaire. RESULTS: Cancer survivors (n = 934) and noncancer participants (n = 155) did not significantly differ by age at menopause (46 y) or age at first clinic visit (51 y). Cancer survivors were more likely than noncancer participants to be severely troubled by vasomotor symptoms (hot flushes and night sweats; odds ratio, 1.71; 95% CI, 1.06-2.74) and reported more frequent (6.0 vs 3.1 in 24 h; P < 0.001) and more severe (P = 0.008) hot flushes. In contrast, cancer survivors were significantly less troubled by psychological and somatic symptoms and reported better quality of life than noncancer participants. Groups did not differ significantly in physical or functional well-being, gynecologic symptom severity, or sexual function. CONCLUSIONS: Cancer survivors are more troubled by vasomotor symptoms than noncancer participants, but noncancer participants report greater psychological

symptoms. Sexual function does not differ. An improved understanding of the nature and impact of menopause on cancer survivors can be used to direct management protocols.

Markow, T. A., et al. (2012). "The wild side of life: *Drosophila* reproduction in nature." Fly (Austin) **6**(2): 98-101.

Drosophila species vary in the rates at which females remate and the number of sperm they receive in the laboratory. In species such as *D. melanogaster* and *D. pseudoobscura*, in which females receive thousands of sperm and remate infrequently compared with species such as *D. hydei* and *D. nigrospiracula*, where females receive only a few hundred sperm and remate many times in a day, wild caught females should produce far more progeny. We tested this prediction by collecting, directly from nature, females of six species whose remating rates and number of sperm received vary from high to low and assessing the proportion of females with sperm and the number of progeny females produce. Over 95% of *D. pseudoobscura* and *D. melanogaster* females were inseminated while far fewer of the other species contained any sperm. In addition, *D. pseudoobscura* females produced progeny for over two weeks, *D. melanogaster* for over a week, while *D. hydei* and *D. nigrospiracula* females ran out of sperm after 1-2 d. These observations suggest extreme sperm limitation in these latter species.

Marselle, M. R., et al. (2019). "Growing Resilience through Interaction with Nature: Can Group Walks in Nature Buffer the Effects of Stressful Life Events on Mental Health?" Int J Environ Res Public Health **16**(6).

Nature-based activities have been used as therapeutic interventions for those experiencing stress and mental ill health. This study investigates whether group walks could be a nature-based intervention to foster resilience, by buffering the effects of recent stressful life events on mental health. An observational research design with propensity score-matched samples compared the mental health of individuals who did (Nature Group Walkers, n = 1081) or did not (Non-Group Walkers, n = 435) attend nature group walks. A sub-sample of Frequent Nature Group Walkers (at least once per week, n = 631) was also investigated. Data were analyzed using multiple regression with an interaction term. All analyses were controlled for age, gender, and recent physical activity. Results showed that neither nature group walking, nor doing this frequently, moderated the effects of stressful life events on mental health. Using a main effects model, the positive associations of group walks in nature were at a greater magnitude than the negative

associations of stressful life events on depression, positive affect, and mental well-being, suggesting an 'undoing' effect of nature group walks. Group walking schemes in natural environments may be an important public health promotion intervention for mental health.

Martz, K. and J. M. Morse (2017). "The Changing Nature of Guilt in Family Caregivers: Living Through Care Transitions of Parents at the End of Life." *Qual Health Res* 27(7): 1006-1022.

Older adults cared for at home by family members at the end of life are at risk for care transitions to residential and institutional care settings. These transitions are emotionally distressing and fraught with suffering for both families and the older adult. A theoretical model titled "The Changing Nature of Guilt in Family Caregivers: Living Through Care Transitions of Parents at the End of Life" was developed using the method of grounded theory. When a dying parent cannot remain at home to die, family members experience guilt throughout the transition process. Findings indicated that guilt surrounding transfers escalated during the initial stages of the transfer but was mitigated by achieving what family members deemed as a "good" death when relatives were receiving hospice care. The findings of this interpretative approach provide new insights into family-focused perspectives in care transfers of the dying.

McCrae, R. R., et al. (2000). "Nature over nurture: temperament, personality, and life span development." *J Pers Soc Psychol* 78(1): 173-186.

Temperaments are often regarded as biologically based psychological tendencies with intrinsic paths of development. It is argued that this definition applies to the personality traits of the five-factor model. Evidence for the endogenous nature of traits is summarized from studies of behavior genetics, parent-child relations, personality structure, animal personality, and the longitudinal stability of individual differences. New evidence for intrinsic maturation is offered from analyses of NEO Five-Factor Inventory scores for men and women age 14 and over in German, British, Spanish, Czech, and Turkish samples (N = 5,085). These data support strong conceptual links to child temperament despite modest empirical associations. The intrinsic maturation of personality is complemented by the culturally conditioned development of characteristic adaptations that express personality; interventions in human development are best addressed to these.

McGue, M., et al. (2014). "The nature of behavioural correlates of healthy ageing: a twin study

of lifestyle in mid to late life." *Int J Epidemiol* 43(3): 775-782.

BACKGROUND: With the greying of the industrialized world has come increased interest in identifying the modifiable lifestyle factors that promote healthy and successful ageing. Whereas many of the behavioural correlates of late-life morbidity and mortality have been identified, relatively little is known about the origins of individual differences in these factors. **METHODS:** A sample of 12,714 twins, including both members of 3806 pairs of known zygosity, ascertained through the Danish Twin Registry and aged 40 to 80 years, completed a self-report assessment of six lifestyle factors associated with ageing: smoking, drinking, diet and physical, social and intellectual activities. Standard biometric methods were used to analyse the twin data and determine the extent to which individual differences in each of the lifestyle factors are heritable. **RESULTS:** For each of the six lifestyle factors, the estimate of heritability ranged from 32% (95% CI: 19-42%) for the diet scale to 69% (62-72%) for the smoking measure. Biometric estimates of the contribution of the twins' common rearing environment were uniformly small ($\leq 6\%$). There was little evidence that standardized biometric estimates varied by gender or age. **CONCLUSIONS:** Individuals likely construct lifestyles in part to complement and reinforce underlying genetically influenced dispositions and talents. The heritable nature of lifestyle factors implies that the behavioural and genetic contributors to ageing processes are not necessarily conceptually distinct but rather reflect the complexity of gene-environment interplay in ageing.

McInerney, J. O., et al. (2014). "The hybrid nature of the Eukaryota and a consilient view of life on Earth." *Nat Rev Microbiol* 12(6): 449-455.

The origin of the eukaryotic cell, which is known as eukaryogenesis, has puzzled scientists for more than 100 years, and many hypotheses have been proposed. Recent analyses of new data enable the safe elimination of some of these hypotheses, whereas support for other hypotheses has increased. In this Opinion article, we evaluate the available theories for their compatibility with empirical observations and conclude that cellular life consists of two primary, paraphyletic prokaryotic groups and one secondary, monophyletic group that has symbiogenic origins - the eukaryotes.

McManus, M. C. and C. M. Taylor (2015). "The changing nature of life cycle assessment." *Biomass Bioenergy* 82: 13-26.

LCA has evolved from its origins in energy analysis in the 1960s and 70s into a wide ranging tool

used to determine impacts of products or systems over several environmental and resource issues. The approach has become more prevalent in research, industry and policy. Its use continues to expand as it seeks to encompass impacts as diverse as resource accounting and social well being. Carbon policy for bioenergy has driven many of these changes. Enabling assessment of complex issues over a life cycle basis is beneficial, but the process is sometimes difficult. LCA's use in framing is increasingly complex and more uncertain, and in some cases, irreconcilable. The charged environment surrounding biofuels and bioenergy exacerbates all of these. Reaching its full potential to help guide difficult policy discussions and emerging research involves successfully managing LCA's transition from attributional to consequential and from retrospective to prospective. This paper examines LCA's on-going evolution and its use within bioenergy deployment. The management of methodological growth in the context of the unique challenges associated with bioenergy and biofuels is explored. Changes seen in bioenergy LCA will bleed into other LCA arenas, especially where it is important that a sustainable solution is chosen.

Meyer, J. E. (1989). "[The finite nature of human life and its significance in the perception of neurotic patients]." *Psychother Psychosom Med Psychol* **39**(2): 64-67.

