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Introduction

The corpus of international human rights (as textually established by instruments such as the *Universal Declaration of Human Rights* (UDHR), the *International Covenant on Civil and Political Rights* (ICCPR), and the *International Covenant on Economic, Social and Cultural Rights* (ICESCR)) developed after the Second World War as an expression of the commitment of governments and the peoples they represented to principles sustaining three great social virtues: justice, equity, and respect for human dignity. It was also, though this was less well recognized or acknowledged, a profound reaffirmation of an idealist view of reality and the norms humans create to function within it. Nations incorporated judicially enforceable social and economic human rights in their constitutions that provided, for example, guarantees about access to health services and medicines as well as civil and political freedoms of speech, association, and prohibitions on torture or arbitrary and unlawful detention or death. Hope grew that such commitments would mark the start of a process whereby governments would not only provide physical security but maintain social structures that allowed their citizens to flourish in good health. Expectations were that states would prioritize programs (such as those implementing the United Nations *Millennium Development Goals*) that aimed to gradually reduce warfare, poverty, corruption, childhood and maternal mortality, and lack of equitable access to health services and essential medicines. UN human rights institutions and non-governmental organizations began to play crucial roles in this process. So, too, did the expanding capacity for individual citizens to petition human rights committees and courts concerning violations of human rights.

Bioethics arose as an academic discipline in roughly the same period. Bioethics may usefully be described as the application of moral philosophy to ethical problems in the life sciences (Harris, 2001). Prominent manifestations of bioethics included guidelines produced by groups of eminent persons in controversial areas

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such as reproductive and end of life issues, as well as genetic testing, manipulation, and data storage (Faunce, 2005; Jonsen, 2000; Pellegrino, 1995). Norms of bioethics have also been devised to regulate the conduct of scientific research, access to, and quality and safety of technology, medical services, essential medicines, and other preconditions for health (Harris, 2001).

This chapter discusses the normative origins of bioethics and human rights. The view presented here is that the normative systems of bioethics and human rights are idealist in that they attempt to shape human conduct according to principles derived (like our understandings of time and space) a priori so that true statements are capable of being made about them that do not necessarily correlate with common experience. This chapter then analyzes the intersections of bioethics and human rights in the context of their responding to two great contemporary challenges: the policy influence of supranational corporations and their capacity to relate to the emerging preeminent social virtue of environmental sustainability.

Normative Origins of Bioethics and Human Rights

Many scholars of bioethics and human rights endorse the view that the principles underpinning those normative areas (as well as legislative and judge-made law) arrived in liberal democracies by a process (chiefly among policy and lawmakers) of what is termed “reflective equilibrium” or “coherence reasoning” from the hypothesis that societies, like individuals, when properly oriented strive to maintain foundational virtues, such as justice and fairness (Dworkin, 1977; Nussbaum, 1999; Rawls, 1976). Respect for human dignity is another such a virtue particularly associated with international human rights law (Faunce, 2005). According to this model, consistent application of foundational principles sustained those virtues, and the normative systems could in turn be reinvigorated by seeking to make new principles and laws coherent with that base, or by calibration between the normative systems (Faunce, 2005). Others distrust such ideas as having uncertain and quasi-mystical natural law elements that can be exploited by messianic totalitarian leaders (Hart, 1979; Kelsen, 1948).

Closely allied with the idea of foundational social virtues as a normative foundation for bioethics, laws, and human rights was the well-established intellectual notion of a hypothetical social contract. This concept seemed less mystical in part because it seemed to link to national legal texts such as the *Virginia Declaration of Rights 1776*, the *American Declaration of Independence 1776*, the French *Déclaration des Droits de l'Homme et du Citoyen 1789*, and other constitutional arrangements derived from them. Many see the global culmination of such ideals and world conscience in the United Nations' *Universal Declaration on Human Rights* of 1948. This is particularly true of Article 1:

All beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.

International human rights itself undoubtedly remain highly suspect, particularly in Islamic societies, for its lack of connection with religious law as expressed in the

Quran or *Sunnah*. In such societies, norms of international human rights are consistently qualified by *shari'a*-based Islamic criteria and by suspicions that the primary norm-creating bodies in international human rights are dominated by the representatives of developed, northern countries or large corporations with alien social values (Abdullahi Ahmed, 2005).

What appears to have been less thoroughly considered, however, is whether what is manifesting in the development of governance systems like bioethics, law, and human rights is an emergent pattern of ordering from low-level rules toward greater complexity characteristic of all life (as revealed by a considerable volume of good research into the organization, for example, of simple organisms such as slime mold or ants to brains, cities, and computer programs) (Johnson, 2001). This leads to the hypothesis, explored here, that it is an illusion to regard normative systems like bioethics and human rights as entirely arising from core documents driven by influential groups or personalities, or being denigrated. Rather, bioethics and human rights may be emergent expressions of a unique human contribution to the perception and heightening of order in the universe – conscience. Let us trace some philosophic origins of this idea.

