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**INTERSTITIAL SPACE: FUTURE INHABITANTS AND
EVOLVING *CORPUS JURIS SPATIALIS***

- BY -

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INTERSTITIAL SPACE: FUTURE INHABITANTS AND EVOLVING *CORPUS JURIS SPATIALIS*

Remarks by Dr. George S. Robinson regarding the current and future “envoys of mankind” on celestial bodies and other components of interstitial space – December 11, 2006, Cosmos Club, Washington, D.C.; *The Eilene M. Galloway Symposium on Critical Issues in Space Law*

I. Defining “Interstitial Space” for *In Situ* Use by Humankind and Post Human Inhabitants

For the instant discussion, interstitial space is defined as a component or “property” of matter forming a continuum, whether separating electrons from neutrons and positrons, photons from neutrinos and quarks, asteroids from planets, space dust from human fabricated space habitats, solar systems from galaxies, black holes and 96% of the universe...dark matter, *ad infinitum*. Interstitial space, then, can be viewed both holistically...as in an ocean...and in specific contexts. The operative words for any legal definition of interstitial space might include function, control, intent, use, context...and quantum mechanics at work. Dr. Stephan Hobe provides a good assessment of issues, both settled and unsettled in law, regarding extraction and appropriation of certain space resources...including “celestial bodies”, however they may be defined (paper presented at the *International and Interdisciplinary Workshop on Policy and Law Relating to Outer Space Resources: The Example of the Moon, Mars, and Other Celestial Bodies*, held at McGill University last June 28-30, 2006). The focus, here, is on humankind or transhuman and post human “envoys of mankind” inhabiting or otherwise existing off-Earth as “*other celestial bodies*”, i.e., as components or objects of interstitial space. And “envoy”, itself, is defined either as a “representative” or “messenger” offering a distinctly functional difference between the two words when characterizing the current status of our astronauts and future envoys of mankind in near and deep space.

Before addressing the comparatively fragile nature of humans in an off-Earth environment of interstitial space, it would be helpful to establish a reasonable foundation of expectations for humankind and post human alternatives based in part on what is referred to as “Moore’s Law.” In 1965, Gordon E. Moore was the young director of the Fairchild Research and Development Laboratories, where he made a very interesting discovery, i.e., the complexity of minimum cost semi-conductor components had been doubling once a year, every year, since the first prototype microchip had been produced six years before. He claimed that this doubling would continue every year for the next ten years. In the global computer industry, it is referred to as the power of information technology that doubles every 18 months...again, *ad infinitum*.

Then, in 2002, the twenty-seventh doubling occurred precisely as predicted with a billion transistor chip. If occurring without interruption, technological evolution sustained by the constant of time can and will produce almost unbelievable transformative results when you have a curve that doubles and redoubles consistently. Although the principle and context in which Moore’s Law has been applied is occasionally challenged, and in certain instances is without fully supportive empirical data, various computer-related

technologies are telescoping dramatically the time it will take for humans to transcend the constraints of their biology, to become transhuman, i.e., *humankind*, and even post human components and/or properties of interstitial space. Both jurisprudence, or legal philosophy, and its positive law practitioners must help prepare, and be prepared for, the changes wrought by this technological transcendence of human biology.

In the context of Moore's Law, we need also be aware of the Singularity Principle, originally conceived by Verner Vinge as the fundamental discontinuity in history created by the technological invention of smarter-than-human intelligence. The Principle has evolved in various ways, but the core concept remains the same, i.e., as noted by Eliezer Yudkowsky, "there is a massive discontinuity approaching, a Singularity, within human history", and it has to do with the "rise of smarter-than-human intelligence, the ability of technology to alter human nature, the final conquest of material reality through nanotech, or some other fundamental change in rules."

Now, returning to the defining of interstitial space and its component parts, it should be noted that scientists have not really defined "celestial body" in scientific terms, other than to say what one is, e.g., a planet...a natural object of certain mass, density, volume, location, and the like. But humans and *humankind* in outer space, as well as on Earth, are natural objects...every bit as much, for example, as a planet and even the International Space Station and artificially intelligent robotics and biorobotics used as extensions of human senses and the unenhanced or enhanced central nervous system. Not to accept this means we tend to raise ourselves all too frequently much too far above our biological origins in trying to understand what and who our species is...and *how* the principles inherent in Natural Law Theory might apply in an endless variety of circumstances.

