

Paper 4 of 5

The teem theory of macroevolution

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KEYWORDS

Emotions, Environment, Innate behaviour, Natural selection, Organic evolution, Instinct, Speciation, Teemosis, Teems, Transduction.

ABSTRACT

While the teemosis evolutionary process initially emerged at the basal Cambrian to generate innate behaviour, here it is argued teemosis additionally enables natural selection to create morphological complexity and speciation otherwise unattainable by natural selection alone. It is argued teemosis precipitated natural selection, sexual selection and sexual dimorphism, and that emotion based teemic biosystems established the physiological infrastructure and precedents from which cerebral biosystems emerged - including declarative memory, cerebral learning, attention, perception (including vision,) motivation, cognition, communication and language. It is concluded that the rapid expansion of complex innate behaviour, macroevolution, speciation, and morphological complexity engendered by teemosis is evident in the fossil record as The Cambrian Explosion.

INTRODUCTION

John Maynard Smith wrote that “only two theories of evolution have ever been put forward: one, originating with Lamarck... the other, originating with Darwin.”¹

Vendramini, (2005)² has proposed a third theory – teemosis, that uses emotion as an intergenerational informational medium. Teemosis emerged from selective pressures for inheritable adaptive behaviours at the basal Cambrian.³ To circumvent the deleterious consequences of inheriting environmentally acquired characteristics, the teemosis process does not moderate exon genes and therefore avoids phenotypic modification of physical traits. However, the author is also of the opinion that teemosis is additionally influential in the evolution of physical characteristics in all teemic taxa. It is suggested this influence is manifest in eight principal ways.

1 Teemosis ‘invents’ natural selection

Since Darwin, natural selection (NS) has been considered a universal evolutionary constant, consistently, methodically and gradualistically ‘producing’ evolution since life first emerged on Earth. Teem theory challenges this view – asserting that NS has only produced biological complexity and diversity for 543 million years – a period corresponding to the emergence of the teemosis evolutionary process. This hypothesis is in part supported by the fossil record of the first 3.2 billion years of life on earth - a record that indicates that NS produced punctuated phyletic gradualism, interspersed by attenuated periods of morphological stasis.

Several reasons have been posited for this,⁴ – the lack of mutational ‘direction,’ the homogeneous abiotic environment of the Precambrian, and the failure of instincts to emerge in any systematic form being prominent among them. Without a methodology for creating instincts, predation and the hierarchy of the food chain could not systematically emerge – a supposition supported by the Precambrian stratigraphy that reveals only defenceless, soft bodied organisms, devoid of body armour and offensive weaponry.^{5, 6, 7, 8, 9} Equally factorial, because sexual reproduction throughout the Precambrian was mediated exclusively by behaviourally deficient genome resident reflex actions, (Darwinian instincts,) mate preference and selection were randomised throughout a population. This predicts that sexual selection was not an evolutionary factor throughout the Precambrian.

Without instincts regulating predation, mate selection, foraging, territorial imperatives, defence and agonistic behaviours, systematic intraspecific and interspecific competition did not contribute to natural selection. Without competition, fitness was randomly allocated and therefore displayed a propensity to be adaptively neutral. Moreover, it may be argued that because the Precambrian biota achieved optimal fit relative to their homogeneous aquatic ecosystem, most new mutations would decrease fitness. Therefore the prominent feature of Precambrian NS was the removal of deleterious mutational alleles, a function consistent with both the bradytelic patterns and prevailing stasis evidenced in the Precambrian stratigraphy.

The emergence of teemosis at the basal Cambrian changed the prevailing evolutionary matrix. By initiating acquired innate behavioural systems, teemosis introduced systematic competition between species and conspecifics for the first time. Competition impacted directly on fitness which generated selective pressure – what Mayr (1988) called it - ‘natural selection proper.’ (NSP)¹⁰ It is suggested that when combined with the mutational process, NSP transformed an ineffectual Precambrian evolutionary process into a viable mechanism of evolutionary modification. That is to say, teemosis created the instincts that generated biotic competition that in turn fused the two indispensable steps of the NS process, (production of variables, and selection proper) into a single synergistic synthesis for the first time.

Clearly, the hypothesis does not assert that NS was non-functional throughout the Precambrian, but that the virtual absence of systematic competition during this eon ensured that random mutations were not adaptively assigned and preserved in any systematic manner.