The philosopher Benedict de Spinoza in his seventeenth century *Ethics* (Bk II, Prop. XLIV) wrote that it is the nature of reason properly applied to perceive things truly, that is, as they are in themselves not as contingently existing in past, present, or future circumstances revealed to us by sensory experience. This pronouncement and its implications have often been ignored or dismissed as a peculiar type of idealist rhetoric. How, for example, could it make us view things any closer to reality or more ethically to regard them as not bound by forward-flowing time? Such a position was contradicted by our sensory experience. Yet Spinoza's profound realization (and others following on from it) paved the way for major scientific as well as ethical breakthroughs in thinking – the realization that there could be true statements about reality that did not appear to correlate with common sense.

Immanuel Kant took Spinoza's insight a few steps further in his eighteenth century *Groundwork of the Metaphysics of Morals* and his *Critique of Pure Reason*. Kant influentially contended that the capacity to form ethical concepts in the form of goals or end points for future actions based on principles applicable to all rational beings is a core distinguishing characteristic of the well-developed human mind. It arises, he maintained, proportionally with our capacity to view our place in the world more objectively, including viewing ultimately our understanding of time and space as arising a priori as necessary preconditions for sensory experience (rather than being determined by it). The freedom of individuals to set conceptual goals presupposes a capacity to reject them, and Kant reasoned that laws (backed up by official enforcement) provide an external constraint upon persons whose selected end points would otherwise unduly interfere with the capacity of other rational beings to choose their own goals.

Kant's was an optimistic moral philosophy about human nature, and it set the tone for what became known as the Enlightenment Tradition with its implicit understanding that humanity's increasing use of rationality would shape more

peaceful and harmonious social structures. Ethics, Kant saw as permitting rationalization of voluntary self-constraint by minds seeking to consistently apply principles capable of general application and becoming virtuous. The more people acted from a concept of duty (often against the opposition of their own sensual inclinations) to consistently apply such principles, the more humanity was morally developing toward a type of collective enlightenment. Those principles also rose in ethical value the more they facilitated the capacity to flourish equally in all other rational beings. Kant summarized this by stating (in his *Introduction to the Doctrine of Virtue*) that virtue arises from consistent voluntary decisions to act (despite internal or external obstacles) upon principles capable and worthy of application by all rational humans. Martha Nussbaum has convincingly demonstrated how it is an error to claim that the works of the central “enlightenment” theorist, Immanuel Kant, reveal an obsession with idealized duty and principle to the exclusion of character-formation and the training of the passions (or to make the same claim against seminal utilitarians such as Henry Sidgwick, Jeremy Bentham, and JS Mill) (Nussbaum, 1999).

Yet thinking like that of Spinoza and Kant, discussed here, had implications not only for ethics but for the emerging science of physics. In his *Critique of Pure Reason*, Kant wrote that “we can never represent to ourselves the absence of space, though we can quite well think it as empty of objects.” (Kant, 68) Likewise, he stated that “appearances may one and all, vanish; but time (as the universal condition of their possibility) cannot itself be removed.” (Kant, 75) The twentieth century physicist Albert Einstein, who studied Kant’s ideas in his youth, probably drew upon this insight (that space and time might exist in ways that seem at odds with everyday sensory experience) to ponder what physical laws (such as the general and special theories of relativity) might answer physical anomalies such as why the speed of light is constant regardless of the speed of its source (Faunce, 2011a).

A corollary of such “pure” reasoning, as Kant perceived, was that knowledge (including moral truths about the role of principles and virtues in constraining free will) could also arise from a suprasensible part of nature that has the potential to be true, despite not necessarily correlating with common experience. Such realization may have been a critical factor in development (particularly by other enlightenment philosophers such as John Locke, physician, philosopher, and founding father of human rights jurisprudence) of the concept of inalienable human rights (granted by nature to all people) even though such a position had no foundation in sociological facts about governance of the time. John Locke was a physician pupil of Sydenham, a great clinical empiricist inheritor of the Hippocratic tradition. It is interesting to speculate that a major factor promoting both the corpus of human rights norms, as well as the norms of bioethics deriving from the *Hippocratic Oath*, was loyalty to the professional virtue of relief of individual human suffering (Faunce, 2007).

In any event, though the constitutions of nation states increasingly incorporated (particularly as a result of Locke’s philosophic influence) the claim that the basis of human rights obligation could reside in an ideal applicable to all people as part of

the “nature of things” rather than be entirely constrained by the interests of a King or religion, the origins of that principle were never fully explored or appreciated.

Overlap Between Bioethics and International Human Rights

Historically, the systems of bioethics and international human rights have many intriguing historical parallels. Medical ethics, for instance, provided the original core of bioethics, and its basic principles may be viewed as derived from the tradition represented by the Hippocratic Oath (Davey, 2001).