Now, how does "the law" apply to these entities occupying interstitial space? One tangible definition of "interstitial space" is that it is *not* simply a vacuum without properties of its own. *Query*: If space exists between, and as a part of, the properties of matter, is there really such a thing as interstitial space...a non-existent entity? Perhaps, but only when expressed as a *space-time* continuum, i.e., a relatively short time between quantum matter, between "things", as scientists might define it. And measurable space-time depends in large part on the density and mass of a given "thing."

II. The Limits to Unenhanced *Homo sapiens sapiens* in, and as a Part of, Interstitial Space

Among many other scientists, Robert Park, of the American Physical Society, asserted that "[s]ending people into space is very old-fashioned, sort of a hangover from the Cold War era. Robots can do just about everything in space better and cheaper." What may be a statement of the obvious to some, may be difficult to accept by others. And that statement asserts unaltered human biology in its pristine form is too fragile, cumbersome, and "expensive" to rely on long-term and permanently as our envoys, explorers, resource exploiters, and permanent settlers of deep space...or as permanent inhabitants of interstitial space even in near-Earth orbit. For unaltered humans in space, highly advanced external life-support technology, or internal biotechnological integrations that do away with periodic homeostasis and other systemic re-acclimations on Earth's surface, are necessary.

The most significant potential for the consequences of internally unenhanced human fragility in space (other than failure of external life support technology) may well be referred to as the “enemy within.” The human body under normal circumstances is host in symbiotic relationships to myriad types of viruses, bacteria, fungi, and the like, all held in a constant state of balanced tension by the host immune system. When that system is disrupted, say, by unusual amounts and types of irradiation deriving, for example, from a solar flare, the T-cells of the immune system are the most vulnerable to the resulting irradiation and may diminish within 24 hours sufficient to cause death of the host body within three days after exposure. Stress, alone, may cause chronic infections and accelerated death through overburdening and disruption of the immune system.

Additionally, irradiation can precipitate mutation of cells that results in accelerated forms of cancer. The effects of radiation on the central nervous system, on cataract formation, and the immune system create high risks to human space flight at present, simply because they are not known...the number of relevant experiments and resulting usable data are unacceptably *de minimus*. The relative unknown factor is true also for the loss of calcium, muscle mass, homeostasis, and occurrence of chronic space adaptation syndrome (failure or compromise of inner ear functions and consequent loss of balance and orientation with resulting nausea, etc., resulting primarily from a gravity-free or low gravity environment). These are but a small handful of the known components and obstacles that mark or evidence human vulnerability and fragility in a space environment...natural or synthetic.

The active or passive space “tourism” of human biology (other than of short duration or the extremely long-term reliance on cryogenics, embryo freezing and “hatching” at the ultimate destination in space, advanced human hibernation, postponement of aging through genetic intervention, i.e., reprogramming the genetic coding relating to organic death, and space born second, *et seq.*, generations), is nonsensical in terms of the hostility *in extremis* of space to unaltered/unenhanced human biology. It also is unnecessary if the real philosophical and theological constructs influencing or directing humankind movement off Earth are to ensure the ultimate survival of the cognitive, sentient, and sapient essence(s) of *Homo sapiens sapiens*, *Homo sapiens alterios*, *Homo alterios spatialis*, etc.

Humans and humankind will be relied on to convey or represent these messages of human/humankind “essences” to and in space. For purposes of the instant discussion, however, the term “soul” is not addressed as a part of, or synonymous with, the “essence” of humans or of human “nature.” Here, the discussion is limited to biologically empirical data, leaving the definition of “soul” in a theological context to the humanists and the “Chief Judge of the Most Supreme Court.” Nevertheless, the door remains open to empirically-based biological definitions of what constitutes a human or humankind soul.

