

MINING THE COMMON HERITAGE OF OUR DNA: LESSONS LEARNED FROM GROTIUS AND PARDO

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ABSTRACT

The Human Genome Project generated oceans of DNA sequence data and spurred a multinational race to grab the bounties of these oceans. In response to these DNA property grabs, UNESCO, drawing upon international law precedents addressing analogous grabs in the past, declared the Human Genome the heritage of humanity. The UNESCO Declaration provided, first, that the heritage shall not, in its natural state, give rise to financial gains and, second, that countries establish an international framework to make the benefits from genome research available to all. This iBrief will first examine Grotius's Mare Liberum to determine whether international law precedent indeed bars the private appropriation of a common heritage. Second, the iBrief will revisit the framework developed by Pardo for the exploitation of the mineral resources of the ocean floor and analyze whether it could serve as a model for an international framework for sharing the benefits of current genome research.

INTRODUCTION

¶1 The completion of the Human Genome Project (HGP) has generated oceans of DNA data. These oceans, however, have proven prone to exploitation through fishery and piracy. In the early stages of the HGP, the U.S. National Institute of Health (NIH) claimed ownership of the DNA sequence data, triggering a multinational race to the patent office.² While the NIH eventually abandoned its patent applications, private firms have since staked their own claims to DNA fragments covering most of the genes

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² Linda J. Demaine and Aaron Xavier Fellmeth, *Reinventing the Double Helix: A Novel and Nonobvious Reconceptualization of the Biotechnology Patent*, 55 STAN. L. REV. 303, 324 (2002).

in the human body.³ The claims have been met with severe criticism. Specifically, the scientific community has made a compelling case that many of the claimed fragments lack utility.⁴ However, in focusing on the statutory patent law requirements of novelty, non-obviousness, utility and enabling disclosure, a more fundamental issue has been largely ignored: Are the DNA sequences of the human genome patentable subject matter *per se*? One fundamental objection to the patentability of the Human Genome does not stem from patent law but rather is suggested by international solutions to previous races to grab the bounties of the human heritage.

¶2 In the 17th century Spain and Portugal claimed the right to exclude all foreigners from navigating or entering the Atlantic and Indian Oceans.⁵ In 1602 the Dutch East India Company (VOC) was formed, and as it attempted to trade with the East Indies, its vessels came into competition with those of the Portuguese.⁶ When the VOC seized a large Portuguese galleon in the Strait of Malacca, located between present-day Sumatra and Malaysia, it had to convince its potential allies of the legality of its seizure.⁷ To that end the VOC commissioned Hugo Grotius to write a defense of the Free Seas. Grotius's tractate, *Mare Liberum*, was to rule the waves for over three centuries, until its *laissez faire laissez passer* implications triggered a second race to grab the bounties of the human heritage.

¶3 The second race began in 1873 when "the *Challenger* expedition discovered the presence of potato-sized manganese nodules scattered across large areas of the sea-bed."⁸ It was not long before technological improvements increased the opportunities for prospecting, exploring and exploiting these resources. These developments prompted the US to claim

³ Eliot Marshall, *Intellectual Property: Companies Rush to Patent DNA*, 275 SCIENCE 780, 780-81 (Feb. 7, 1997).

⁴ HUGO Statement on the Patenting of DNA Sequences; see also Rebecca S. Eisenberg & Robert P. Merges, *Opinion Letter as to the Patentability of Certain Inventions Associated with the Identification of Partial CDNA Sequences*, 23 AIPLA Q.J. 1 (1995); Molly A. Holman & Stephen R. Munzer, *Intellectual Property Rights in Genes and Gene Fragments: A Registration Solution for Expressed Sequence Tags*, 85 IOWA L. REV. 735 (2000).

⁵ The Papal Bull of May 14, 1493, issued by Pope Alexander VI and modified by the Treaty of Tordesillas, which effectively had partitioned the "New World" between Spain and Portugal.