Proving a breach of the *Hippocratic Oath's* ethical obligation to “do no harm” was central to the conviction of the Nazi doctors at the Nuremberg Trials after the Second World War for nonconsensual, brutal experimentation; sterilization; and active nonvoluntary euthanasia. Those proceedings spurred creation of a tripartite collection of documents that remain central to medical ethics: the *Declaration of Geneva* (or the modernized *Hippocratic Oath*), the *Nuremberg Declaration on Human Experimentation*, and the *International Code of Medical Ethics*. These international medical ethics documents can be viewed as synergistic with the tripartite international Bill of Human Rights: the *UDHR*, as well as the latter *ICCPR* and the *ICESCR*. A major distinction, however, was that the former bioethics instruments were unambiguously directed at relationships between individuals, the latter human rights documents chiefly with relations between individuals and states.

Particularly overlapping with norms of bioethics in the *UDHR* were provisions requiring respect for human dignity and equality (articles 1 and 2), as well as the human right to life (article 3). Others resembled components of medical ethics in prohibiting torture or cruel, inhuman, or degrading treatment or punishment (article 5), requiring nondiscrimination (article 7), freedom from arbitrary interference with privacy (article 12), and progressive realization of the human right to a standard of living adequate for health and medical care (article 25). In the same category was the human right to share in scientific advancement and its benefits (article 27) (Claude & Issel, 1998).

Consent to medical treatment and experimentation is one area of explicit overlap between bioethics and international human rights. Article 7 of the *ICCPR* provides that “no one shall be subjected without his free consent to medical or scientific experimentation.” Under general comment 20, the United Nations Human Rights Committee has interpreted this to require “special protections” – for example, no institutionally nominated surrogate decision-making – for persons “under any form of detention or imprisonment,” or those hospitalized on grounds of necessity or involuntarily due to mental illness. It could extend also to protect patients from doctors who were institutionally prevented from providing such “free consent,” even where such physicians were not considered state agents (Faunce, 2007).

Contemporary international human rights and bioethics clearly overlap in the regional *European Convention on Human Rights and Biomedicine*. In force since 1997, the regulatory impact of this convention has been more significant than its

limited ratification might at first indicate; the European Court of Human Rights having referred to and taking into it in dealing with the cases where the countries were involved that did not ratify or even sign it. This convention covers matters such as equitable access to health care (article 3), consent (Chap. II), private life and right to information (Chap. III), the human genome (Chap. IV), scientific research (Chap. V), and organ and tissue removal from living donors for transplantation (Chap. VI) (Council of Europe, 1997).

In considering the intersections between bioethics and human rights, it is important to take into account article 38 of the *Statute of the International Court of Justice*. This provision identifies international conventions and customary international law, among others, as the sources of international law. Thus, as a Declaration, rather than an international convention, the *UDHR* did not directly create binding human rights norms under international law upon signatory states.

International humanitarian law, as an aggregation of customary and treaty-based norms concerned with the treatment of the wounded, civilians, and prisoners of war, has many areas of overlap between bioethics and human rights law. The *Geneva Conventions* in 1949, the *Hague Convention* of 1907, and the *Genocide Convention* (what year?) and *Nuremberg Charter* (what year?) all impose upon states positive duties to permit and negative duties to hinder the exercise of medical professionalism amid armed conflict. These have now achieved status as customary international law. Medically related NGOs, such as the International Red Cross, Physicians for Human Rights, and *Médécins Sans Frontières*, though staffed by professionals required by bioethics to owe distinct obligations to their patients are increasingly involved in monitoring, preventing, alleviating, and even defining state violations of international humanitarian law. Along with nonphysician groups such as Amnesty International and Human Rights Watch, many of their members view themselves as at the vanguard of a cosmopolitan world order normatively governed more by human rights than by bioethics (Faunce, 2005).

The UNESCO *Universal Declaration on the Human Genome and Human Rights* (1998) and UNESCO *Universal Declaration on Bioethics and Human Rights* (2003) are other instances of texts with clear overlap between bioethics and human rights (Nys, 2005). The former pronounces that the human genome symbolically represents part of the common heritage of humanity, while forbidding practices contrary to human dignity, such as human reproductive cloning. The latter instrument, though also nonbinding under international law, arguably provides, if not a codification, then a promotion of bioethical norms onto the global normative stage. Particularly important are norms of technology transfer and social responsibility in relation to essential medicines that specifically apply to corporations (Faunce, 2007). Article 14(2) of the *Universal Declaration on Bioethics and Human Rights* provides:

Taking into account that the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, and economic, or social condition, progress in science and technology should advance:

- (a) Access to quality health care and essential medicines, especially for the health of women and children, because health is essential to life itself and must be considered to be a social and human good
- (b) Access to adequate nutrition and water;
- (c) Improvement of living conditions and the environment;
- (d) Elimination of the marginalization and the exclusion of persons on the basis of any grounds
- (e) Reduction of poverty and illiteracy

Article 15 – sharing of benefits provides:

1. Benefits resulting from any scientific research and its applications should be shared with society as a whole and within the international community, in particular with developing countries. In giving effect to this principle, benefits may take any of the following forms:
 - (a) Special and sustainable assistance to, and acknowledgement of, the persons and groups that have taken part in the research
 - (b) Access to quality health care
 - (c) Provision of new diagnostic and therapeutic modalities or products stemming from research
 - (d) Support for health services
 - (e) Access to scientific and technological knowledge
 - (f) Capacity-building facilities for research purposes
 - (g) Other forms of benefit consistent with the principles set out in this Declaration
2. Benefits should not constitute improper inducements to participate in research.