Human “essence” or “nature” is assessed in the context of distinguishing taxonomic criteria (e.g., relying in part on genome/genetics and biological systemics, such as the reproductive system, skeletal system, endocrine system, vascular system, integumentary system, digestive and alimentary systems, and even morphology and ethology, etc.). These distinguishing factors may well help reduce to manageable portions for cyberspace (are cyberspace *personas* separate and distinct from their creators for purposes of separate accountability under cyberlaw?) and outer space lawyers the concept of an intelligent and independently accountable telepresence under some future

regime of law. Focusing on the biologically based expressions of human “essence” and “nature” will demand a greater spectrum of criteria in astronaut or “envoy” selection than has heretofore been thought necessary. They, in effect, will become a very small number of “elitist” envoys or representatives of the entire species, or, ultimately, *humankind*/transhumans. Even for comparatively short-duration manned space objectives, such as missions to Earth’s moon and Mars, and long-term or permanent habitation of that sister planet, it is less difficult to change what is human and what are *humankind* cognitive, sentient, and sapient essences than it is to terraform the planet and “other celestial bodies”, or otherwise create technologically artificial, long-term life support habitats for *Homo sapiens sapiens*; particularly in deep space.

It should be noted briefly here that incipient research into the human epigenome, the array of chemical markers and switches sitting on top of the DNA that tells the genes what to do, as well as when and where to do it, indicates the long-debunked theory of Jean-Baptiste Lamarck was inherently correct, to a degree, i.e., that external environmental changes to the genome/genes could in fact be passed along to succeeding generations (e.g., diet, smoking, synthetic vitamins, etc.). Although these “acquired” changes...more often than not “defects”...seem to result for the most part in abnormal and frequently harmful characteristics, the possibility of adaptation to abnormal environments by directed changes to the epigenome may allow humans or *humankind* in future generations to adapt “naturally” to Earth-alien environments.

Epigenetics illuminates some of the subtle nuances that bring “nature” and “nurture” together in a fashion that may help us shape the societies in which we hope to live in the future...perhaps on “other” celestial bodies. “If environment has a role to play in changing your genome,” says Moshe Szyf, a research pharmacologist at McGill University in Montreal, “then we’ve bridged the gap between social processes and biological processes.”

III. Evolution versus Devolution?

For purposes of defining “the law” as it might apply to future intelligent component inhabitants of interstitial space serving as “envoys of mankind/*humankind*”, it might be expressed as the “neurophysiological interpretation reflecting the survival dictates of an evolving sentient species.” This definition can apply to humans and *humankind* regardless of physical location.

On Earth, we rely on the genesis of our controlling jurisprudence deriving from the secular-humanist principles of Natural Law Theory. But is that Theory adequate to serve as the foundation of intellectually articulated bio-ecological dictates for humans (and humans in biotechnologically integrated transition, i.e., *humankind* or transhumans)? Can it serve effectively as the foundation of a pseudo-human presence in space: For example, an independently interactive “telepresence”, the latter being defined as the projection of a user’s sensory, cognitive, and motor capabilities to a distant environment? Alternatively, the distant environment can be recreated virtually at the location of the user or operator. In the former case, the user’s sensory channels can be linked to remote sensors. For example, a user’s vision can be linked to remote cameras, providing an

exocentric or egocentric frame of reference. The user's actions in the proximal locality drive the movements of the remote actuators. In this case the task environment is digitalized and recreated as a virtual interactive environment surrounding the operator in which local actions are transformed into distant actions...all in and through interstitial space.

Mars, for example, can be explored by sending to its surface small robots and sensors, and, with virtual reality, people can have a *virtual* presence on Mars or anywhere else in interstitial space, perhaps even creating electronic virtual presence communities. Now, suppose those robots are bio-technological integrations with humanlike characteristics that allow self-replication (as in the case of current nanotechnology self-replication capabilities) and metabolic activities. Add advanced artificial intelligence capabilities, or expanded anthropocentric intelligence, or sentient capabilities in human biotechnologically integrated form...are we really looking at a robotic entity, or are we seeing the incipient stages of a species alteration invoking a reassessment of the applicability of Linnaean taxonomic principles? Are we in fact looking at the next steps in human and *humankind* evolution, i.e., transhumans leading to post humans, beyond the biologist's and taxonomist's definition of "evolution" as a change in the gene pool of a population over time?"

Now, very briefly, a "transhuman" may be said quite simply to be a transitioning form between *Homo sapiens sapiens*, i.e., being human, and becoming "post human." In many ways, given the current and near-term state of invasive medicine and biotechnological integration capabilities, a good many humans in the industrialized world...including our current "Envoys of Mankind"...might be considered as in the first phases of being "transhuman." Perhaps it is both correct and safe to say that it is still a bit too early to attempt a determinative and, therefore, fully useful definition of "transhuman." Nevertheless, at the very basis of transhumanism and the "creation" of transhumans are the incipient steps in the re-interpretation of what it means to be human.