In respect of these speculations, the emergence of natural selection as an effective two step evolutionary process dates from the advent of behavioural competition among species and conspecifics first engendered by the teemosis evolutionary process at the basal Cambrian. Throughout the Phanerozoic, the effectiveness of the NS evolutionary process has been correlated to competition exerted by the biotic and abiotic environment. When competition is intense, as for example during rapid and extreme environmental change, (as described by Grant and Grant¹¹ in relation to drought stricken

finches (*Geospiza fortis*) on the Galapagos Islands, morphological evolution may be dramatic. By contrast, when competition is reduced by homogeneous environmental conditions and the absence of predation, as in the case of the jellyfish (*Mastigias*) population in Jellyfish Lake, Palau, NS functions as an agent of stasis resulting in negligible morphological and behavioural variation.¹²

In conclusion, by creating innate behaviours that foster competition in a diverse range of ecologies, teemosis transformed NS from an agent of stasis and punctuated phyletic gradualism into a robust mechanism of morphological and physiological modification.

2 The evolution of teemic functionality directs natural selection

Once established at the basal Cambrian from a number of disparate pre-adaptations, teemosis was singularly adaptive, so generated unprecedented selective pressures that guided the rapid evolution of teemic components, including sensory organs, CNS receptivity, sensory transduction and vigilance modules, electro-chemical messaging systems and so on. Selection was primarily directed towards increasing the adaptive functionality of individual teemic components, and additionally on developing synchronituous interconnectivity and communication between the components. That is to say, any biological character that contributed to the adaptive functionality of the teemosis evolutionary process was subject to positive selection. As teemosis requires at least six irreducible sequential steps,¹³ each of which involves one or more traits, it may be assumed the evolution of the characters requisite to these steps evolved in synchronism. To demonstrate how teemosis directs the evolution of physical characteristics, the evolution of the vertebrate eye serves as an appropriate example.

The apparent irreducible complexity of the vertebrate eye has remained problematical for evolutionary biology since Darwin (1859) acknowledged that to suppose the eye “could have been formed by natural selection, seems, I freely confess, absurd in the highest degree.”¹⁴ Central to the controversy is what Behe (1996)¹⁵ and others^{16, 17, 18, 19} term ‘irreducible complexity.’ Although sophistically espoused by creationist rhetoric to support a literal interpretation of the Bible, irreducible

complexity, I argue, is a valid schema and consistent with the author's assertion that Precambrian NS could not initiate complex phenotypic modifications or foster large-scale taxonomic radiations.

However, while it is correct that the vertebrate eye is irreducibly complex and cannot see clearly without a striate cortex, variable-focus lens, retina, opsins, cornea with its six layers of tissue, lateral geniculate nucleus, variable diaphragm, geniculostriate projection, etc. and these irreducibly complex components are unlikely to have emerged simultaneously, these considerations, it is argued, do not apply to the Cambrian 'teemic eye.'

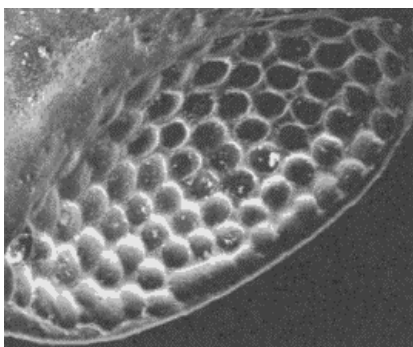
The teemic eye emerged at the basal Cambrian exclusively as an organ of emotional perception. Because emotional vision mediated emotional representations rather than visual images, the Cambrian teemic eye did not require rhodopsin receptor proteins, multiple muscles, a striate cortex or many of the elements normally associated with perspicacious 'cerebral vision.' A cluster of light sensitive cells, (available from photosynthetic biochemistry extant in the Precambrian,) neuronally connected to the CNS is all emotional vision required to functionally transduce a subject into an identifiable emotional precept. Significantly, the acuity of emotional vision is not dependent on optical perspicacity, colour vision or a visual cortex to fabricate and comprehend the image, (a supposition, I have argued elsewhere and that is supported by the phenomenon of 'blindsight,')²⁰ but on the inherent emotionality and transduceability of the perceived subject. The greater the amplitude of emotion generated by a subject, the clearer, faster and more salient will be the transduced emotional precept – a phenomenon indirectly supported by Öhman et al, (2001) who demonstrated a statistically significant number of human subjects detected hidden fear-relevant images (snakes or spiders) in arrays faster than fear-irrelevant images - of flowers or mushrooms.²¹

Thus, the archaic eye-spot and cup eyes of the first metazoans were adaptive in the context of teemosis, and accordingly, their evolution throughout the Cambrian progressed in accordance with the evolutionary requirements of teemosis. That is to say, the evolution of the eye during the Cambrian was not driven by visual acuity, (as the

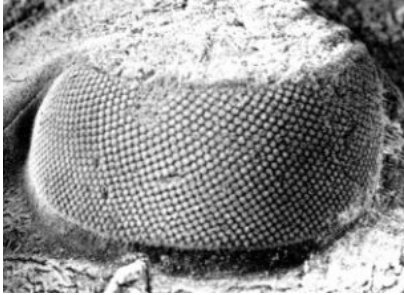
cerebral modules requisite for perspicuous vision were not yet extant,) but by emotional acuity - primarily the need to transduce movement, directionality, speed, size and shape – into emotional Emlanic representations, sufficient to encode a number of predatory, defensive, sexual and other adaptive teems.