There are now many tribunals both at national and regional levels, authoritatively interpreting norms of bioethics at least partially in terms of international human rights. These include the English Court of Appeal and House of Lords, as well as the European Court of Human Rights. In *Case of D v United Kingdom*, for example, the European Court of Human Rights held that deportation of an HIV/AIDS-infected patient to his developing country of origin was state conduct which violated his human right to be protected from inhuman or degrading treatment or punishment. The judges reasoned that such deportation would result in his being denied adequate medical treatment and exposed to poor public health conditions (*D v. UK*, 1997). In many other jurisdictions around the world, judicial cases concerning new reproductive technologies, end of life decisions, privacy, and informed consent are now heavily influenced by international human rights norms, either because of parliamentary or judicial incorporation of human rights into domestic law, or to remedy a common law lacuna, or legislative ambiguity or obscurity.

The international right to health (as specified in article 12 of the *ICESCR* and in over a hundred national constitutions) also provides an important area of overlap between bioethics and human rights. The international right to health, for example, has core obligations to provide the basic preconditions for existence (food, water, sanitation, housing, nontoxic environment) including reasonable access to essential health services and products (Toebes, 1999). Approaches to the implementation of the international human right to health have involved defining universal outcome measures that measure compliance with the core state obligations of the human right to health, establishing systematic reporting to responsible international bodies to monitor progress on implementation and compliance with international

human rights obligations, and highlighting civil rights violations, such as discrimination against protected groups, that inhibit access to healthcare services (Kinney, 2001). A UN special rapporteur has been appointed to work on these issues, but has been largely symbolic in function owing to an understandable reluctance to confront some of the main corporate and sovereign obstacles to implementing the right.

The human right to health, particularly in domestic constitutions, indeed has often been interpreted as a largely symbolic, non-individually enforceable, progressively realizable concession to normative decency or attempt to claim political legitimacy. Technical and financial, as well as conceptual limitations, currently prevent it involving a justiciable guarantee for each person of a minimum level of actual health. Progressive realization of such a right requires effective use of available resources. The minimum content of this core, which cannot be set aside on grounds of progressive realization, may be conceptualized as a responsibility to reduce serious threats to the health of individuals, or the state's population, according to international standards (Ngwenya, 2003).

Effective state infectious disease control and equitable provision of essential medicines as well as taxpayer-funded health services in medical emergencies comprise a compelling and justiciable minimum core public health component of the right to health. Courts have enforced the right to health in domestic constitutions to make states, for example, provide basic treatment to HIV/AIDS patients. In 2002, the South African Constitutional Court unanimously found the government in breach of s 27(1) ("right of access to healthcare services") and 27(2) ("progressive realization" of the right to health) in that Constitution. It held that the government's policy of restricting the anti-HIV drug "nevirapine" to 18 sites was unreasonably rigid and inflexible, denying babies of HIV-infected mothers outside those sites a potentially life-saving therapy. The Court took note of the fact that the drug was apparently affordable, easy to administer, and recommended by the WHO (*Minister of Health v. Treatment Action Campaign*, 2002).

The Challenge of Supranational Corporations

So, after the Second World War, the peoples of the world through their governments seemed set on a course of prioritizing ideals such as those expressed in the normative systems of bioethics and human rights – ideals that seemed strongly to emerge from a commitment to conscience as well as foundational social virtues such as justice, equity, and respect for human dignity. Yet something went badly wrong.

The governments of the world started to prioritize a different set of international legal commitments to people lacking in any fundamental or necessary commitment to conscience or foundational social virtues. These were increasingly politically and normatively powerful artificial persons in the form of transnational corporations. What commenced to cut across the ideal of bioethics and human rights was a process of private sector lobbying of state officials and indoctrination of

politicians into the so-called neoliberal free market ideology. This manifested in World Trade Organization (WTO) agreements that created huge financial penalties for nations seeking to reestablish taxpayer control over areas such as water, food, power, telecommunications, or health services and investor-state dispute mechanisms that allowed supranational corporations to sue governments when legislation or policies (though otherwise coherent with bioethics or human rights) impeded their investments.