This article is a presentation of the manifold fears that beset humans in respect of dying and death-based on case reports-as are frequently encountered in patients suffering from anxiety neuroses, phobias and obsessional neuroses, hypochondria and depersonalisation syndromes. The links between these individual fears with the personality structure of the affected person are discussed. This also raises the question to what extent these fears become manifest because of a slackening of the defence mechanisms. It appears to be a characteristic sign of the times that collective worries about the finite nature of human life focus entirely on dying, whereas the problems and questions regarding death itself are not subject to any discussion.

Mills, J. and M. Fuller-Tyszkiewicz (2018). "Nature and consequences of positively-intended fat talk in daily life." *Body Image* **26**: 38-49.

The current study used ecological momentary assessment to explore the frequency, trait predictors, and momentary consequences of positively-intended fat talk, a specific sub-type of fat talk that involves making negative comments about one's own appearance with the view to making someone else feel better. A total of 135 women aged 18-40 completed trait measures of appearance-based comparisons, thin-

ideal internalisation, body shame, and body surveillance, before completing a state-based component, involving six short surveys delivered via a smartphone app at random points during the day for seven days. Findings indicate that both self- and other-fat talk are common in daily social interactions, and that individuals with higher levels of trait negative body image were more likely to engage in fat talk. Self-fat talk negatively impacted state body satisfaction levels. Possible theoretical and practical implications are outlined.

Mischley, L. K., et al. (2017). "Use of a self-rating scale of the nature and severity of symptoms in Parkinson's Disease (PRO-PD): Correlation with quality of life and existing scales of disease severity." *NPJ Parkinsons Dis* **3**: 20.

A self-rating scale was developed to permit patient-reported, remote assessment of Parkinson's disease symptom severity. The goal was to create a continuous outcome measure that does not require a clinical exam, does not fluctuate in response to dopaminergic medications, takes only a few minutes to complete, allows for stratification by symptom (s), and captures both motor and non-motor Parkinson's disease symptoms, major contributors to quality of life. The Patient Reported Outcomes in Parkinson's Disease (PRO-PD) is the cumulative score of 32 slider bars, each evaluating a common Parkinson's disease symptom. The PRO-PD has been used as an outcome measure in three studies. The baseline data from each of these studies were pooled for this analysis. Symptom frequency and severity are described, as well as correlation coefficients with existing measures of Parkinson's disease severity. Data on 1031 participants with Parkinson's disease were available for analysis. Fatigue, impaired handwriting, daytime sleepiness, slowness, tremor, muscle cramps, and forgetfulness were the most frequently reported symptoms. Persons with a relatively long duration of Parkinson's disease tended to report more, and more severe, symptoms. The PRO-PD was most highly correlated with the Parkinson's Disease Questionnaire-39 ($r = 0.763$, $P < 0.000$) and Patient-Reported Outcome Measurement Information System Global quality of life ($r = -0.7293$, $P < 0.000$), other patient-reported quality of life measures. The PRO-PD non-motor subset was highly correlated with the Non-Motor Symptom Score ($r = 0.7533$, $P < 0.000$). There was a moderate correlation seen with Hoehn & Yahr ($r = 0.5922$, $P < 0.000$), total Unified Parkinson's disease Rating Scale ($r = 0.4724$, $P < 0.000$), and the Timed-Up- & -Go ($r = 0.4709$, $P < 0.000$). The PRO-PD may have utility for patients, providers, and researchers as a patient-centered measure of Parkinson's disease

symptom severity. Further PRO-PD validation efforts are warranted.

Morange, M. (2011). "Some considerations on the nature of LUCA, and the nature of life." *Res Microbiol* **162**(1): 5-9.

In addition to its scientific interest, research on the last universal common ancestor (LUCA) and the lower part of the tree of life raises important and difficult issues in biology, but also in the philosophy of science as well as in philosophy in general. The way inquiries are formulated has to be scrutinized to avoid unanswerable questions. Preconceived ideas, poorly defined notions and abuse of metaphors are obstacles which can induce bias in studies and in the interpretation of their results. In the background, the question of life has recently re-emerged.

Morelot-Panzini, C., et al. (2016). "Real-life assessment of the multidimensional nature of dyspnoea in COPD outpatients." *Eur Respir J* **47**(6): 1668-1679.

Dyspnoea is a prominent symptom of chronic obstructive pulmonary disease (COPD). Recent multidimensional dyspnoea questionnaires like the Multidimensional Dyspnea Profile (MDP) individualise the sensory and affective dimensions of dyspnoea. We tested the MDP in COPD outpatients based on the hypothesis that the importance of the affective dimension of dyspnoea would vary according to clinical characteristics. A multicentre, prospective, observational, real-life study was conducted in 276 patients. MDP data were compared across various categories of patients (modified Medical Research Council (mMRC) dyspnoea score, COPD Assessment Test (CAT) score, Global Initiative for Chronic Obstructive Lung Disease (GOLD) airflow obstruction categories, GOLD "ABCD" categories, and Hospital Anxiety and Depression Scale (HADS)). Univariate and multivariate regressions were conducted to explore factors influencing the affective dimension of dyspnoea. Cluster analysis was conducted to create homogeneous patient profiles. The MDP identified a more marked affective dimension of dyspnoea with more severe mMRC, CAT, 12-item Short-Form Health Survey mental component, airflow obstruction and HADS. Multivariate analysis identified airflow obstruction, depressive symptoms and physical activity as determinants of the affective dimension of dyspnoea. Patients clustered into an "elderly, ex-smoker, severe disease, no rehabilitation" group exhibited the most marked affective dimension of dyspnoea. An affective/emotional dimension of dyspnoea can be identified in routine clinical practice. It can contribute to the phenotypic description of patients. Studies are needed to determine whether

targeted therapeutic interventions can be designed and whether they are useful.

Morris, D. J. (2012). "A new model for myxosporean (Myxozoa) development explains the endogenous budding phenomenon, the nature of cell within cell life stages and evolution of parasitism from a cnidarian ancestor." *Int J Parasitol* **42**(9): 829-840.

The phylum Myxozoa is composed of endoparasitic species that have predominately been recorded within aquatic vertebrates. The simple body form of a trophic cell containing other cells within it, as observed within these hosts, has provided few clues to relationships with other organisms. In addition, the placement of the group using molecular phylogenies has proved very difficult, although the majority of analyses now suggest that they are cnidarians. There have been relatively few studies of myxozoan stages within invertebrate hosts, even though these exhibit multicellular and sexual stages that may provide clues to myxozoan evolution. Therefore an ultrastructural examination of a myxozoan infection of a freshwater oligochaete was conducted, to reassess and formulate a model for myxozoan development in these hosts. This deemed that meiosis occurs within the oligochaete, but that fertilisation is not immediate. Rather, the resultant haploid germ cell (oocyte) is engulfed by a diploid sporogonic cell (nurse cell) to form a sporoplasm. It is this sporoplasm that infects the fish, resulting in the multicellular stages observed. Fertilisation occurs after the parasites leave the fish and enter the oligochaete host. The nurse cell/oocyte model explains previously conflicting evidence in the literature regarding myxosporean biology, and aligns phenomena considered distinctive to the Myxozoa, such as endogenous budding and cell within cell development, with processes recorded in cnidarians. Finally, the evolutionary origin of the Myxozoa as cnidarian parasites of ova is hypothesised.

Moya-Higueras, J., et al. (2018). "Recent Stressful Life Events (SLE) and Adolescent Mental Health: Initial Validation of the LEIA, a New Checklist for SLE Assessment According to Their Severity, Interpersonal, and Dependent Nature." *Assessment*: 1073191118817648.

The main aim of the present study was to develop and validate a checklist for adolescents, the Life Events Inventory for Adolescents (LEIA), for screening stressful life events (SLEs) of different nature (major-minor, dependent-independent, and personal-interpersonal). The LEIA was administered together with another SLE checklist (Escala de Acontecimientos Vitales [Life Events Scale], EAV), and with measures of life satisfaction and externalizing and internalizing symptoms. The results showed that

the kappa and the percentage agreement reliability indices were adequate. Regarding validity evidences, the correlations found between the LEIA and the EAV ranged from .65 to .69, and between the LEIA and the psychopathological symptoms ranged from .26 to .38. Specifically, major dependent noninterpersonal SLEs were the best predictors of externalizing psychopathology; while major independent noninterpersonal SLEs were the best predictors of internalizing symptoms and low life satisfaction. To conclude, the LEIA could be considered an adequate checklist to screen for SLEs in adolescents.