Accordingly, because movement and detection were essential to teemosis, among the first functional teemic eyes were compound eyes, which are singularly proficient at detecting movement and directionality. An object moving across the field of vision will activate cells in each of the ommatidia sequentially, providing an emotional sensation of movement, speed and directionality. Additionally, the more cells that are activated, the larger the object.

Significantly, the Cambrian fossil record demonstrates the first trilobites (notably the genus *Fallotaspis* from Morocco,) that appeared abruptly approximately 540 mya featured functional compound eyes.^{22, 23, 24} The abathochroal and holchroal compound eyes of Early Cambrian trilobites (certainly among the first teemic phyla,) were able to detect movement, speed and direction without a visual cortex or other adaptations normally associated with the vertebrate eye. Equipped with the simple teemic eye, trilobites, had the capacity to utilise emotional vision to differentiate blurred moving black and white shadows as prey, predators, rivals and prospective mates and encode a number of adaptive teems based on these emotional perceptions.



Abathochroal trilobite eye, from Zhang & Clarkson, 1990²⁵



Holochroal trilobite eye, from Clarkson, 1975.²⁶

Emotional perception provides the teemic sensory organ with an adaptive function. It is this function that differentiates teemic evolution from random mutational aspects of NS. Without the directionality imposed by an adaptive trait in development, NS remains undirected, lethargic and inefficient. When guided by teemosis towards a specific adaptive goal, either teemic functionality or a specific teemic behaviour, NS becomes a more effectual evolutionary mechanism.

The teemic eye and transduction hypotheses refute the premise that only irreducibly complex ‘seeing eyes’ are adaptive. The morphological simplicity of teemic eyes - indeed, all teemic sensory organs from the Cambrian, were achievable by NS utilising existing pre-adaptations. Significantly however, by ‘inventing’ sensory organs, teemic sensory modalities established the precedents that would guide the phylogenetic evolution of sensory receptors for the next half billion years. Although emotional transduction is not dependent on visual acuity, it is nevertheless improved by visual acuity, and this correlation generated selective pressure for increased visual perspicacity. This guided the evolution of cerebral visual processing modules that effected the supplementation of emotional vision with cerebral vision. Thus, it may be argued that the seeing vertebrate eye emerged by coopting emotional vision preadaptations devised by teemosis to a new purpose – cerebral vision.

3 Teemic biosystems facilitate the emergence of cerebral biosystems

In addition to the individual physiological organs such as sensory organs, amygdala, neurons and neuropeptides that contribute to teemosis, a number of major teemic informational ‘biosystems’ may also be identified, each of which emerged as a ‘metafunctional component’ of the teemosis process. As inheritable informational

components, these adaptive biosystems are axiomatically all configured from emotion. They include emotions, emotional memory, emotional attention, emotional motivation, emotional cognition (perception and judgement), emotional learning (or conditioning,) emotional communication, (primarily subliminal,) and emotional perception, (emotional vision, taste, etc.)

These teemic biosystems, have been indispensable to teemic functionality since the basal Cambrian, and remain so in all teemic taxa. However, these teemic biosystems also exerted a cumulative influence on brain evolution by providing the morphological infrastructure and evolutionary precedents that guided the evolution of duplicate cerebral versions of these biosystems. In this way, teemosis presaged the next great biological revolution – *cerebral biosystems*.¹

This is the ‘teemic precedent hypothesis’ and it argues that NS was, by itself, unable to achieve the irreducible complexity required to initiate functional cerebral modules such as cognition, declarative memory, imagination, consciousness, cerebral learning, cerebral attention and other cortical processes - a supposition supported by biostratigraphic data that confirms complex brains did not emerge throughout the first 3.2 billion years of evolution by means of NS.

It is proposed that once teemic biosystems dispersed as part of the teemic radiation at the basal Cambrian, they contributed to the adaptive landscape and fostered taxa vagility into increasingly marginal, complex and challenging biotic and abiotic environments. In the next 50 – 100 million years, selective pressures were exerted for more adaptive information – to foster increasingly complex teems and emotional learning. However, as teemosis only applies to information transducible into Emlan, teemic informational deficits, including *how*, *why*, *when* and *precisely where* increasingly frustrated teemic complexification and expansion. The rise of fishes, amphibians and the ecological transition to terrestrial environments further highlighted

¹ By ‘cerebral’ I infer that which is pertaining specifically to the brain as it evolved from the CNS. I use the term in a general sense – primarily to distinguish the sophisticated neural networks and circuits that evolved from the teemosis process.

the maladaptation of teemic informational deficits. This generated puissant selective pressures for new biosystems that could provide adaptive nonemotional information - information to compliment emotionally configured information modulated by teemosis.