Pertinent examples included the WTO agreements such as that on *Trade-Related Aspects of Intellectual Property Rights* (TRIPS) and the *General Agreement on Trade in Services* (GATS). These did have provisions that allowed exemption for government policies necessary to protect public order and morality (articles 27(2) and XIV (a), respectively). Public order or morals, however, were not defined in such agreements, and trade dispute panels had to rely on dictionary definitions such as that which defined public morals as “standards of right and wrong conduct maintained by or on behalf of a community or nation.” Naturally, such a definition implied varying cultural, religious, and other national contexts, rather than the notion that there was or could be consensual and clearly defined systems of global bioethics or human rights. Indeed, since the 1990s in particular, the WTO has been able to create a politically influential, profit-driven global corporate agenda for global governance in healthcare policy with no explicit requirement to consider norms of bioethics or human rights (Abbott, 2005).

A state can now elect, for example, as have many OECD countries, to place “hospital services” on its “schedule of commitments” to be covered by the “liberalizing” rules of the WTO GATS agreement. This executive action (mostly no specific parliamentary scrutiny or democratic mandate is constitutionally necessary) facilitated a reorganization of ownership and management of public hospitals towards a “for fee” private insurance-oriented model. Under this patients with insurance were increasingly exposed to the moral hazard (contrary to basic bioethics and human rights norms) that an assessor at their insurance company (specifically tasked to do this) would find it more lucrative to find a reason to deny their claim than honor their premium. Likewise, under the GATS “market access” requirement, subsequent (more bioethics and human rights-minded) governments were hindered from legislating to regulate the total number or market share of foreign private healthcare services or suppliers.

The GATS rule of “national treatment” additionally required that a “liberalizing” government could not provide, even unintentionally, more favorable conditions to domestic healthcare companies than to foreign corporations. The most favored nation (MFN) rule obligated such administrations to also ensure that most favorable treatment, in terms of trade, granted to any foreign company was extended to all foreign companies wishing to enter this “liberalized” sector. The “domestic regulation” rule likewise made domestic laws and regulations, including those which protected the public’s health and safety, subject to challenge and possible elimination if they were determined to be “unnecessary barriers” to trade, or more “burdensome than necessary” to assure the quality of a service. These changes often facilitated a brief influx of foreign venture capital, but created

a one-way policy agenda toward global privatization of healthcare services regardless of adverse population health impacts and infringements of basic bioethics and human rights norms.

The WTO TRIPS agreement created a process of influencing the way states used bioethics and human rights norms to balance intellectual monopoly privileges (IMPs). This can be seen, for example, in its express exceptions to IMP protections over pharmaceuticals such as compulsory licensing by governments to allow generic manufacture of medicines (after payment of reasonable compensation to any patent holder) if such medicines were required to be cheaper and more readily available for public health reasons. Yet, a so-called “data exclusivity” requirement (allowing prolonged withholding from generic competitors of data revealed by pharmaceutical patent holders to drug regulators for safety, quality, and efficacy assessment prior to marketing approval) seemed designed to undermine compulsory licensing. Indeed, any nation (such as Brazil or Thailand) that has attempted to invoke WTO TRIPS compulsory licensing to provide essential medicines (particularly to treat HIV/AIDS) in fulfillment of its bioethics and human rights obligations has been threatened with trade sanctions by nations such as the USA at the behest of their patented pharmaceutical corporations.

The WTO TRIPS agreement has actually inhibited the capacity of governments to deal rationally with the global burden of disease in accord with core components of bioethics and the international human right to health. This interpretation is supported by the 2001 TRIPS clarification known as the *Doha Declaration on TRIPS and Public Health*. This Declaration symbolically affirmed the capacity of WTO members to use the full exceptions in the TRIPS agreement to promote public health by facilitating access to affordable medicines while implicitly acknowledging their lack of capacity or will to do so (Abbott, 2005; Correa, 2002).

Bilateral and regional preferential trade agreements have additionally facilitated the plans of multinational pharmaceutical and managed care corporations to exploit “liberalized” markets and challenge universalist (taxpayer-funded and egalitarian) domestic health and medicines policies, often on the grounds that they created nontariff trade barriers, or insufficiently rewarded “innovation” or “research and development” (Faunce, 2007).

Supranational corporations continued to lobby governments under the thrall of the neoliberal ideology that market forces (though often monopolistic or collusive in operation) would provide a viable alternative to normative systems like bioethics and human rights in providing for the essential needs and flourishing of citizens. When international civil society defeated the Multilateral Investment Agreement (MIA) these corporations turned to regional deals (Chap. 11 of the North American Free Trade Agreement between the USA, Canada, and Mexico) and bilateral investment treaties (BITs). These allowed those corporations to sue for damages (before a panel of trade arbitrators with a vested financial interest in perpetuating such a system) governments that impeded investments by legislation otherwise coherent with bioethics or human rights. Governments were sued, for example, by corporations in Canada (when they legislated to prohibit toxic lawn chemicals or gasoline) and in Uruguay and Australia (when they tried to reduce

smoking in young people by introducing plain packaging of tobacco products) (Faunce, 2011b).