⁶ See James Brown Scott, *Introductory Note to HUGO GROTIUS, THE FREEDOM OF THE SEAS*, vii (James Brown Scott ed., Ralph Van Deman Magoffin trans., Oxford University Press, 1916).

⁷ Martine Julia van Ittersum, *Hugo Grotius in Context: Van Heemskerck's Capture of the Santa Catarina and its Justification in De Jure Pradae (1604-06)*, 31 A.J.S.S. 511, 524 (2003).

⁸ R. R. CHURCHILL & A. V. LOWE, *THE LAW OF THE SEA* 223 (Manchester University Press, 3rd ed. 1999).

ownership of the natural resources of the continental shelf beneath the high seas.⁹ This proclamation triggered a proliferation of similar claims by other nations.¹⁰ Following these claims by nations, a private company, US Deep Sea Ventures Inc., claimed exclusive mining rights to a specified nodule deposit in the Pacific.¹¹ This race to privatize the bounties of the Deep Seabed urged Arvid Pardo, in his seminal address delivered to the United Nations General Assembly, to propose that the resources of the deep seabed be declared the common heritage of mankind.¹² Under Pardo's proposal, the exploitation of this heritage was to be controlled by an international authority, as a trustee for all countries and for the benefit of mankind.¹³

¶4 Drawing on Pardo's proposal, the United Nations, faced with the multinational race to grab the bounties of the Human Genome, has endorsed the United Nations Educational, Scientific and Cultural Organization (UNESCO) Universal Declaration on the Human Genome and Human Rights (Declaration)¹⁴ stating, in a symbolic sense,¹⁵ that the human genome is the heritage of humanity.¹⁶ The Declaration stipulates that the human genome, in its natural state, shall not give rise to financial gains¹⁷ and that an international framework be established to make the benefits of research on the genome available to all.¹⁸ The Declaration, however, raises two, interrelated, questions.

¶5 First, the assumption underlying the prohibition on financial gain is that the common heritage principle bars private appropriation of the

⁹ Truman Proclamation on the Continental Shelf, Proclamation No. 2667, 10 Fed. Reg. 12,303 (Sept. 28, 1945).

¹⁰ Shigeru Oda, *The Continental Shelf*, published in FIFTY YEARS OF THE LAW OF THE SEA, SELECTED WRITINGS OF SHIGERU ODA, 18-23 (Kluwer Law International, 2002).

¹¹ CHURCHILL, *supra* note 8, at 226.

¹² First Statement of Arvid Pardo, as included in THE COMMON HERITAGE, selected papers on Ocean and World Order, 1967-1974, I.O. Occasional papers, page 2.

¹³ See KEMAL BASLAR, THE CONCEPT OF COMMON HERITAGE OF MANKIND IN INTERNATIONAL LAW 209 (Martinus Nijhoff Publishers, 1998); PATRICIA W. BIRNIE & ALAN E. BOYLE, INTERNATIONAL LAW AND THE ENVIRONMENT 143-44 (Oxford University Press, 2d ed. 2002).

¹⁴ Universal Declaration on the Human Genome and Human Rights, UNESCO Gen. Conf. Res. 29 C/Res.16, reprinted in Records of the General Conference, UNESCO, 29th Sess., 29 C/Resolution 19, at 41 (1997) (adopted by the UN General Assembly, G.A. res. 152, U.N. GAOR, 53rd Sess., U.N. Doc. A/RES/53/152 (1999)) [hereinafter Declaration].

¹⁵ *Id.* at art. 12.

¹⁶ United Nations Resolution on The Human Genome and Human Rights, G.A. res. 152, U.N. GAOR, 53rd Sess., at art. 1, U.N. Doc. A/RES/53/152 (1999).

¹⁷ Declaration, *supra* note 14, at art. 4.