Consistent with the observation that nature ‘tinkers’ with existing systems rather than creates wholly new ones, the pre-existing biological infrastructure and morphology of teemic biosystems guided the gradualistic evolution of numerous nonemotional ‘cerebral’ versions of extant teemic biosystems. That is to say, as each teemic biosystem emerged, it provided the evolutionary precedent, and some of the morphological modules that NS could then adopt, duplicate, refine and redesign to create complimentary systems (utilising newer cerebral circuitry,) that overcame the informational deficits inherent in the original teemic biosystems.

Thus emotional memory, a core teemic biosystem provided the precedent and a number of morphic traits that precipitated the evolution of cerebral memories, including declarative or implicit, procedural, short and long term – memory systems specifically attuned to archiving and recalling nonemotional information – the kind of data that teemic memory is blind to.

Logic circuits emerged to process information in a manner diametrically opposed to emotions and to temper and control maladaptive teemic emotions. Similarly, the emotional perception paradigm argues that sensory organs first emerged exclusively as emotional organs but once established, these simple modalities provided the evolutionary precedents and physical infrastructure for the emergence of cerebral processing modules and cerebral compatible sensory receptors that distinguish modern perception. In each instance, the degree of duplication or transition to a cerebral modality was moderated exclusively by issues of fitness relative to each specific species.

Emotional attention, utilised by the teemic monitory system to maintain vigilance for teemic repeats, (which are all exclusively emotionally transduced precepts,) is incapable of providing attention for nonemotional circumstances. When these deficits began to impact on fitness, it may be supposed they generated selective pressure that

guided the emergence of cerebral attention modules in higher taxa, (based on pre-existing teemic attention modules,) which facilitated attention for nontransduceable subjects and situations. While cerebral attention is generally of short duration compared to emotional attention, it does nevertheless fulfil an important adaptive niche. In humans, typically, cerebral attention is utilised to maintain attention in circumstances where emotional attention displays a functional deficit – for example, in relation to boring or repetitive tasks, or where emotional interest is low or eroded by habituation.

Collectively, the evolution of the morphological modules associated with cerebral biosystems, and their interconnections with pre-existing teemic biosystems contributed significantly to the evolution of the brain. The precedent hypothesis proposes the brain is thus evolved vis-a-vis an evolutionary ratchet mechanism initiated by teemosis which created an intermediately level of morphological complexification. Without this two-step evolutionary path, NS would have been unable to achieve the complexification that neurological functioning requires. Symbiotically however, the synchronic relationship between teemosis and NS achieved the incremental complexification of arguable the most complex system in the known universe.

Today, all higher taxa display what may be called ‘teemic-cerebral biosystems,’ a term that suggests the hybrid synchronic nature of these evolutionary adaptations. Significantly, the transition from teemic biosystems to teemic-cerebral hybrid biosystems occurred because hybrid biosystems proved more adaptive in complex ecologies.

4 Teemic behaviour directs morphology and physiology

The premise that physiological, morphological and ecological evolution are influenced by behaviour has been posited by Lamarck,²⁷ Darwin,²⁸ Schmalhausen,²⁹ Mayr³⁰ and Waddington.³¹ However, since Mayr (1963) noted a “shift into a new niche or adaptive zone, is almost without exception, initiated by a change in behavior,”³² the schema that behaviour is an important causal ‘pacemaker’ driving organic evolution has been widely acknowledged.^{33 34 35 36 37 38 39}

However, as Plotkin (1988)⁴⁰ points out, Mayr's assertion, that "the importance of behavior in initiating new evolutionary events is self-evident,"⁴¹ stands in stark contrast to the lack of subsequent discussion on this important topic. Plotkin suggests this incongruity "expresses the absence of an adequate conceptual framework from which to examine the role of behavior in evolution. It is one thing to say that the importance of behavior is self-evident, and quite another formally to incorporate the behavior of phenotypes into a theory of evolution."⁴²

At issue is what Piaget (1979)⁴³ considered to be an insoluble problem for the NeoDarwinian paradigm – why morphology is invariably accompanied by apposite behaviour. For instance, Ho (1998) asserts it "stretches credulity to imagine that the woodpecker first got a long beak from some random mutations followed by other random mutations that made it go in search of grubs in the bark of trees. The only explanation for this coincidence of form and behavior in the execution of function is that the two must have evolved together through the organism's experience of the environment."⁴⁴

The failure to integrate behaviour into a holistic theory of organic evolution, the inability to explain the morphology-behavior nexus and the general neglect of the 'feedback' between behaviour and evolution in present day evolutionary theory, (Waddington 1975)⁴⁵ is inevitable without a cogent new theory of innate behaviour.