Nisbet, E. G. and N. H. Sleep (2001). "The habitat and nature of early life." *Nature* **409**(6823): 1083-1091.

Earth is over 4,500 million years old. Massive bombardment of the planet took place for the first 500-700 million years, and the largest impacts would have been capable of sterilizing the planet. Probably until 4,000 million years ago or later, occasional impacts might have heated the ocean over 100 degrees C. Life on Earth dates from before about 3,800 million years ago, and is likely to have gone through one or more hot-ocean 'bottlenecks'. Only hyperthermophiles (organisms optimally living in water at 80-110 degrees C) would have survived. It is possible that early life diversified near hydrothermal vents, but hypotheses that life first occupied other pre-bottleneck habitats are tenable (including transfer from Mars on ejecta from impacts there). Early hyperthermophile life, probably near hydrothermal systems, may have been non-photosynthetic, and many housekeeping proteins and biochemical processes may have an original hydrothermal heritage. The development of anoxygenic and then oxygenic photosynthesis would have allowed life to escape the hydrothermal setting. By about 3,500 million years ago, most of the principal biochemical pathways that sustain the modern biosphere had evolved, and were global in scope.

Nott, K. H. and K. Vedhara (1999). "Nature and consequences of stressful life events in homosexual HIV-positive men: a review." *AIDS Care* **11**(2): 235-243.

A great deal of research has been conducted into the stressful experiences that befall HIV-infected individuals. In this review we have focused on the work that has been conducted with HIV-positive homosexual males and have examined issues concerning the measurement, nature and consequences of stressful life events. It is apparent that, in consort with most other life events research, the measurement of events in this patient group is affected by methodological difficulties. Such difficulties may

have, in particular, led to the observation by some investigators that HIV-positive homosexual men experience greater numbers of such events than their HIV-negative counterparts. It is also evident that, while some of these events are typical of those faced by individuals with other life threatening conditions, others are peculiar to this patient group. Research into the consequences of these events for emotional and behavioural functioning indicate that the effects are far-reaching. Similarly, data on the consequences of stressful events for immune function suggest that they may play a role in the progression of the disease, although these data are equivocal.

Okazaki, N. (1983). "Life of advanced cancer patients after knowing the nature of their own disease: a personal experience of seven cases." *Jpn J Clin Oncol* **13**(4): 703-707.

To seven patients suffering from advanced cancer who wished to know what their disease was and whose families supported them in their wish, I informed them of the name of the disease and how advanced their case was. After being told they had cancer, not only did the patients become more cheerful to and more trustful of their families, but also they came to place greater confidence in us' doctors and nurses. Their wish to live was strong and they all wanted to have their anticancer therapy continued. At the terminal stage, four of them merely wanted to have their pain relieved, and two of them became depressive when the symptoms of approaching death became evident. But judging from the total clinical course of the seven carefully screened patients, I believe that informing them of the true nature of the disease brought about favorable results.

Oliverio, A. M. and L. A. Katz (2014). "The dynamic nature of genomes across the tree of life." *Genome Biol Evol* **6**(3): 482-488.

Genomes are dynamic in lineages across the tree of life. Among bacteria and archaea, for example, DNA content varies throughout life cycles, and nonbinary cell division in diverse lineages indicates the need for coordination of the inheritance of genomes. These observations contrast with the textbook view that bacterial and archaeal genomes are monoploid (i.e., single copied) and fixed both within species and throughout an individual's lifetime. Here, we synthesize information on three aspects of dynamic genomes from exemplars representing a diverse array of bacterial and archaeal lineages: 1) ploidy level variation, 2) epigenetic mechanisms, and 3) life cycle variation. For example, the Euryarchaeota analyzed to date are all polyploid, as is the bacterium *Epulopiscium* that contains up to tens of thousands of copies of its genome and reproduces by viviparity. The

bacterium *Deinococcus radiodurans* and the archaeon *Halobacterium* sp. NRC-1 can repair a highly fragmented genome within a few hours. Moreover, bacterial genera such as *Dermocarpella* and *Planctomyces* reproduce by fission (i.e., generating many cells from one cell) and budding, respectively, highlighting the need for regulation of genome inheritance in these lineages. Combining these data with our previous work on widespread genome dynamics among eukaryotes, we hypothesize that dynamic genomes are a rule rather than the exception across the tree of life. Further, we speculate that all domains may have the ability to distinguish germline from somatic DNA and that this ability may have been present the last universal common ancestor.

Packman, W., et al. (2005). "Siblings of pediatric cancer patients: the quantitative and qualitative nature of quality of life." *J Psychosoc Oncol* **23**(1): 87-108.

This study used both quantitative and qualitative methodologies to assess the pediatric health-related quality of life (HRQOL) in siblings (n = 77) of cancer patients attending summer camp. On quantitative measures (Pediatric Quality of Life Inventory (PedsQL) parent and child versions), siblings reported statistically significant improvements in HRQOL from pre-to post camp. The parent sample, as a whole, did not report a statistically significant improvement in the siblings' HRQOL; however, statistically significant improvements were found when the analysis controlled for the responses of bereaved parents. On the qualitative measures (Sibling Qualitative Interview and Camp Okizu Satisfaction Surveys), both children and parents described the positive impact of camp. Using grounded theory, we identified the major themes and found that the positive emotional and social experiences captured by the quotes were paralleled in the quantitative findings of improved HRQOL in psychosocial domains on the PedsQL. These findings suggest the beneficial effects of camp as a psychological intervention and illustrate the value of integrating quantitative and qualitative methodological approaches in research.

Rajji, T. K. and B. H. Mulsant (2008). "Nature and course of cognitive function in late-life schizophrenia: a systematic review." *Schizophr Res* **102**(1-3): 122-140.

OBJECTIVES: To systematically review the literature on the nature and course of cognition in late-life schizophrenia (LLS). **METHODS:** We conducted a literature search using Medline. Search terms included schizophrenia, cognition, memory, and other cognitive search terms. We limited our search to age 45 and above. All titles or abstracts were read, and relevant papers were reviewed. Only cross-sectional

studies with healthy control groups or longitudinal studies of cognition in LLS are presented in this review. **RESULTS:** We identified 23 publications reporting on cross-sectional studies comparing cognition in subjects with LLS and healthy controls, and 19 publications reporting on cognitive changes during longitudinal follow-up. The cross-sectional reports suggest that patients with LLS are most consistently impaired in executive function, visuospatial ability, and verbal fluency. Impairment has less consistently been observed in memory, attention, and working memory. Longitudinal studies suggest that patients with LLS start to decline cognitively around the age of 65, and that this decline may first affect visuospatial abilities. However, most of these studies have been conducted in institutionalized patients, rather than the typical ambulatory population. Other limitations include small sample sizes, short follow-up periods, and lack of comprehensive neuropsychological assessments. **CONCLUSIONS:** The existing literature suggests that the nature and course of cognition in LLS is heterogeneous. Larger and longer studies using both comprehensive and specific cognitive assessments are needed to understand the causes and consequences of this heterogeneity.

Rea, J. N., et al. (2015). "Genes and life-style factors in BELFAST nonagenarians: Nature, Nurture and Narrative." *Biogerontology* **16**(5): 587-597.

Understanding how to 'Age Longer and Age Well' is a priority for people personally, for populations globally and for government policy. Nonagenarians are the oldest members of our societies and survivors of their generation. Approximately 10 % of nonagenarians reach 90 years and beyond in good condition and seem to have a combination of both age-span and health-span. But what are the factors which help people reach their ninetieth birthday and beyond in good condition? Are they genetics, as in 'nature', or do they depend on 'nurture' and are related to environment, or are both factors inextricably intertwined within the concept of behavioural genetics? Nonagenarians have rich life experiences that can teach us much about ageing well; they are reservoirs of genetic, life-style and behavioural information which can help dissect out how to live not only longer but better. Personal family history and narrative are powerful tools that help to determine familial traits, beliefs and social behaviours and when used in parallel with new biotechnology methods inform and elaborate causality. Here we present themes and insights from personal narrative enquiry from nonagenarian participants from the Belfast Elderly Longitudinal Free-living Ageing Study (BELFAST) about factors they consider important for

good quality ageing and relate these insights to the emerging genetics and life-style evidence associated with healthy longevity.

Remacha, C., et al. (2016). "Human Disturbance during Early Life Impairs Nestling Growth in Birds Inhabiting a Nature Recreation Area." *PLoS One* **11**(11): e0166748.