Thus health policy debates began to rationalize widespread deaths among increasing numbers of poor, uninsured patients and those who could get access to essential medicines (because of fiercely protected patents or lack of corporate R&D interest in that area) as temporary market failures or “adjustments” (Holmer et al., 2000). The corporate sector ascribed the causes of this lack of consumer capacity, for example, to government policies fostering unemployment or restricting business innovation, as well as to high costs of rent, food, and education (Kinley & Chambers, 2006).

Particular challenges created for bioethics and human rights by global governance via supranational corporations include protecting in priority to shareholder profits the interests and welfare of the million or so women and girls under 18 trafficked yearly for prostitution, 10 million refugees, or 5 million internally displaced persons; the victims of any one of the 35 or so wars currently raging across the earth, of state-promoted torture, or rape in the guise of “ethnic cleansing”; or any of the 250 million children exploited for labor, sexual gratification, or as soldiers, as well as the 1.2 billion people living in severe poverty, without adequate obstetric care, food, safe water, or sanitation. Gender discrimination, poverty, famine, and displacement by warfare are significant factors in large numbers of children in African countries still failing to receive basic information from health professionals about how to avoid infection with HIV/AIDS, despite often over 20 % of the population being seropositive (Fidler, 1998).

The Challenge of Environmental Sustainability

The virtue of environmental sustainability has been linked to the idea that this planet should be treated as a distinct living entity (James Lovelock’s Gaia Hypothesis) (Lovelock, 1991). It has become a symbolic rubric focusing public and governmental attention on the interaction between human health, technological development, and sustainability of the biosphere (McMichael, 2002). In this emerging discipline, anthropogenic climate change and environmental degradation as well as poverty and lack of necessary fuel and food are targeted as intrinsically global environmental pathologies the resolution of which requires concerted efforts to implement a wide range of not just renewable energy technologies (such as those using nanotechnology) but bioethical principles including those related to protecting the interests of future generations and preservation of biodiversity. By logical extension the application of renewable energy technologies, for example, utilizing nanotechnology to improve solar energy conversion to electricity, or to purify soil or water, can be regarded as forms of planetary nanotherapeutics.

Salutary facts driving academic and policy interest in planetary medicine are not only the greenhouse-gas-driven increase in severe weather events, but the projected increase of global human population to 10 billion by 2050 with associated energy consumption rising from ≈ 400 EJ/year to over 500 EJ/year beyond the capacity of

existing fossil-fuel-based power generation. The research underpinning planetary medicine also emerges strongly from influential commentaries such as the Intergovernmental Panel on Climate Change (IPCC, 2007) and the Stern report (Stern, 2007) as well as the United Nations *Millennium Development Goals*.

Environmental sustainability as a primary social virtue can be linked with so-called “ecocentric” or “biocentric” bioethics. This is also known by terms such as *Deep Ecology* and expressed in documents like the *Earth Charter* or *Earth Manifesto*. It involves two key ethical principles. The first is that the flourishing and diversity of nonhuman life forms has intrinsic value requiring protection by policies and technologies that reduce the number of humans along with their demands on those other species. The second holds that human flourishing itself requires a deepening respect for right relations with ecosystems which should be reflected in the choices our species make about the use of new technologies.

It is difficult to discern environmental sustainability as a clearly defined ethical virtue or principle in contemporary media and policy debates between those with Christian, Islamic, or secular perspectives; those enmeshed in securing the embellishments of institutional or corporate financial power; and those (such as the “Occupy Wall St.” protestors) critiquing the desuetude of that power in the face of moral crises. One finds, for example, little if any reference to environmental sustainability in ethical works derived from religious traditions, or from academic schools such as utilitarianism (“act on principles maximizing the greatest good for the greatest number”) or deontologic idealism (“act on principles capable of universal application”). It could, of course, be argued that the concept of environmental sustainability is present implicitly in such doctrines or in core religious concepts like Buddhist compassion, Christian conscience, or Islamic *taqwa*.

Those supporting environmental sustainability as an emerging foundational social virtue alongside the human-focused justice, equity, and respect for human dignity could argue that the “virtue ethics” position supports the social virtue of environmental sustainability because its achievement is one of the central altruistic goals of good people in our age. Such goal-oriented virtue-based approaches to ethics have been criticized as too readily subjugating individual liberties and flourishing to the attainment of ostensibly wider social aims (Crisp & Slote, 1997). On the other hand, non-goal-oriented virtue ethics theories are commonly subjected to objections emphasizing their circularity and failure to provide determinate guides to action particularly in pluralist societies.

The less human-centered social virtue of environmental sustainability (as a normative basis for bioethics and human rights) can also be viewed as an extension from moral concerns in related areas such as protection of animals, based on their common capacity to suffer and the primacy of norms preventing suffering as far as practicable for the majority of our interactions. This focus on the normative primacy of “suffering” creates conceptual difficulties for those who rely upon it to argue that ecosystems (such as wild rivers or rainforests) deserve ethical status or legal rights. Why should expanding the circle of empathy require proof that an entity can suffer because it possesses a nervous system that we can readily discern as comparable to our own?