In the realm of evolved and evolving biorobotics, we are addressing those characteristics of emerging beings with intellectualizing capabilities that outperform, or function differently in a totally unique fashion, those characteristics of humans and even certain enhanced *humankind* with basic biological properties of the human species still intact. These are entities for which there is no ambiguity regarding their differentiation from *Homo sapiens sapiens*. "Post" humans are "in addition to", and not necessarily a replacement of, humans. And post humans may be differentiated by the environments in which they will be designed to function; in the current circumstances, long-duration and permanently off Earth, primarily in *outer* interstitial space. In fact, as mused by Nick Bostrom, a highly noted and respected member of the faculty of philosophy at Oxford University,

"Posthumans could be completely synthetic artificial intelligences, or they could be enhanced uploads...or they could be the result of making many smaller but cumulatively profound augmentations to a biological human. The latter alternative would probably require either the redesign of the human organism using advanced nanotechnology or its radical enhancement using some combination of technologies such as genetic engineering, psychopharmacology, anti-aging

therapies, neural interfaces, advanced information management tools, memory enhancing drugs, wearable computers, and cognitive techniques.”

There are broad basic principles of biology shared by all carbon-based life forms. One is “grow or die” and another is “seed dispersal”, or pursuit of new ecotones and other forms of survival adaptation. Human and/or *humankind* migration off Earth is not only necessary, it is critical to the survival of the human species, or its very essence or nature...and it has been taking place since carbon-based life occurred and evolved in its simplest form. With increasing complexification of earthly biota, reflecting both the Singularity Principle...at least in part...and Moore’s Law, life must continue to evolve and migrate into new ecotones, niches of nature, where it can compete and survive.

Evolution of *Homo sapiens sapiens* has followed the same path, and the essence or nature of the species, in one form or another...collectively and individually...must continue its migration into space to help assure its survival through the biological (and now biotechnological) principle of seed dispersal. That *essence* or *nature* must be defined with sufficient empirical data to have it reflected in the next step of human evolution; a biotechnological evolution with a short time span available, given the evolving and telescoping nature of technology consistent with Moore’s Law and, perhaps, the Singularity Principle itself. Evolve...or devolve.

IV. Humans, Humankind, and Post Humans: Early Distinguishing Characteristic(s)

So, it may well be that the parameters or characteristics that define exactly what it means to be “conscious” is the determinative factor of differentiation once reproduction by sexual and asexual means, parthenogenesis, biological *ex vitro* manipulation/fertilization, etc., are eliminated as a necessity for entity or species continuum. In this respect, the most likely *in situ* architects, e.g., construction workers, explorers, miners/managers/engineers/scientists/resource control, capture, and commercial exploiters of resources found both on celestial and “other” celestial bodies...however those terms are defined in specific contexts...will be transhumans and, ultimately, post humans, i.e., humans altered *in extremis* (both in terms of morphology and significant portions...if not all...of the central nervous system and supporting systemics).

Defining the distinction between transhumans and posthumans may likely rest upon determining empirically the essence, or nature, of *Homo sapiens sapiens* by, in turn, grasping the quantifiability of “consciousness.” Interestingly, the traditional, but rather archaic definitions of “consciousness” offered by Webster’s include “the quality or state of being aware...of something within oneself.” The word “conscious” is defined as “sharing another’s knowledge or awareness of an inward state or outward fact.” Now, the definition of “awareness” are endless, and also not empirically helpful. Nevertheless, for purposes of the instant discussion, the long struggle that preceded the current secular understanding of “consciousness”, and what it means, will be set aside.