Nature recreation conflicts with conservation, but its impacts on wildlife are not fully understood. Where recreation is not regulated, visitors to natural areas may gather in large numbers on weekends and holidays. This may increase variance in fitness in wild populations, if individuals whose critical life cycle stages coincide with periods of high human disturbance are at a disadvantage. We studied nestling development of blue tits (*Cyanistes caeruleus*) in a natural area where recreation activities intensify during weekends and other public holidays at picnic and leisure facilities, but not in the surrounding woods. In nests located near recreation facilities, blue tit nestlings that hatched during holidays developed slowly, and fledged with low body mass and poor body condition. However, nestlings that hatched outside of holidays and weekends in these nest boxes developed normally, eventually attaining similar phenotypes as those hatching in the surrounding woods. Within-brood variance in body mass was also higher in broods that began growing during holidays in disturbed areas. Our results show that early disturbance events may have negative consequences for wild birds if they overlap with critical stages of development, unveiling otherwise cryptic impacts of human activities. These new findings may help managers better regulate nature recreation.

Riemer, S., et al. (2014). "Impulsive for life? The nature of long-term impulsivity in domestic dogs." *Anim Cogn* **17**(3): 815-819.

Individual differences in impulsivity occur at a cognitive and/or behavioural level and are associated with differing life outcomes. However, there is a lack of empirical evidence to support the long-term stability of these characteristics in non-human animals. This study reports on the stability of convergent measures of impulsivity in domestic dogs assessed more than 6 years apart. Measures were (1) owner assessment by means of a questionnaire, the validated 'Dog Impulsivity Assessment Scale' (DIAS) and (2) dogs' performance in a delayed reward choice test. Dogs had 15-min free access to two food dispensers, one dispensing a piece of food immediately, the other dispensing three pieces after a delay, which increased by 1 s every other time the dogs sampled it. Maximum delay reached in this task reflects decision-making, or cognitive impulsivity, whereas the rate of extra presses

on the delayed reward device during the delay can be considered as a measure of motor or behavioural impulsivity. DIAS scores were strongly and significantly correlated across years. The maximum delay reached in the behaviour test was also highly stable, whereas paw-pressing rate was uncorrelated between the years. These results demonstrate that cognitive but not motor impulsivity is highly consistent over time in dogs.

Robert, K. A. and A. M. Bronikowski (2010). "Evolution of senescence in nature: physiological evolution in populations of garter snake with divergent life histories." *Am Nat* **175**(2): 147-159.

Evolutionary theories of aging are linked to life-history theory in that age-specific schedules of reproduction and survival determine the trajectory of age-specific mutation/selection balances across the life span and thus the rate of senescence. This is predicted to manifest at the organismal level in the evolution of energy allocation strategies of investing in somatic maintenance and robust stress responses in less hazardous environments in exchange for energy spent on growth and reproduction. Here we report experiments from long-studied populations of western terrestrial garter snakes (*Thamnophis elegans*) that reside in low and high extrinsic mortality environments, with evolved long and short life spans, respectively. Laboratory common-environment colonies of these two ecotypes were tested for a suite of physiological traits after control and stressed gestations. In offspring derived from control and corticosterone-treated dams, we measured resting metabolism; mitochondrial oxygen consumption, ATP and free radical production rates; and erythrocyte DNA damage and repair ability. We evaluated whether these aging biomarkers mirrored the evolution of life span and whether they were sensitive to stress. Neonates from the long-lived ecotype (1) were smaller, (2) consumed equal amounts of oxygen when corrected for body mass, (3) had DNA that damaged more readily but repaired more efficiently, and (4) had more efficient mitochondria and more efficient cellular antioxidant defenses than short-lived snakes. Many ecotype differences were enhanced in offspring derived from stress-treated dams, which supports the conclusion that nongenetic maternal effects may further impact the cellular stress defenses of offspring. Our findings reveal that physiological evolution underpins reptilian life histories and sheds light on the connectedness between stress response and aging pathways in wild-dwelling organisms.

Schoenle, L. A., et al. (2018). "Understanding Context Dependence in Glucocorticoid-Fitness Relationships: The Role of the Nature of the

Challenge, the Intensity and Frequency of Stressors, and Life History." *Integr Comp Biol* **58**(4): 777-789.

It has been well-established that there is variation in the strength and direction of the relationship between circulating glucocorticoids (GCs) and fitness. When studies demonstrate such variation or the direction of the GC-fitness relationship is unexpected, the results are often attributed to context-dependency. However, descriptors of context can be vague (e.g., "environmental context") and few studies explicitly test how the optimal hypothalamic-pituitary-adrenal (HPA) axis response to stressors varies across specific contexts. Although existing hypotheses create a strong foundation for understanding GC-fitness relationships, many do not provide explicit predictions of how, when, and why the relationships will change. Here, we discuss three broad factors which we expect to shape the relationships between HPA axis activity and fitness metrics: (1) whether the HPA axis-mediated response matches the challenge, (2) the intensity and frequency of challenges, and (3) life history. We also make predictions for how these factors might affect GC-fitness relationships and discuss ways to test these predictions. Observational studies, experimental manipulations of context, and large-scale cross-species comparisons will be critical to understanding the observed variation in GC-fitness relationships.

Sheehan, N. W., et al. (1980). "The nature of the life concept across the life-span." *Int J Aging Hum Dev* **12**(1): 1-13.

In this study of people ranging from six to over sixty-five years of age, a high frequency of animistic responses was found in all ages examined. While a significant age effect was noted in the ability to categorize animate objects accurately, animistic responding was generally unrelated to logical classification ability or to analytic cognitive style. For eleven- to thirteen-year-olds, however, a significant relationship between animism and both cognitive style and classification ability existed. An interpretation of the results which found high levels of animistic thinking beyond adolescence does not support Piagetian theory. Rather, adults may respond animistically because of emotional attachments which they have formed to a certain meaningful physical objects.

Simkin, P. (1992). "Just another day in a woman's life? Part II: Nature and consistency of women's long-term memories of their first birth experiences." *Birth* **19**(2): 64-81.

Twenty women who attended the author's natural childbirth classes between 1968 and 1974 were the informants in this study of long-term memories of their first childbirths. The data from each informant

consisted of 1) a labor and birth questionnaire, including an open-ended account of her labor, written shortly after her baby was born; 2) a similar questionnaire and account written in 1988 and 1989; and 3) a transcribed interview during which her memories and perceptions were discussed and any discrepancies between the questionnaires were explored. The questionnaires were compared for consistency of recall, and the interviews consulted for further clarification. Specific memories were excerpted, compared, classified, tabulated, and summarized. Findings were that, years later, women's memories are generally accurate, and many are strikingly vivid, especially of onset of labor; rupture of the membranes; arrival at the hospital; actions of doctors, nurses, and partners; particular interventions; the birth; and first contact with the baby. Most memory lapses or confusion were minor. Evidence of a halo effect was observed as well.

Skeath, P., et al. (2013). "The nature of life-transforming changes among cancer survivors." *Qual Health Res* **23**(9): 1155-1167.

Some cancer survivors report positive subjective changes they describe as "life transforming." We used a grounded theory approach to identify the content, underlying process, and identifying characteristics of self-defined "life-transforming" changes (LTCs) reported by 9 cancer survivors. To actualize their hopes for improvement, participants used a self-guided process centered on pragmatic action: researching options, gaining experience, and frankly evaluating results. Many participants discovered unanticipated personal abilities and resources, and those became highly useful in coping with other challenges apart from cancer. This made the increased personal abilities and resources "life transforming" rather than being substantially limited to reducing cancer-related problems. The action-oriented features and processes of LTCs seemed to be more fully described by experiential learning theory than by posttraumatic growth and coping. Supportive intervention to facilitate positive change processes could decrease suffering and enhance positive psychosocial and spiritual outcomes for cancer survivors.

Stark, D., et al. (2002). "Anxiety disorders in cancer patients: their nature, associations, and relation to quality of life." *J Clin Oncol* **20**(14): 3137-3148.