Attempts have been made by some economists to frame the bioethics of sustainability chiefly in terms of the fictional notion of perpetual growth in gross domestic product (GDP). Such formulations often pay obeisance to the fictional power of deregulated markets and the “invisible hand” of entrepreneurial self-interest to ethically regulate demand upon earth’s resources. Other economists, however, have striven to factor our moral responsibilities concerning the finite and fragile resources of the biosphere much more centrally into their economic calculations. The virtues of ecological sustainability and environmental integrity, for instance, were influentially propounded by eco-economists such as the EF Schumacher (with his concept of “small (and local) is beautiful”) and Kenneth Boulding (with his idea of “Spaceship Earth” as a closed economy requiring recycling of resources). In doing this, the former drew upon Buddhist ethical principles and virtues, while the latter relied upon those resonating with the Quaker tradition.

The economist Herman Daly similarly drew on the laws of thermodynamics and the tendency of the universe to greater entropy (dispersal of energy) to champion the idea of “steady-state” economics that financially values maintenance of ecosystems equally with production and profits. Such an approach could be extended to suggest that bioethics, human rights, and economic principles be coherent not just with thermodynamics, but with physical laws and patterns of symmetry such as those underpinning electromagnetism, gravity, general relativity, and quantum physics, as well as other principles that are nonfalsifiable, without necessarily correlating with our sensory-oriented experience of the world.

Many economists interested in developing greater moral and scientific credibility for their discipline are investigating the bioethics of sustainability through the lens of human population and ecosystem science. One such approach, for example, defines sustainability as involving the persistence of diversity and ethical ideas of human flourishing among human communities, as well as the preservation and regeneration of ecological systems.

Case Study: Global Artificial Photosynthesis

In its present technologically unenhanced form, photosynthesis globally already traps around 4,000 EJ/year solar energy in the form of biomass. Nanotechnology researchers now are actively redesigning photosynthesis to achieve, for example, low-cost, local-domestic conversion of sunlight, water, and carbon dioxide into fuel for heating and cooking (Hurst, 2010). Nanotechnology is not only facilitating the capture of electromagnetic radiation from the sun but helping its transfer to improvements of the reaction center where it splits water to produce hydrogen (for fuel) and oxygen and then to reduce atmospheric carbon dioxide via the enzyme RubisCO to make carbohydrate food. Those methods seek to replicate how plants perform a single quantum computation, sensing many states simultaneously and so enhancing the efficiency of the energy capture and transfer at physiological temperatures (Gray, 2009).

Numerous competitively funded research teams have dedicated artificial photosynthesis-related projects already underway in many developed nations (Sanderson, 2008). Enhanced artificial photosynthesis, if applied consistently with bioethics and human rights, could assist crop production on marginal lands; reduce atmospheric CO₂ levels; lower geopolitical and military tensions over fossil fuel, food, and water scarcity; and create carbon-neutral hydrogen fuel for domestic, community, and industrial storage. Practical “artificial leaf” systems have been developed and are on the threshold of commercial rollout (Reece et al., 2011).

Establishing how bioethics and human rights meet the twin challenges of corporate globalization and environmental sustainability will be equally important with facilitating the scientific collaborations that will allow global artificial photosynthesis to take place in time to address the major societal and environmental challenges that the expanding human population and its dependence on fossil fuels are currently creating (Faunce, 2012).

The essence of a bioethical or human rights principle conceived in an ideal sense (and thus not merely derived mechanistically from a written religious or legal code, guideline, or declaration) as meeting these challenges is that it should be widely or even universally applicable (for example, depending on context, extend to protecting, respecting, or fulfilling the interests of all human beings, or animals, lifeforms, or ecosystems). The traditions of bioethics and human rights derive from profound consideration of the relations of humans with each other and nature. They should provide a calibration system against which can be critiqued for example the behavior of those artificial corporate persons currently self-interestedly dominating domestic and international trade law and policy in ways likely to be inimical to global artificial photosynthesis.

At present, the foundational social virtues and ethical principles likely to underpin any rollout of a new source of renewable energy and basic food will be perceived by many policy makers as likely to derive from corporate-driven free market ideology, religious authority, or indirectly through confronting the necessities of survival – an understanding that without such norms or rules of behavior the majority of humans could not live well with each other, or for very long.

A macrosience project to promote equitable global use of artificial photosynthesis represents an excellent opportunity to create a high profile awareness of nanotechnology, bioethics, and human rights as positive joint-contributors to overcoming major contemporary public health and environmental problems (Faunce, 2011a). One particular area of looming conflict will be between such a vision will be IMPs such as patents. Many of the nanotechnological techniques and structures, as well as the artificial proteins involved in artificial photosynthesis will be the subject of patents. The process of photosynthesis is as central to life on earth as DNA; thus, there are likely to be major debates over whether patents should be allowed over any part of the photosynthetic process. Such debates will be unlikely to inhibit patents being taken out over all aspects of artificial photosynthesis, but if excessive patents cause artificial photosynthesis ownership to become fragmented, “follow-on” research may be hampered by the high cost and difficulty in negotiating contracts with large numbers of patent owners (Faunce, 2011b).