Teem theory, by explicating the biotic mechanisms by which new innate behaviour is promulgated and distributed, provides a conceptual framework by which the morphology-behaviour matrix may be understood. It asserts that new innate behaviour is created by teems and that once encoded, each teem has the potential to inform the selection of new mutational alleles, (in addition to regulating the expression, packaging and cytosine methylation of existing alleles,) that contribute to the adaptive functionality of the teem. Teems do not create mutations, but the competitive behavioural advantage they confer on organisms frequently determines which mutations are retained and which are exorcised. To demonstrate how teemic behaviours drive organic evolution, two hypothetical examples are cited.

Consider a drought stricken famished herbivorous mammal stumbling across a termite mound. Driven by starvation to extend its diet, the herbivore manages to extract a few termites from the mound and is overwhelmed by the taste of the termites and restorative nutrients the meal provides. The positive trauma of this lifesaving meal may well encode a ‘termite teem’ that encodes the emotions of hunger, interest, surprise, gastronomic delight, relief, satiation and taste, along with the transduced sensory cues identifying the mound and termites into a single teem.

If the aggregate emotions of the new termite teem are more powerful than the emotions engendered by its pre-existing ‘grass-eating teem’, a new dietary preference may be established, causing the animal (and its descendents,) to reject the old diet in favour of the new. Eventually, the moribund grass-eating teem will atrophy, precipitating a permanent behavioural transformation from herbivorous to insectivorous. Once disseminated by progeny, the new monophagous diet would generate selective pressure and establish selection criteria to retain morphological traits that facilitated the expression of the new termite teem. Such mutational modifications may include specialised termite adaptations - an extended muzzle, a flexible and bite resistant tongue, thick leathery lips, glands to secrete sticky saliva, powerful digging claws and thick protective fur. It is not too difficult to imagine that inevitably, this teemic directed mutational activity will produce a giant anteater (*Myrmecophaga tridactyla*), or perhaps a lesser anteater, (*Tamandua*), or a two-toed anteater (*Cyclopes didactylus*.)

The second example attempts to explain Ho’s (1988.)⁴⁶ quandary of the behavioural-morphological nexus of the woodpecker, (*order Piciformes*.) It may be conjectured that a hungry bird that extracted a succulent insect from the bark of a tree by pecking into the bark encoded a ‘pecking teem.’ When triggered, the teem recalls predatory emotions that precipitate a pecking behaviour. Clearly, progeny born with mutations that increase the fitness of the pecking teem (sharp, sturdy beak etc.) will be selected. In this way, we may suppose, woodpeckers evolved.

By providing innate behaviours that both generate selective pressures and determine selection criteria, teems establish a biological nexus between form and function – between behaviour and morphology.

5 Teemosis and sexual selection

As an adjunct to NS, Charles Darwin advanced the theory of Sexual Selection which described same sex competition for mates, and proposed that members of one sex, tended to select mates on the basis of preferred epigamic traits and behaviours which then became more pronounced.⁴⁷

Characteristically, while it is usually males that develop these characters - elaborate plumage, fighting prowess, large antlers, manes etc. the preference is invariably established by the female and is often arbitrary and occasionally maladaptive - as when excessive plumage makes birds more vulnerable to predators.^{48, 49} Since Darwin, sexual selection has been studied in humans,^{50, 51} birds,⁵² spiders,⁵³ snakes⁵⁴, turtles⁵⁵ frogs,⁵⁶ and various applications,^{57, 58, 59, 60, 61} However, it has not yet been demonstrated how the female first acquires the genetic proclivity for the new trait or behaviour. Given the degree of environmental interactivity and complexity that many multi-faceted, sequentially precise mating rituals and displays demonstrate and the improbability that these epigamic behaviours are derived from random mutations, this issue remains problematical for NeoDarwinian theory.

Teem theory, by contrast, asserts that while Darwinian reflex actions may regulate sexual behaviour in simple nonteemic organisms, in teemic phyla, sexual preference is moderated in both sexes exclusively by teemosis – that is to say, a new sexual preference is conceived when a transduced behaviour or distinctive morphological trait generates such an intense emotional reaction in a conspecific of the opposite sex, (usually a female,) that a new ‘sexual preference teem’ is encoded and inherited by daughter progeny as an emotional proclivity. When activated in a descendent female by a male displaying similar traits or behaviours, the teem is activated and releases the encoded ‘attractor emotions’ that predispose the female to mate with the male.

Attraction emotions include transducible aesthetic responses to symmetry, colouration, size, strength, fluidity, beauty, plumage, gait, dance, display, fighting prowess and so one, and manifest as appeal, sexual desire, love, admiration, etc. It is axiomatic therefore that only epigamic behaviour and sexually selected morphological

characters that can be transduced into the Emlanic language of emotions may contribute to sexual selection. This has ensured that epigamic behaviour and transduction mechanisms have co-evolved in unison.