From the melding and interaction of Rene Descartes’ theory of *res extensa* (material substance) and thinking substance (*res cogitans*) in the 17th century, through John Watson’s and Ivan Pavlov’s observable results of consciousness found in resultant behavior; the “siren song of Sigmund Freud’s theory of the unconscious mind”; Francis

Crick's 1976 move from Cambridge University to the Salk Institute to pursue his self-absorbing research on the biological basis of consciousness that would lead to the causes, as well as the correlates, of consciousness; and Crick's protégé Cristophe Koch's ensuing research based on the belief that here are "very specific neurons that subserve consciousness", and his belief that the "real challenge will be ...to develop genetic techniques to selectively activate specific groups of neurons to see how they are related to different conscious states"; to the currently intense and broad-scale research into consciousness that has even led to the fledgling field of "neurotheology" attempting to manage in a reductionist fashion something we call the human "soul." Imagine, once this element of consciousness that defines *Homo sapiens sapiens* approaches an understanding based in large part on underlying empirical data...we change it to create something we call a true transhuman and post human.

Most importantly, however, is having a strong grasp of the empirical underpinnings of "consciousness" and "conscious awareness." From a taxonomic perspective, if the distinction between genus (*Homo*) and species (*sapiens*) is "consciousness" and level or quality of sentient and abstract reasoning, then we must ask whether biotechnologically integrated robots (biobots) with better indicators of consciousness and conscious awareness with abstract reasoning will be a new species or subspecies of *Homo sapiens sapiens*. Or will such an entity be characterized as no more than a biotechnological extension of human reasoning used to "assist" humans in a critical space-time and human biologically threatening off-Earth environment? At this point, consciousness seems to be an integral component in the defining of the human species.

But just what is "consciousness" or "conscious awareness?" In terms of biological evolution, is it possible that consciousness and abstract reasoning is an unnecessary "add-on", not essential to survival of the species, let alone the individual representative? Does a *coma* qualify for consciousness, or is it the "potential" for consciousness and abstract reasoning that determines what constitutes humanity or humanness...human essence or human nature? Does a coma with a "subconscious" awareness qualify as "conscious" awareness? Does a foetus born without the ability to be conscious (e.g., severe hydrocephalism) fail to qualify for possessing human "essence" or human "nature" under the "conscious awareness" test? At what point in, or part of, a coma can it be determined that an individual is no longer possessive of a "self", the basis of the Terri Schiavo issue that came before the Florida courts and the U.S. Supreme Court? Does telepresence either in cyberspace or outer space, or on "other celestial bodies" incorporate "consciousness", or is it simply a *reflection* of the consciousness of the programmer/user, etc.? Is the existence of a genome, alone, determinative of a species that exhibits "consciousness" and abstract reasoning? Is it, perhaps, a simple percentage of gene sequencing, *ad infinitum*? And what about "avatar" consciousness...?

Recent research at the Salk Computational Neurobiology Laboratory indicates that our "consciousness" is less a factor in decision making than we have assumed to date. As for "unconscious" decision making, the research suggests the factors normally associated with evolutionary and survival requirements of the individual representative of the species are the directive factors, i.e., obtain necessary nutrition sources, replicate, avoid predators, protection from natural elements, etc. Consciousness, then, would be a form of explaining and rationalizing what the unconscious already has done. True or not,

the issue has been joined by neuroscientists, cognitive psychologists, artificial intelligence specialists, philosophers, and theologians.

As noted, above, we assume *conscious awareness* is becoming increasingly biologically/biochemically/biophysically measurable through ongoing research. The human “soul” is God’s. What is being addressed, here, is whether *conscious awareness* is becoming sufficiently identifiable empirically that, in a transhuman or post human, intelligent biobot or other form of advanced artificial or enhanced intelligence, it can be considered independently accountable under some form of law. The next issue for research and assessment, then, is whether such “artificial” *conscious awareness* must also be responsive to involuntary deprivation as a means of enforcement in order to be treated as independently accountable under law. That issue, however, is for a separate undertaking.

Nevertheless, for the moment it is reasonably safe to assume that the human mind, that three pound blob of gray matter, is more than the sum of all the body parts that support it, i.e., not just a carbon based biological “technology” that responds to external and internal stimuli. At a minimum, there is something very troubling about this empirically based reductionist approach to defining what makes a species, a subspecies, and a representative specimen, unique, i.e., the approach lurks somewhere in the causative factors for the hard-core humanist on one side and the equally as hard-core secularist on the other. This mystery of “consciousness” and abstract reasoning approached by scientist-reductionists have certainly complicated the long path of the secularists to reduce the essence of “humanity” to the consequences of material causes.