PURPOSE: We aimed to estimate the prevalence and types of anxiety disorders diagnosed according to standardized criteria in cancer patients, to compare screening tools in detecting them, and to examine their demographic, oncologic, and psychosocial associations. **METHODS:** In this cross-sectional observational study of 178 subjects with lymphoma,

renal cell carcinoma, malignant melanoma, or plasma cell dyscrasia, we related responses to questionnaires (administered by computer touch-screen) measuring psychological symptoms, quality of life (QOL), and social support to standardized psychiatric interviews and cancer management. RESULTS: Forty-eight percent of subjects reported sufficient anxiety for anxiety disorder to be considered. At subsequent diagnostic interview, 18% fulfilled International Classification of Disorders, 10th Revision criteria for anxiety disorder, including 6% of patients who reported low levels of anxiety by questionnaire. When subjects reported anxiety by questionnaire, if disruptive somatic anxiety was present, this increased the probability of diagnosable anxiety disorder from .31 to .7. The most accurate screening questionnaires were the trait scale of the State-Trait Anxiety Inventory and the Hospital Anxiety and Depression scale. Female sex and negative aspects of social support were associated with anxiety disorder in multivariate analyses. Anxiety disorder was independently associated with a deficit in QOL, particularly insomnia. CONCLUSION: Anxiety symptoms are common in cancer patients. Screening by questionnaire seems to assess anxiety symptoms adequately but discriminates abnormal anxiety inadequately. To improve this, we may need to use criteria such as disruption from anxiety, as illustrated by the impact of anxiety disorders on QOL. There seem to be few oncologic variables that could target screening for anxiety disorders.

Stettler, N. (2007). "Nature and strength of epidemiological evidence for origins of childhood and adulthood obesity in the first year of life." *Int J Obes (Lond)* **31**(7): 1035-1043.

Increased interest in early life origins of chronic disease, a concept often referred to as programming, has resulted in several studies investigating the origins of childhood or adulthood obesity during infancy. Rapid infancy weight gain as a risk factor and breastfeeding as a protective factor for later obesity have been most thoroughly studied. The association between rapid infancy weight gain and later obesity is supported by several observational studies, but not by the two, relatively small, randomized trials. This association is strong, suggests a dose-response effect and has biological plausibility, but is not consistent between study designs. Rapid infancy weight gain as a risk factor for later obesity has been experimentally reproduced in animal models, but not in humans. The protective effect of breastfeeding on obesity is also supported by several observational studies, but randomized trials are not available. Considering the potential for residual confounding factors, current evidence is insufficient to demonstrate origins of

obesity during infancy or to change public health recommendations, but the potential for obesity prevention during infancy is promising.

Subash, A., et al. (2015). "Kaposiform hemangioendothelioma with Kasabach-Merritt phenomenon in a neonate of life- and limb-threatening nature: A case report." *J Indian Assoc Pediatr Surg* **20**(4): 194-196.

Kaposiform hemangioendothelioma involving whole of a leg in a neonate with Kasabach-Merritt phenomenon causing limb and life-threatening situation has not been reported. One such case and its successful management is presented in this case report. Literature review is made.

Sy, A. (2018). "[The medicalization of life: hybrids against the dichotomy Nature/Culture]." *Cien Saude Colet* **23**(5): 1531-1539.

This paper aims to analyze the process of medicalization in current societies, starting from the description of the way in which medicine gradually appropriated various aspects of everyday life that were once part of the life cycle of people. At the theoretical level, we are based on authors such as Descola and Latour, who problematize the dichotomy between Nature and Culture, and propose the need to think from a superior episteme. Methodologically, this theoretical proposal enables an analysis of the medicalization that can illuminate what is hidden in the discourse and biomedical practices: the sociocultural, political and economic processes that are part of these "objects" of Medicine. From this perspective, the presentation of them as scientific facts, objectively isolatable and manipulable by medical science, is in crisis. Thus, our analysis, based on the concept of "quasi-objects" or "hybrids", problematizes such objectification, while providing critical tools to reflect on the medicalization of life in today's societies.

Tabibzadeh, S. (2016). "Nature creates, adapts, protects and sustains life using hydrogen sulfide." *Front Biosci (Landmark Ed)* **21**: 528-560.

Life emerged on Earth in an anaerobic environment, bathed in noxious gases. Among these gases, the role of hydrogen sulfide is significant since this gas, was required as a building block of life, contributed to abiogenic generation of organic compounds that gave rise to life and drove adaptations of life throughout its entire evolutionary path. During evolution, hydrogen sulfide contributed to sustaining life in face of harsh environmental conditions. Modern cells still utilize hydrogen sulfide as a signaling molecule, in pro and anti-inflammatory responses, for acquisition of tolerance against damage, in directing

repair responses, as a source of energy and in modifying their genetic makeup and function to acquire a phenotype reminiscent of early life forms.

Terman, A. K. (1991). "[The nature of and the interrelations between the concepts of "life", "disease" and "aging"]." *Fiziol Zh* **37**(3): 119-127.

An attempt is made to consider disease and aging following from the concepts of the essence of life. The proposed definition of life represents a modified Engels' (1878) definition. Proceeding from the analysis of possible mechanisms of different disturbances in the life process leading to a decreased probability of the organism existence it is concluded that disease develops either as a result of hereditary changes in the genome or due-to disorders in its realization under certain unfavorable conditions. Aging is determined by the properties of the genome itself and develops in connection with age increase.

Thakurta, R. G., et al. (2012). "Nature of sexual dysfunctions in major depressive disorder and its impact on quality of life." *Indian J Psychol Med* **34**(4): 365-370.

BACKGROUND: Adequate sexual expression is an essential part of many human relationships, and may enhance quality of life and provide a sense of physical, psychological, and social well-being. Epidemiological and clinical studies show that depression is associated with impairments of sexual function and satisfaction, even in untreated patients. Most antidepressant drugs have adverse effects on sexual function, but accurate identification of the incidence of treatment-emergent dysfunction has proved troublesome. However, few investigators have reported the base rate for disturbances in sexual desire, arousal, and orgasm or ejaculation in patients with major depressive disorder (MDD) prior to antidepressant treatment. The purpose of this study is to define the frequency of sexual dysfunction (SD) in 60 patients with MDD and examine the relationship between SD and quality of life enjoyment and satisfaction variables. **MATERIALS AND METHODS:** A consecutive series of 24 male and 36 female MDD patients diagnosed by SCID-DSM IV assessment completed a series of psychometric measures including a Sexual Function Questionnaire-Arizona Sexual Experience Scale (ASEX) which asked about change in sexual interest and function as well as quality of life of life enjoyment using QLESQ-SF. **RESULTS:** Over 33.33% of men and 42% of women reported decreased sexual interest. Reduced levels of arousal were more common in both men and women (8-22%) than ejaculatory or orgasm difficulties (11-16%). In women, SDs were more than males. Quality of life was more impaired in sample with SDs

than those without dysfunction showing significant impact of SD on quality of life. **LIMITATION AND CONCLUSION:** Although limited by a relatively small sample of drug-free patients with MDD, and by the absence of a non-depressed comparison sample, these results emphasize the importance of factors beyond specific drug effects in the assessment of SD in drug naive-depressed patients.

Theunissen, B. (1993). "[Nature study and happiness in life: Hugo de Vries, Eli Heimans and Jac. P. Thijssse]." *Gewina* **16**(4): 287-307.

This article analyses the backgrounds of Hugo de Vries' stance with regard to the Dutch nature study movement, which rapidly gained momentum in the 1890s. The movement has received little attention from historians until now. A short exposition of its aims and intentions, as envisioned by its main protagonists, Heimans and Thijssse, is provided. It is shown that De Vries' scientific ideas on the improvability of the human species and his liberal social views led him to conclude that both socialism and right-wing 'laissez-faire' ideologies were scientifically unsound. Hereditary theory implied that the human races were genetically stable entities which could not be improved by selection of any kind. The progress of society could only be furthered by placing the emphasis on the individual and its cognitive and social development. According to de Vries, the study of nature provided an excellent means to this end, since it contributed to the individual's personal development as well as to its happiness.

Thorpe, C. and B. Jacobson (2013). "Life politics, nature and the state: Giddens' sociological theory and The Politics of Climate Change." *Br J Sociol* **64**(1): 99-122.

Anthony Giddens' *The Politics of Climate Change* represents a significant shift in the way in which he addresses ecological politics. In this book, he rejects the relevance of environmentalism and demarcates climate-change policy from life politics. Giddens addresses climate change in the technocratic mode of simple rather than reflexive modernization. However, Giddens' earlier sociological theory provides the basis for a more reflexive understanding of climate change. Climate change instantiates how, in high modernity, the existential contradiction of the human relationship with nature returns in new form, expressed in life politics and entangled with the structural contradictions of the capitalist state. The interlinking of existential and structural contradiction is manifested in the tension between life politics and the capitalist nation-state. This tension is key for understanding the failures so far of policy responses to climate change.