Unlike Darwinian reflex instincts, sexual preference teems facilitate a degree of environmental interactivity and flexibility that is singularly adaptive. Typically, a female will review displays and advertised traits of available males and select the male whose attributes most perfectly express the emotions of her particular preference teem. She selects on the basis of her teemically proscribed emotions.

One of the noted characteristics of sexual selection is that the behavioural or physical trait that is selected is frequently arbitrary and occasionally non-adaptive. The literature ranges from antlers so large they make it difficult for a moose to move, to a Toucan's beak which can be half as long as its body and at times prove an encumbrance. Consequently, any theory that attempts to explain sexual selection must encompass its arbitrary nature. Arbitrariness is a hallmark of sexual selection and significantly, teemosis, based on capricious emotional preferences, appears to explain this arbitrariness. Although teemosis is more typically associated with encoding 'negative' traumas, (frequently the result of predation or misadventure,) it may encode any high salience emotional experience, into a teem, including potent emotions of affection and desire.

The author is of the opinion that the capacity of organisms to encode sexual preference teems is augmented by seasonal elevation in sex hormones and pheromones. Sex hormones - among the most powerful chemicals in nature, impact significantly on the CNS, increasing overall emotional responsiveness, sexual arousal, physical sensitivity and levels of stress. This heightened state of emotional arousal may increase teemic receptivity, allowing seemingly inconsequential environmental disturbances to traumatize a hyper-responsive CNS.

Because sexual preference teems are derived from emotions which are often arbitrary and capricious, a habitually selected trait may eventually become maladaptive, as in the oft cited example of the peacock's extended tail which may render the bird

vulnerable to predators. In these cases, NSP curbs the deleterious traits until fitness is restored.

In conclusion, the teem theory of sexual selection asserts that teemosis is the principal originator and regulator of new innate sexual preferences and is therefore a functional mechanism of sexual selection. As such, it may be considered a small adjunct to Darwin's seminal theory of sexual selection. For the purpose of this dissertation however, I suggest that by utilising emotions to moderate the selection of preferred morphological traits, teemosis appears to display macroevolutionary consequences.

6 Sexual dimorphism and teemosis

Why do species vary so greatly in size? Biologically, there appears no uniform trend towards larger organisms. Insects, among the most successful and numerous phyla have remained minute while the Indrichotherium, the largest mammal of all time, is now extinct. In the nautical environment, organisms vary from microscopic plankton to 30m long blue whales weighing in excess of 112 tonnes. In the absence of any definitive explanation that would explain the arbitrary disparity between ants and blue whales, and indeed, the extent of speciation which is a feature of life on earth, it is here proposed that species size is moderated by a single sexual preference 'size teem.'

Aesthetic emotions are ubiquitous in nature, allowing teemic organisms to transduce the size, shape, symmetry, colour etc of forms in their physical environment to construct habitats, identify predators, prey and food, select mates, identify offspring, determine territories and so on. These 'aesthetic teems' render each teemic organism singularly receptive to the emotions of size – the size of food, prospective mates, habitats, competitors, etc. I further suggest that size teems quantify size not in absolute terms, but relative to the organism's own size, and moreover, optimum size is generally calibrated along a simple bell curve - where under and over size engender less satisfying emotional responses than a teemically proscribed 'ideal' size. The precise size of a prospective mate, relative to the self, appears to be a common sexual preference. Human males for example, appear to display a universal preference for females slightly shorter than themselves, while females appear teemically predisposed to selecting males taller

than themselves. This presupposes that excessive height disparities (relative to the self,) are less aesthetically appealing and are unlikely to be selected.

However, in some species, leviathans in particular, an ancestral individual appears to have encoded a ‘bigger the better teem’ – that effectively generates an emotional preference for increasingly larger mates. This ‘runaway’ size teem will select for increasingly larger mates until NSP curbs the upper limit. By only selecting the largest males, a fox-size Paleogene female mammal (*Ichthyolestes pinfoldi*) could transform into a blue whale (*Balaenoptera musculus*) within a comparatively short period of time. In this way, sexual dimorphism is an attribute of teemosis.

7 Teemosis and speciation

Although Darwin called his book ‘The Origin of Species,’ paradoxically the issue of how organisms divide into separate taxonomic categories received little attention,^{62, 63} and the concept of parapatric, sympatric and allopatric speciation, advanced by Mayr^{64, 65, 66} and others remains the prevailing biological orthodoxy in relation to speciation. Here though, it is suggested teems play a significant role in the formation of new species.

A number of different teems exert an evolutionary impact on speciation in teemic phyla, foremost among which are sexual preference teems. This hypothesis asserts that whenever a female encodes a new Sexual Preference Teem (SPT) in response to a male’s demeanour, behaviour or distinctive physical trait, she and her progeny will preferentially select males that display these attributes, because these traits, when transduced, express the SPT. Within a single generation, a new SPT can establish an isolated interbreeding population, inevitably resulting in a new ‘sibling species.’