Now, the issue becomes whether these evolving biotechnological entities existing in interstitial space as “envoys of mankind” can be reasonably considered “*other* celestial bodies” that have been referred to by Mrs. Eilene Galloway. Will our Natural Law Theory be looked to for defining legal principles, or will these other non-anthropocentric intelligent and significantly or fully autonomous entities exist with some unique and independent accountability under some yet-to-be-defined theory and dependent legal regimes? More importantly, perhaps, is the question whether this is *really* a problem for practitioners of *corpus juris spatialis*. Is it a relatively imminent issue? The fact remains that the issue *is* critical since the basic research and development have been and are being conducted...is happening now within the first phases of astronaut transhumanism occurring, and telepresence situated in interstitial space, as well as on celestial bodies, in its rudimentary, but tangible, stages.

V. Natural Law Theory and Outer Space: Is No Legal Theory Safe Anymore?

Can Natural Law Theory serve as the genesis of a unique *corpus juris spatialis*? Many variations of Natural Law Theory have evolved over the centuries, and in its most classical form at the outset, the Theory espoused views that opposed, or were the opposite of, traditional moral skepticism. The Thomist vision of Natural Law viewed it as the rational nature of humans given by God, emphasizing the nexus between why there was a Creation and God’s purpose for human beings in that Creation. This, in turn, defined how humans “ought” to lead their lives, i.e., Thomism asserts that a primary principle of Natural Law Theory is that all humans must do what is “good” and abstain from acts of

“evil.” In a fashion, it was an early attempt at Einstein’s *Theory of Everything*, that is, an attempt to “read the mind of God.”

Later, in ancient Greece, moral laws deriving from Natural Law Theory were seen to be reflections of positive law since they varied from nation to nation, or culture to culture, according to their expressions in legislation and implementing rules. Since these laws were transitory, they were not really considered binding in the sense that they were Divine Dictates. This was a kind of early cultural relativism that was opposed by the likes of Plato, Aristotle, and Cicero, who believed that morality was not relative, but rather inherent in the nature of humans, i.e., it must be obeyed regardless of whether it is reduced to legislation and implementing positive rules. Currently, we call this “moral objectivism”, and it forms the basis of classical Natural Law Theory. All that is needed to qualify as Natural Law Theory is that it embraces the view that moral law is independent of legislative acts; but that there also is nothing that dictates moral laws as immutable.

So, what is the necessity for any connection between Natural Law Theory and the view that morality is immutable, i.e., non-transferrable through biotechnological evolution to transhumans, particularly post humans? Here, of course, the pragmatic or empirically quantifiable characteristics of the “essence” or “nature” of being *Homo sapiens sapiens* are being examined.

Whether the Thomist view, the view of Natural Law Theory and moral dictates associated with Thomas Aquinas, or the more secularist view premised on evolving empirical data underlying the bioecological nature of *Homo sapiens sapiens*, it is a traditional weakness in the many variations of Natural Law Theory that they are unclear, at best, in their applications. The basic conclusion in determining the relationship between the amorphous and transitory characteristics of morality and the allegedly abiding principles of human rights embraced by Natural Law Theory (i.e., each human has certain rights simply by virtue of being born or even simply being conceived) is that we must act in accordance with our human nature. And, again, we are back to researching and assessing what constitutes human “nature.”

What is *natural* for us *to do*, individually and collectively, particularly as significantly *enhanced* humankind and post humans? Do we know everything there is to know about Natural Law? Answer: No. Is Natural Law a continuously unfolding event requiring legal philosophers to analyze constantly evolving scientific data and technology that may add, amend, or otherwise compromise existing human and humankind/post human rights deriving from Natural Law Theory? Answer: Yes. Our knowledge of Natural Law precepts and principles will always be incomplete as humans and transhumans evolve. Although Dr. Ernst Fasan seems to believe these higher forms of intelligent life flowing from the loins and minds of humankind “will still be human”, and referred to perhaps as *Homines sapientes sapientes* (personal letter to the author, 11/02/06), a new BioTechoNatural Law Theory may well have to be formulated and implemented once two or more post humans have been created, self-replication, and independent metabolic capabilities have been accomplished...and *artificial* consciousness has been achieved in the context of advanced artificial intelligence.