Tillmann, S., et al. (2018). "Children and Nature: Linking Accessibility of Natural Environments and Children's Health-Related Quality of Life." *Int J Environ Res Public Health* **15**(6).

A growing body of research suggests that increasing children's nature interactions can have positive benefits for their health-related quality of life (HRQOL); however, researchers have yet to examine how geographical context influences this relationship. The purpose of this study was to examine individual-level and environmental factors that are associated with HRQOL of children from different geographical contexts. Data were collected for 851 children from 34 elementary schools in Ontario, Canada. The natural environments around each child's home were computed using geospatial analyses in a geographic information system. Natural environment measures were combined with HRQOL and the demographics from child surveys to be used in a series of step-wise linear regression models. These models explored the relationship between children's HRQOL and the natural environment in urban/suburban and rural populations. In addition to important individual-level determinants, the findings revealed that characteristics of the natural environment, including the amount of greenness, park, and water, show significant relationships in the urban/suburban population. Interpersonal variables were the key predictors of HRQOL in the rural population. Where children live influences relationships between nature and HRQOL. These findings have implications for policymakers, health practitioners, educators, and parents in the design and the promotion of nature for children's HRQOL.

Tinyakova, E. (2007). "Fieldwork: man in the system of nature and priority of natural laws in human life." *Coll Antropol* **31**(2): 601-612.

Fieldwork is a branch of inseparable unity of natural and humanitarian sciences; it is aimed at the cultural origin of humanity on the maximum level of its variety. Practically all natural sciences have some space determined by ethnic conscience in nature cognition: ethnodemography, ethnobotany, ethnozoology, etc. Fieldwork guides the research of human culture from the laws of nature. This kind of knowledge is useful to balance human relations with nature and avoid conflicts. Peoples should exchange their wisdom in the dialogue with nature to be more safe. Fieldwork understood as traditional culture only, explaining the variety of ethnoses on our earth, is just the narrow and diachronic level of this branch of knowledge. The cosmological knowledge, where fantasy and not exhausted in its cognition understanding the world of nature are mixed, forms the

source of fieldwork and in many respects explains the direction of knowledge: the man finds himself under the open sky, he is the child of nature. Then as time went on there appeared a gradual transition--first nature was creating the man, then by and by he began turning to answer nature by his activity. Nowadays the man is actively creating nature. There are two levels of fieldwork: the ancient one which deals with the origin of ethnoses and the modern one which explores how contemporary life is determined by ethnic specific traits. Fieldwork is the core of multidisciplinary situation in man's knowledge. It is related to such humanitarian sciences: semiotics, culturology, sociology, history, philosophy, literature, linguistics. In the cycle of natural sciences fieldwork stands close to anthropology, geography, biology, demography. Fieldwork as a science has the two main levels--the "sophy" level and the logos "level". The first one discovers wisdom of human life, the second one is aimed at logical structuring of knowledge, here proceed various classifications of peoples.

Tomita, N. (2000). "[Multimedia (visual collaboration) brings true nature of human life]." *Nihon Geka Gakkai Zasshi* **101**(3): 288-292.

Videoconferencing system, high-quality visual collaboration, is bringing Multimedia into a society. Multimedia, high quality media such as TV broadcast, looks expensive because it requires broadband network with 100-200 Mbps bandwidth or 3,700 analog telephone lines. However, thanks to the existing digital-line called N-ISDN (Narrow Integrated Service Digital Network) and PictureTel's audio/video compression technologies, it becomes far less expensive. N-ISDN provides 128 Kbps bandwidth, over twice wider than analog line. PictureTel's technology instantly compress audio/video signal into 1/1,000 in size. This means, with ISDN and PictureTel technology. Multimedia is materialized over even single ISDN line. This will allow doctor to remotely meet face-to-face with a medical specialist or patients to interview, conduct physical examinations, review records, and prescribe treatments. Bonding multiple ISDN lines will further improve video quality that enables remote surgery. Surgeon can perform an operation on internal organ by projecting motion video from Endoscope's CCD camera to large display monitor. Also, PictureTel provides advanced technologies of eliminating background noise generated by surgical knives or scalpels during surgery. This will allow sound of the breath or heartbeat be clearly transmitted to the remote site. Thus, Multimedia eliminates the barrier of distance, enabling people to be just at home, to be anywhere in the world, to undergo up-to-date medical treatment by expertise. This will reduce medical cost and allow

people to live in the suburbs, in less pollution, closer to the nature. People will foster more open and collaborative environment by participating in local activities. Such community-oriented life-style will atone for mass consumption, materialistic economy in the past, then bring true happiness and welfare into our life after all.

Vagharseyyedin, S. A., et al. (2011). "The nature nursing quality of work life: an integrative review of literature." *West J Nurs Res* **33**(6): 786-804.

Studies that have examined the nursing quality of work life (QWL) have not been systematically reviewed in the recent years. Thus, the current study was aimed to identify the predictors of the nurses' QWL and determine the definitions of QWL for nurses. The authors used an integrative review of the literature and identified six themes as the major predictors of the nurses' QWL: leadership and management style/decision-making latitude, shift working, salary and fringe benefits, relationship with colleagues, demographic characteristics, and workload/job strain. Although different researchers had varied perspectives on the QWL in nursing, most viewed QWL as a subjective phenomenon that is influenced by personal feeling and perceptions. A closer review of definitions of QWL indicated that some authors considered QWL as an "outcome," whereas others saw it as a "process." Further research needs to be conducted to determine the relative importance of QWL predictors, and implementation programs to improve the QWL.

Veenhoven, R. (2010). "Life is Getting Better: Societal Evolution and Fit with Human Nature." *Soc Indic Res* **97**(1): 105-122.

Human society has changed much over the last centuries and this process of 'modernization' has profoundly affected the lives of individuals; currently we live quite different lives from those forefathers lived only five generations ago. There is difference of opinion as to whether we live better now than before and consequently there is also disagreement as to whether we should continue modernizing or rather try to slow the process down. Quality-of-life in a society can be measured by how long and happy its inhabitants live. Using these indicators I assess whether societal modernization has made life better or worse. Firstly I examine findings of present day survey research. I start with a cross-sectional analysis of 143 nations in the years 2000-2008 and find that people live longer and happier in today's most modern societies. Secondly I examine trends in modern nations over the last decade and find that happiness and longevity have increased in most cases. Thirdly I consider the long-term and review findings from

historical anthropology, which show that we lived better in the early hunter-gatherer society than in the later agrarian society. Together these data suggest that societal evolution has worked out differently for the quality of human life, first negatively, in the change from a hunter-gatherer existence to agriculture, and next positively, in the more recent transformation from an agrarian to an industrial society. We live now longer and happier than ever before.

Verboom, G. A., et al. (2004). "Testing the adaptive nature of radiation: growth form and life history divergence in the African grass genus *Ehrharta* (Poaceae: Ehrhartoideae)." *Am J Bot* **91**(9): 1364-1370.

In most documented examples of adaptive radiation, the processes underlying divergence in form and function are poorly explored and remain speculative. Here, data from a comparative seedling growth experiment are used to explore growth form divergence in *Ehrharta*, a group of grasses that radiated in seasonally arid environments of the Cape region of South Africa. Seedlings of eight *Ehrharta* species of variable growth form were grown in liquid culture under conditions of high resource availability for 56 d, during which time changes in dry mass, allocation, and leaf parameters were measured. The results of this experiment reveal the existence of distinct seedling growth patterns that are associated with differences in adult plant form and seasonal drought survival strategy. Specifically, species that utilize a reseeding strategy have higher seedling growth rates and flower earlier than species that persist by vegetative means. A correlation between species' growth rates and their native substrates suggests that edaphic heterogeneity has been central in directing the evolution of alternative persistence strategies and growth forms. Parsimony reconstruction identifies slow growth and an association with nutrient-deficient sandstone-derived soils as ancestral in *Ehrharta*, with fast growth evolving after a transition to richer shale- and granite-derived soils. The emergence of annual species in two fast-growth lineages suggests that the latter is a key step in the evolution of an ephemeral strategy. An association between plant function and habitat identifies the radiation of *Ehrharta* as adaptive.