Although the members of the new sibling species may be morphologically almost identical to the parent population, individuals that inherit the new SPT demonstrate an emotional antipathy to conspecifics of the parent population. That is to say, although sibling species may be genetically capable of producing fertile ‘hybrids,’ teemic incompatibility ensures that hybridisation does not normally occur. This model

challenges a prevailing view of speciation, first espoused by Dodzhansky (1937) that speciation defines ‘separate arrays which are physiologically incapable of interbreeding.’⁶⁷ Teem theory argues that initially it is the lack of sexual attraction prevents copulation.

8 Teemosis generates directed mutations from which new genes are derived

Evolution requires variability, which in Darwinian evolution is exclusively provided by random mutations. In , we see how teemosis functions at the genetic level by duplicating, relocating and rearranging diverse ‘mobile’ non-protein-coding DNA (ncDNA) elements into new Emlanically encrypted ‘sentences’ that describe the parameters of each and every teem. To borrow the analogy of human language, teemosis selects from an alphabet of ncDNA elements (SINEs, LINEs, LTR retrotransposons, transposons, Helitrons, etc.) and by duplicating, deleting, transposing and organising these elements into linguistically meaningful combinations, genomically archives the precise parameters of each teem into an individual’s genome.

While new teems may be encrypted into intergenetic nucleotides (between genes,) they also may be encrypted within close proximity to coding genes and even within genes – into introns. In Paper 5, I speculate the non-random proximity of teemic nucleotide sequences is positively selected for, to facilitate a genomic regulatory interaction between the teem and the organism’s physiology and morphology. When a new teem is written, (wholly or in part) into the middle of a coding gene, it functions as a mutation (albeit, a ‘directed mutation,) and like all mutations, it may be adaptively neutral, adventurous or deleterious. When the inserted teem disrupts the function of the gene, the host genome may be fatally compromised, resulting in the death of the individual organism, in which case the teem is removed. However, by inserting transposable teemic elements into coding genes and into the regulatory regions of coding genes, teemosis feeds NS with an endless source of new mutational alleles, providing the raw material from which occasional new adaptive genes and regulatory sequences may emerge.

9 Teems regulate the expression of genes

Paradoxically, while teemosis does not directly influence the evolution of coding genes or protein products, it does appear to exert a regulatory function in respect of the expression of genes and proteins and this function is under positive selection. This occurs in two principal ways.

Firstly, innate behaviours are often associated with physiological responses, (increased heart rate, galvanic skin resistance, pupil dilation, etc.) These physical responses are moderated by hormones, enzymes, neurotransmitters, neuropeptides etc. that are in turn, controlled by coding exon genes.

These Mendelian concomitants of behaviour first emerged in multicellular organisms via NS during the early Precambrian, long before the advent of teemosis. Indeed, I have argued that throughout the Precambrian, all behaviour (including innate behaviour) was moderated exclusively by Darwinian evolution (NS) vis-à-vis electro-chemical systems controlled and activated by coding genes.

However, from the emergence of teemosis 543 mya, complex behaviour has been primarily moderated by emotions configured as teems. Significantly however, teemosis did not completely replace Darwinian behaviour. Instead, NS incorporated pre-existing physical systems into teemosis - in particular hormones, enzymes, neurotransmitters, neuropeptides, messenger systems and transporters that contribute the physical component of complex behaviour and thereby increase the adaptive functionality of teemosis. In practical terms, this entailed teemosis acquiring a regulatory function in respect of the coding genes that controls these Darwinian traits.

Because this regulatory interconnectivity increases the functionality of teems, it has been subject to positive selection. Significantly, although the hormones, neuropeptides and binding receptors that regulate the expression of 'teemic genes' plus the Emlanic code that controls them are components of teemosis, they evolve exclusively by NS independently of teemosis. That is to say, natural selection proper takes advantage of randomly occurring physical traits and incorporates them into the teemosis evolutionary process. However, these traits originate as Darwinian .mutations

This hypothesis predicts that the transcription of hormones, enzymes, neuropeptides and other electro-chemical processes related to teemic physical responses, are ultimately regulated by noncoding nucleotide sequences. In Paper 5, genetic evidence is offered to support the hypothesis.

There is a second means by which teemic regulation of gene expression drives physical evolution. Once ncDNA encryptions evolved that regulated the expression of genes essential to complex behaviour, NS could extend this regulatory role into other adaptive domains. For example, it is entirely possible that teemic control of gene expression facilitated the evolution of environment-specific phenotypes.