We also have to look at what indicia are used by taxonomists to distinguish between two species/subspecies of the same genus. Is it the genome? The number of genes? Gene sequencing, etc.? Is it the simple existence of a specific genome that determines a genus, species, or subspecies? Or is it a percentage of the gene sequencing

expressions that is determinative? Just how subtle can the genetic transition be between one species to another under current taxonomic criteria? And then, what will the unfolding research in epigenetics do to the commonly accepted view that your deoxyribonucleic acid (DNA) is who you are...and the belief, say, of Prof. Szyf at McGill University, that “unlike genetic mutations, epigenetic changes are potentially reversible?” Further, epigenetics offers the perspective that “free will” has an impact on our understanding of genetic dictates. In all, however, we may just have to formulate an entirely new taxonomic Kingdom, in addition to the Animal and Plant Kingdoms.

Then, again, we may well be at the point in human and *humankind* evolution where the “bush” of evolution splits yet again...and an entirely different entity is created that is not anticipated or encompassed in the Linnaean system of taxonomy; that is, not only is it not human or *humankind*, it “thinks” and communicates in a fashion totally outside an organic, (regardless of whether carbon-based), non-anthropocentric form of intelligence, but capable of cross communication with varying forms of traditional carbon-based biology. We are beginning to find these cross-communications capabilities between humans and other orders of animals, such as the cetaceans (whales, porpoises, etc.).

VI. A Passing Conclusion

Unsettled Issues:

Will the U.S. National Aeronautics and Space Administration continue its belief and related policies that robotic and biorobotic autonomy will be the future of space exploration...and settlement? At what point will Homo sapiens sapiens have evolved itself into a new species or subspecies through biotechnological integration and/or the creation of a highly advanced form of autonomous artificial intelligence exhibiting some recognizable form of conscious awareness and personal deprivation for purposes of enforcement sanctions? And at what point will these entities be of sufficiently independent and autonomous “personhood” to invoke a unique theory of jurisprudence resulting in positive laws to which they would be individually accountable for their decisions and actions?

And that is where we seem to be from one perspective in determining whether the human creation of self-replicating entities with an artificial “consciousness” and metabolic capabilities can be individually and separately accountable to a regime of positive law deriving from existing Natural Law Theory...or whether a new Non-Natural Law Theory must be allowed to develop for altered/enhanced biotechnologically integrated individuals functioning solely in *outer*, non-Earth, interstitial space as an “other” celestial body; perhaps as *Homo alterios spatialis* in accordance with Linnaean taxonomic principles.

Again, as noted by Eilene Galloway, potential legal issues must be evaluated on basic scientific and technological facts. Legal philosophers and practicing space lawyers must be prepared to pluck a petal and disturb the fabric of the universe in an empirically

knowledgeable fashion. Clearly, space jurists and practicing lawyers with a broad spectrum of expertise must keep up with, and stay ahead of, the anticipated technological and biotechnological users of interstitial space, commercial or military. All the more important, perhaps, if the “users” are actually a part of interstitial space and involve highly advanced artificial intelligence, advanced forms of human intelligence, sophisticated forms of telepresence (and perhaps even teleportation), cyberspace among the “celestial bodies” and “...other celestial bodies” composing interstitial space, and, finally, fully post human “Envoys of Mankind.”

At some point, sooner rather than later, humans, *humankind/transhumans*, and post humans, will have to communicate and otherwise interact effectively in interstitial space. To accomplish this task, a formal framework of rather unique values and principles will have to be formulated. With an eye to Moore’s Law, this, too, may have to be accomplished much sooner rather than later. Additionally, it may well become one of the most critical issues for consideration by multidisciplinary experts, including space jurists and practicing space lawyers who currently are defining and assessing that body of law frequently referred to as *corpus juris spatialis*...or, perhaps, even *corpus juris spatialis interstitialis*.

The not-so-simple question remains, however; i.e., are we creating autonomous entities who or which can be held individually accountable under a regime of positive law based on principles of existing Natural Law Theory...or will we be faced with interacting with entities having principles and values deriving from some unique legal theory of interspecies interaction as yet unknown to us? As noted previously, an infrastructure of laws based on empirical data is needed to guide relations between and among humans, *humankind/transhumans*, and post humans. The time to start formulating this infrastructure is well at hand, if not of critical moment, for space lawyers.

SUGGESTED READING

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