Veronese, A. M., et al. (2012). "[Life risk and nature of SAMU: users' perspectives and implications for nursing]." *Rev Gaucha Enferm* **33**(4): 142-148.

The article is part of a qualitative study analysis developed in 2009 aiming at investigating the demand of emergency calls to the Emergency Mobile Attendance Service/Porto Alegre (SAMU) that classifies it as non-pertinent. The information was gathered from 16 semi-structured interviews with the

subjects of that demand by utilizing as a methodological guideline the Grounded Theory. The article approaches the content of the sub-category "Entering into conflict with SAMU regulation in the evaluation of life-threatening", by focusing the divergences between the regulation and the users' perception about the operation of the service and the meaning of "life-threatening", factors implied in the construction of the non-pertinent demand. The importance of Nursing within this scenery is in its competence to perform education actions about first aid and to participate in projects among sectors which are able to intervene in situations that generate vulnerability.

Vincent, M. (2012). "Cancer: a de-repression of a default survival program common to all cells?: a life-history perspective on the nature of cancer." *Bioessays* **34**(1): 72-82.

Cancer viewed as a programmed, evolutionarily conserved life-form, rather than just a random series of disease-causing mutations, answers the rarely asked question of what the cancer cell is for, provides meaning for its otherwise mysterious suite of attributes, and encourages a different type of thinking about treatment. The broad but consistent spectrum of traits, well-recognized in all aggressive cancers, group naturally into three categories: taxonomy ("phylogenation"), atavism ("re-primitivization") and robustness ("adaptive resilience"). The parsimonious explanation is not convergent evolution, but the release of an highly conserved survival program, honed by the exigencies of the Pre-Cambrian, to which the cancer cell seems better adapted; and which is recreated within, and at great cost to, its host. Central to this program is the Warburg Effect, whose malign influence permeates well beyond aerobic glycolysis to include biomass interconversion and genomic heuristics. Warburg-type metabolism and genomic instability are targets whose therapeutic disablement is a major priority.

Viswanathan, H., et al. (2005). "Nature and correlates of SF-12 physical and mental quality of life components among low-income HIV adults using an HIV service center." *Qual Life Res* **14**(4): 935-944.

OBJECTIVES: This study describes health-related quality of life (HRQOL) among low-income HIV adults using an HIV service center, compares participants' scores to US published norms for the general population and persons with chronic conditions, and examines relationships between patient characteristics, nonadherence, and HRQOL. **METHODS:** A cross-sectional survey of individuals on antiretroviral therapy was conducted. The Medical Outcomes Study SF-12 was used to assess HRQOL.

Medication nonadherence was assessed using the 9-item Morisky Adherence Scale. Data also were collected on social support, CD4 cell count, and time since diagnosis. **RESULTS:** Approximately 84% of the 86 participants were male, 50% were white, and 39% were black. The mean +/- SD Physical component summary (PCS-12) score of 41.0 +/- 12.5 and Mental component summary (MCS-12) score of 41.9 +/- 11.0 were lower than US general population norms ($p < 0.001$). PCS-12 scores were similar to those of patients with other chronic conditions. Respondents reported lower MCS-12 scores than patients with hypertension and diabetes ($p < 0.006$). Employment and higher social support had positive associations with PCS-12 scores and nonadherence had a negative association with MCS-12 scores ($p < 0.05$). **CONCLUSIONS:** HRQOL in this sample of low-income HIV adults was comparable to other HIV populations. Identifying strategies for increasing social support and medication adherence for economically disadvantaged persons with HIV/ AIDS may improve their HRQOL.

Wagner, J., et al. (2013). "The nature and correlates of self-esteem trajectories in late life." *J Pers Soc Psychol* **105**(1): 139-153.

Is it possible to maintain a positive perspective on the self into very old age? Empirical research so far is rather inconclusive, with some studies reporting substantial declines in self-esteem late in life, whereas others report relative stability into old age. In this article, we examine long-term change trajectories in self-esteem in old age and very old age and link them to key correlates in the health, cognitive, self-regulatory, and social domains. To do so, we estimated growth curve models over chronological age and time-to-death using 18-year longitudinal data from the Australian Longitudinal Study of Ageing (N = 1,215; age 65-103 years at first occasion; M = 78.8 years, SD = 5.9; women: 45% of sample). Results revealed that self-esteem was, on average, fairly stable with minor declines only emerging in advanced ages and at the very end of life. Examination of the vast between-person differences revealed that lower cognitive abilities and lower perceived control independently related to lower self-esteem. Also, lower cognitive abilities were associated with steeper age-related and mortality-related self-esteem decrements. In our discussion, we consider a variety of challenges that potentially shape self-esteem late in life and highlight the need for more mechanism-oriented research to better understand the pathways underlying stability and change in self-esteem.

Wang, M., et al. (2010). "Examining the factor structure and hierarchical nature of the quality of life

construct." *Am J Intellect Dev Disabil* **115**(3): 218-233.

There is considerable debate in the area of individual quality of life research regarding the factor structure and hierarchical nature of the quality of life construct. Our purpose in this study was to test via structural equation modeling an a priori quality of life model consisting of eight first-order factors and one second-order factor. Data were collected from 769 individuals with mild or moderate intellectual disability from 15 countries in four geographic regions. They all completed a multidimensional quality of life questionnaire. The presence of a single second-order factor in quality of life was empirically demonstrated through confirmatory factor analysis. Comparison of two alternative second-order quality of life factor models was further evaluated. Implications for future research, practice, and public policy regarding services to individuals with intellectual disability are also discussed.

Weaver, I. C. (2014). "Integrating early life experience, gene expression, brain development, and emergent phenotypes: unraveling the thread of nature via nurture." *Adv Genet* **86**: 277-307.

Adaptation to environmental changes is based on the perpetual generation of new phenotypes. Modern biology has focused on the role of epigenetic mechanisms in facilitating the adaptation of organisms to changing environments through alterations in gene expression. Inherited and/or acquired epigenetic factors are relatively stable and have regulatory roles in numerous genomic activities that translate into phenotypic outcomes. Evidence that dietary and pharmacological interventions have the potential to reverse environment-induced modification of epigenetic states (e.g., early life experience, nutrition, medication, infection) has provided an additional stimulus for understanding the biological basis of individual differences in cognitive abilities and disorders of the brain. It has been suggested that accurate quantification of the relative contribution of heritable genetic and epigenetic variation is essential for understanding phenotypic divergence and adaptation in changing environments, a process requiring stable modulation of gene expression. The main challenge for epigenetics in psychology and psychiatry is to determine how experiences and environmental cues, including the nature of our nurture, influence the expression of neuronal genes to produce long-term individual differences in behavior, cognition, personality, and mental health. To this end, focusing on DNA and histone modifications and their initiators, mediators and readers may provide new inroads for understanding the molecular basis of phenotypic plasticity and disorders of the brain. In this

chapter, we review recent discoveries highlighting epigenetic aspects of normal brain development and mental illness, as well as discuss some future directions in the field of behavioral epigenetics.

Wei, G., et al. (2016). "Protein Ensembles: How Does Nature Harness Thermodynamic Fluctuations for Life? The Diverse Functional Roles of Conformational Ensembles in the Cell." *Chem Rev* **116**(11): 6516-6551.

All soluble proteins populate conformational ensembles that together constitute the native state. Their fluctuations in water are intrinsic thermodynamic phenomena, and the distributions of the states on the energy landscape are determined by statistical thermodynamics; however, they are optimized to perform their biological functions. In this review we briefly describe advances in free energy landscape studies of protein conformational ensembles. Experimental (nuclear magnetic resonance, small-angle X-ray scattering, single-molecule spectroscopy, and cryo-electron microscopy) and computational (replica-exchange molecular dynamics, metadynamics, and Markov state models) approaches have made great progress in recent years. These address the challenging characterization of the highly flexible and heterogeneous protein ensembles. We focus on structural aspects of protein conformational distributions, from collective motions of single- and multi-domain proteins, intrinsically disordered proteins, to multiprotein complexes. Importantly, we highlight recent studies that illustrate functional adjustment of protein conformational ensembles in the crowded cellular environment. We center on the role of the ensemble in recognition of small- and macromolecules (protein and RNA/DNA) and emphasize emerging concepts of protein dynamics in enzyme catalysis. Overall, protein ensembles link fundamental physicochemical principles and protein behavior and the cellular network and its regulation.