Creating governance principles consistent with bioethics and human rights to deal with such issues will be an arduous and complex process. A good point of departure for such a governance journey might be a UNESCO *Declaration on the Bioethics and Human Rights of Global Artificial Photosynthesis*. Such a document would not have the force of law (under article 38 of the Statute of the International Court of Justice). However, it might become important as a symbolic utterance that guides ethical debate and law reform at international and domestic levels.

The UDBHR has many features that would be relevant to shaping the bioethical and human rights principles governing global artificial photosynthesis. These include, first, application to individuals, communities, and private corporations as well as states (article 1) and, second, a focus on “access to adequate nutrition and water,” “improvement in living conditions and the environment,” and “reduction in poverty and illiteracy” (article 14). The UDBHR also emphasizes the need to recognize the importance of freedom of scientific research and equitable access to medical, scientific, and technological developments (article 2); sharing its benefits with particular attention to the needs of developing countries (article 15); and safeguarding and promoting the interests of the present and future generations (article 2). UDBHR article 21.3 likewise relevantly requires that states and public and private corporate actors should recognize the “importance of research contributing to the alleviation of urgent global health problems” (Faunce, 2011b).

There are however bioethical issues much more specific to global artificial photosynthesis that could be raised by means of a specific UNESCO Declaration. These include whether photosynthesis in its natural form should be considered a subject to common heritage of humanity principles (as under specific United Nations Declarations and Conventions are the human genome, the moon, the outer space, the deep sea bed, our natural or cultural world heritage) or indeed a part of a new category of ethical and international law principles in the category of planetary common heritage. A statement in such a UNESCO Declaration that photosynthesis (in either its natural or artificial forms) was the common heritage of humanity could be important in wider governance moves to restrict corporate ownership through intellectual property rights or misuse by nation states for strategic or military purposes. Other questions may involve developing specific principles by which artificial photosynthesis technology can best address within defined time pressures critical problems of global poverty and environmental degradation (Faunce, 2011a, 2012).

One specific outcome of such normative intersections could be provisions supporting science-based assessment of the cost-effectiveness of such new technologies before government subsidy. Another might involve a commitment to withdraw investor-state dispute settlement rights once a nation has achieved a specific score on a rule of law index. Yet another might be a provision that supranational corporations, as a legal requirement of their registration, be ineffect ‘married’ through a requirement to undertake obligations to global public goods (annually selected by a regulatory authority) and restrain salaries for chief executives within a set proportion of those of political leaders. Sustainable government support for new renewable energy options like solar fuels could derive from a tax on global financial transactions

(Faunce, 2007). The treaty creating such a Tobin tax could include provisions preventing fraud through financial incentives to informants and their lawyers on the model of act us False Claims Act (Faunce, 2011b).

It is an act profoundly coherent with bioethics and human rights to imagine a world where every road, building and vehicle is “doing” photosynthesis more efficiently than plants and where each household could generate its own basic carbohydrate food and ethanol fuel for cooking, heat, and light simply and cheaply from a roof unit that required as inputs only photons, water, and carbon dioxide. It is also ethical to consider the pressure that thereby would be taken off the natural environment to provide land for crops or sources of fuel.

Conclusion

We have seen that there are now two powerful normative systems intersecting (and not necessarily in the public or environmental interest) with bioethics and human rights – domestic law (constitutional, judge made, as well as legislative) and international trade and investment law. The idea has been advanced that bioethics could be evolving toward justiciable and enforceable international human rights as part of a functional global social contract and this implies a combination of both self-assurance about the latter's regulatory and symbolic importance, as well as mistrust of governments to otherwise uphold the principles and virtues that sustain them.

The conceptual heart of any global social contract can no longer be considered to involve contractual-type guarantees involving rules about when any one person's freedom can be interfered with by another's, when the aims of the state should not unduly infringe those of its citizens and guarantees of basic social, cultural, and economic support. The obligations of supranational corporations and the capacity of citizens and the environment to be protected from them must also be part of a hypothetical global social contract and the national constitutional norms derived from it.

Both bioethics and human rights carry the promise of enlarging the objects of human sympathy and so the applicable range of principles and rules available to decision-makers. One such emerging social virtue is “environmental sustainability” and it is critical for the survival of our civilization and our planet that it takes its place alongside justice, equity, and respect for human dignity in the normative foundations of bioethics and human rights. Global artificial photosynthesis may emerge as the technology best able to shape the moral revolution that places environmental sustainability at the heart of the world's governance arrangements.

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