It is well known that under certain environmental conditions, a genotype may produce more than one phenotype. That is to say, the environment may instruct the genome to induce an environment-specific ‘morph’ in response to particular environmental conditions. For example, when north-western Atlantic snails, (*Littorina obtusata*) are exposed to predatory crabs, they develop a thicker shell which may revert back to the original phenotype when the danger has passed.⁶⁸

Typically this developmental plasticity is expressed in ‘either/or’ phenotypes (polyphenism) although an organism may produce a number of phenotypes in response to fluctuating environments. This phenotypic (or developmental) plasticity was observed in butterflies by August Weismann in 1892. He found that when pupae from the German subspecies of lycaenid butterfly (*Polymmatius phlaeas*) were exposed to abnormally high temperatures, the adults resembled the darker southern variety *eleus*.⁶⁹ (See also Standfuss, 1896.⁷⁰) Confirming this effect, Goldschmidt (1938) demonstrated that not only did heat-shocked central European butterflies (*Aglais urticae*) develop wing patterns similar to warm climate Sardinian subspecies, but that cold-shocked central European butterflies produced the wing patterns similar to cold climate Scandinavian varieties.⁷¹

The emerging field of ecological development biology has since confirmed that not only can temperature shock produce new phenotypes that mimic patterns of related races or species existing in colder or warmer conditions,^{72, 73, 74} but that in addition to

temperature and seasonal fluctuations, other environmental factors such as diet, population density, predation and photoperiod can also produce novel phenotypes.⁷⁵ One of the most interesting examples of environmentally induced development plasticity is predator-induced polymorphisms.⁷⁶ Van Buskirk and Relyea (1998) found that when wood frogs (*Rana sylvetica*) are reared in a tank within sight of predatory dragonflies, (*Anax*,) the tadpoles were stunted in size and developed more muscular tails, presumably to more effectively escape predation.⁷⁷ Similarly, when gray treefrog (*Hyla cryoscelis*) tadpoles are confronted by predators, they alter their size and develop a bright red tail which is used to deflect the predators.⁷⁸ (See also^{79, 80, 81})

Significantly, in seminal breeding experiments with fruit flies, C. H. Waddington found that by artificially selecting these environment-induced phenotypes, they became permanent after about fifteen generations. Waddington called this phenomenon 'genetic assimilation' and while he believed it could be explained by conventional Darwinian evolution acting on regularly genes, genetic assimilation continues to remain problematical for evolutionary biology, not least because it appears to involve the inheritance of acquired characters with its inherent Lamarckian implications. To date, no consensus exists on how environmental factors are able to affect gene expression.

However, it is suggested that phenotypic plasticity and genetic assimilation are regulated by teemosis. It is argued that when a butterfly pupae is exposed to heat shock, when population densities inflate, when predation is ubiquitous, when climatic extremes prevail and when food is suddenly scarce, the one common effect on the individual is emotional trauma. These disparate environmental conditions all produce high salience emotional responses, strong enough, to rupture homeostasis and trigger a unique coterie of teems I call 'Physical Response Teems' (PRT.)

PR teems genetically archive both the anomalous environmental condition (AEC) ie. transduced drought, heat shock, predators, etc, plus the hormonal, enzymic genomic instructions that precipitate an adaptive new phenotype, into a sequence of ncDNA nucleotides. The teemic cluster may lie dormant for many generations until the AEG recurs and activates the teem. When transduced by the organism's sensory organs, the AEG triggers the teem that assumes control over the expression of the reverent genes,

causing the transcription of specific hormones and enzymes that precipitate the archived alternative phenotype. In this manner, NS has fused a symbiotic adaptive relationship between teemosis and physiology – elements that are normally noncompatible, but which will synchronistically collaborate to blindly achieve their common goal of survival.

10 An explanation for the Cambrian Explosion

In this issue, it is argued that the emergence of the teemosis evolutionary process at the basal Cambrian precipitated an unprecedented expansion of complex innate behaviour. Here the author has attempted to demonstrate that teemosis additionally drove morphological evolution from the basal Cambrian onwards. Together, these two hypotheses strongly suggest it was the emergence of teemosis 543 mya that precipitated the unprecedented global radiation of the metazoans known as ‘the Cambrian explosion.’ This teemic explanation is given additional support by the fact that no consensual alternative palentological explanation for the Cambrian explosion currently exists.

Conclusion

The prevailing view of NS as a single process is here replaced by a view that distinguishes the two separate processes inherent in NS - a steady rate of mutations and a diverse array of selective pressures, mechanisms and variables – the variability of which define the scope, efficiency, speed and direction of NS. Teemosis does not impact on the production of mutations. However, by inventing teemic biosystems and presaging the emergence of the brain, by guiding the selection of mutations favourable to teemosis, by controlling the expression of genes in certain circumstances and by establishing sexual preferences and proclivities that directly impact on morphology *vis-a-vis* sexual selection, sexual dimorphism and speciation, teemosis appears to demonstrate a macroevolutionary function. Thus, from its inception at the basal Cambrian, teemosis, (together with NS,) has been responsible for much of the biological complexity and diversity that characterises the biosphere.

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