Williams, R. J. (2002). "The fundamental nature of life as a chemical system: the part played by inorganic elements." *J Inorg Biochem* **88**(3-4): 241-250.

In this article we show why inorganic metal elements from the environment were an essential part of the origin of living aqueous systems of chemicals in flow. Unavoidably such systems have many closely fixed parameters, related to thermodynamic binding constants, for the interaction of the essential exchangeable inorganic metal elements with both inorganic and organic non-metal materials. The binding constants give rise to fixed free metal ion concentration profiles for different metal ions and ligands in the cytoplasm of all cells closely related to

the Irving-Williams series. The amounts of bound elements depend on the organic molecules present as well as these free ion concentrations. This system must have predated coding which is probably only essential for reproductive life. Later evolution in changing chemical environments became based on the development of extra cytoplasmic compartments containing quite different energised free (and bound) element contents but in feed-back communication with the central primitive cytoplasm which changed little. Hence species multiplied late in evolution in large part due to the coupling with the altered inorganic environment.

Williamson, D. E., et al. (1998). "Nature of life events and difficulties in depressed adolescents." *J Am Acad Child Adolesc Psychiatry* 37(10): 1049-1057.

OBJECTIVE: To examine the significance of acute life events and ongoing difficulties in adolescents with a recent major depressive disorder. **METHOD:** Adolescents (aged 13-18 years) with a recent episode of major depressive disorder based on DSM-III-R (n = 26) and normal controls free of any Axis I lifetime psychiatric disorder (n = 15) were assessed using the investigator-based Life Events and Difficulties Schedule (LEDS). **RESULTS:** Traditionally defined severe events were more likely to occur in the year prior to onset among depressed adolescents (46%) than in a comparable period among normal controls (20%), but these differences did not reach statistical significance. Expanding the definition of severe events to include those events focused on others important to the adolescent resulted in a significantly higher percentage of depressed adolescents having one or more refined "severe" events in the year prior to onset (62%) compared with normal controls (27%) ($p < 0.02$). It is interesting that one half of the depressed adolescents had two or more refined severe events occur during the year prior to onset compared with none of the normal controls ($p < 0.01$). Further analyses showed that depressed adolescents were significantly more likely to have a major difficulty precede the onset of their depression (27%) compared with normal controls (0%) ($p < 0.04$). **CONCLUSIONS:** The results suggest that depressed adolescents are exposed to high levels of stress prior to becoming depressed. Future investigations might benefit from using the LEDS with adolescents to assess acute and ongoing stressors.

Wong, C. K., et al. (2012). "The impact of work nature, lifestyle, and obesity on health-related quality of life in Chinese professional drivers." *J Occup Environ Med* 54(8): 989-994.

OBJECTIVE: To assess the association of work nature, lifestyle and obesity with health-related quality

of life (HRQOL) in professional drivers. **METHODS:** A total of 3376 Chinese professional drivers aged 18 to 70 years were recruited to assess the HRQOL by SF-12 summary scores (Physical Component Summary [PCS]; Mental Component Summary [MCS]), and collect data for work nature, lifestyle, and body mass index. Factors associated with HRQOL were examined by multiphase regression analyses. **RESULTS:** Professional drivers reported poorer physical and mental HRQOL than the general population. Shift work and lorry driving had significant negative effect on HRQOL. Obesity was associated with lower PCS but higher MCS. **CONCLUSIONS:** HRQOL of professional drivers tended to be low, especially among lorry drivers and shift drivers. Health intervention programs should promote regular exercise, healthy eating, no smoking, and weight control, which are modifiable factors improving HRQOL.

Wood, C. J. and N. Smyth (2019). "The health impact of nature exposure and green exercise across the life course: a pilot study." *Int J Environ Health Res*: 1-10.

BACKGROUND: Both nature exposure and green exercise (GE) provide numerous health benefits. However, there are no studies examining the impact of childhood GE on adult health. **METHODS:** 45 healthy adults (aged 69.8 +/- 8.4 years) took part in the study, wearing a Firstbeat heart rate variability (HRV) monitor for 24 hours. Participants also completed questionnaires assessing childhood and adulthood nature exposure and GE, as well as current connectedness to nature (CN), perceived stress and well-being. Pearson's correlations and linear regression were used to examine relationships between variables. **RESULTS:** Childhood nature exposure and GE significantly predicted adult nature exposure and GE (beta=0.317, $p < 0.05$) as well as CN (beta = 0.831, $p < 0.01$). After controlling for childhood nature exposure and GE, CN was negatively associated with the percentage of stress over the 24-hour period ($r = -0.363$; $p < 0.05$) and positively associated with HRV during sleep ($r = 0.415$; $p < 0.05$). **CONCLUSIONS:** CN is important for adult health; however childhood nature exposure and GE are essential to developing this connection.

Yamamoto, D. and S. Kohatsu (2017). "What does the fruitless gene tell us about nature vs. nurture in the sex life of *Drosophila*?" *Fly (Austin)* 11(2): 139-147.

The fruitless (*fru*) gene in *Drosophila* has been proposed to play a master regulator role in the formation of neural circuitries for male courtship behavior, which is typically considered to be an innate

behavior composed of a fixed action pattern as generated by the central pattern generator. However, recent studies have shed light on experience-dependent changes and sensory-input-guided plasticity in courtship behavior. For example, enhanced male-male courtship, a fru mutant "hallmark," disappears when fru-mutant males are raised in isolation. The fact that neural fru expression is induced by neural activities in the adult invites the supposition that Fru as a chromatin regulator mediates experience-dependent epigenetic modification, which underlies the neural and behavioral plasticity.

Zeledon, R., et al. (2010). "Life cycle of *Triatoma ryckmani* (Hemiptera: Reduviidae) in the laboratory, feeding patterns in nature and experimental infection with *Trypanosoma cruzi*." Mem Inst Oswaldo Cruz **105**(1): 99-102.

A cohort initiated with 121 eggs, yielding 105 first instar nymphs (eclosion rate: 86.78%), allowed us to observe the entire life cycle of *Triatoma ryckmani* under laboratory conditions (24 degrees C and 62% relative humidity), by feeding them on anesthetized hamsters. It was possible to obtain 62 adults and the cycle from egg to adult took a mean of 359.69 days with a range of 176-529 days (mortality rate of nymphs: 40.95%). Mean life span of adults was of 81 days for females and 148 days for males. The developmental periods of 4th and 5th nymphs were longer than those of the other instars. This suggests that young siblings have a better chance of taking a hemolymph meal from older ones, in order to survive during fasting periods during prolonged absences of vertebrate hosts from natural ecotopes. The stomach contents of 37 insects showed blood from rodents (15 cases), lizards (7 cases), birds (6 cases) and insect hemolymph (7 cases). Out of 10 insects fed by xenodiagnosis on a *Trypanosoma cruzi* infected mouse, all but one became infected with the parasite.

Zinner, D. E., et al. (2016). "The Changing Nature of Scientific Sharing and Withholding in Academic Life Sciences Research: Trends From National Surveys in 2000 and 2013." Acad Med **91**(3): 433-440.

PURPOSE: Since 2000, federal funders and many journals have established policies requiring more open sharing of data and materials post-publication, primarily through online supplements and third-party repositories. This study examined changes in sharing and withholding practices among academic life scientists, particularly geneticists, between 2000 and 2013. **METHOD:** In 2000 and 2013, the authors surveyed separate samples of 3,000 academic life scientists at the 100 U.S. universities receiving the most National Institutes of Health funding.

Respondents were asked to estimate the number of requests for information, data, and materials they made to and received from other academic researchers in the past three years. They were also asked about potential consequences of sharing and withholding. **RESULTS:** Response rates were 63.9% (1,849/2,893) in 2000 and 40.8% (1,165/2,853) in 2013. Proportions of faculty in 2000 and 2013 who received, denied, made, or were denied at least one request were not statistically different. However, the total volume of requests received from or made to other scientists dropped substantially (19.4 received in 2000 versus 10.8 in 2013, $P < .001$; 8.4 made in 2000 versus 6.6 in 2013, $P < .001$). Faculty in 2013 also made an average of 8.4 requests to third-party repositories. Researchers in 2013 were less likely to report sharing resulted in new research or collaborations. **CONCLUSIONS:** The results show a dramatic shift in sharing mechanisms, away from a peer-to-peer sharing model toward one based on central repositories. This may increase efficiency, but collaborations may suffer if personal communication among scientists is deemphasized.

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11/21/2020