¹⁸ *Id.* at art. 17.

concerned heritage. Part I of this iBrief will analyze whether this assumption is correct by revisiting Grotius's *Mare Liberum*. As this iBrief will demonstrate, Grotius's doctrine offers a surprisingly up-to-date framework by which to decide whether, to put it in Grotian terms, a common heritage is indeed a *res omnium communis*, incapable of appropriation, or a *res nullius*, exploitable on a "first come, first serve" basis.

¶6 Second, the litmus test of the common heritage principle is how it can be reduced to practice. The Declaration stipulates that nation states create a framework of international cooperation between established and developing countries. However, while the Declaration lists a few measures that States should pursue in creating such a framework,¹⁹ it fails to provide a concrete structure for States to build upon.²⁰ As one possible solution, organizations have proposed a global genome trust.²¹ For example, the U.S. National Research Council has suggested that the interests of donors of human DNA samples, collected from populations across the globe, could be represented by an international organization that would serve as a trustee and fund-holder for all the sampled populations.²² Additionally, a number of scientists recently urged the World Intellectual Property Organization (WIPO) to examine new, open collaborative development models for DNA data, because excessive, unbalanced, or poorly designed intellectual property protections may be counter-productive.²³ Part II of this iBrief will examine the viability of these proposals by revisiting the foremost example of an application of the common heritage principle: Pardo's solution to the appropriation of the deep seabed resources.

I. CAN A COMMON HERITAGE BE APPROPRIATED? MARE LIBERUM AND THE RIGHT TO FISH

A. *Mare Liberum*: Context, Natural Law and Rationale

¶7 On February 25, 1603, Jacob van Heemskerck, a Dutch Admiral employed by the Dutch East India Company (VOC), seized the *Santa*

¹⁹ *Id.* at art. 19.

²⁰ *Id.* at art. 12.

²¹ Barbara Looney, *Should Genes be Patented? The Gene Patenting Controversy: Legal, Ethical, and Policy Foundations of an International Agreement*, 26 LAW & POL'Y INT'L BUS. 231, 268-72 (1994).

²² NATIONAL RESEARCH COUNCIL, EVALUATING HUMAN GENETIC DIVERSITY (National Academy Press, 1997), available at <http://www.nap.edu/readingroom/books/genetic/>.

²³ Declan Butler, *Drive for Patent-free Innovation Gathers Pace*, 424 NATURE 118 (July 2003).

Catharina, a rich laden Portuguese galleon, in the straits of Malacca.²⁴ The matter was vital to the upstart VOC, as it attempted to trade with the East Indies at a time when Spain and Portugal, then united under one crown, had claimed the right to exclude all foreigners from navigating the Pacific and Indian Oceans.²⁵ To convince potential allies of the legality of the capture, the VOC retained the twenty-one year-old Grotius to write a defense that would hold across the globe.²⁶ Admitted to the Bars of Holland and Zeeland at the age of 17, Grotius framed his defense as a lawyer's brief. He brought his case before the double tribunal of "Conscience, or the innate estimation of oneself, and Public Opinion, or the estimation of others."²⁷ He appealed to the law that "is not difficult to find" but is "the same among all nations; and . . . is easy to understand, seeing that it is innate in every individual and implanted in his mind."²⁸ In brief, Grotius turned to natural law, as opposed to the man-made laws of a specific nation or jurisdiction. In Grotius's opinion, the laws of nature were particularly persuasive because they had not been "graven on tablets of bronze or stone" but were "written in the minds and on the hearts of every individual, where even the unwilling and the refractory must read them."²⁹ To build his case of natural law, Grotius drew on a variety of authorities, including Spanish jurists, theologians, and Roman law precedents.

¶8 Grotius began his tractate by proclaiming what he called the "specific and unimpeachable axiom of the Law of Nations, called a primary rule or first principle *Every nation is free to travel to every other nation, and to trade with it.*"³⁰ To illustrate the universal and timeless nature of this principle, Grotius described a series of wars waged throughout history over restrictions on the right to travel. For example, Moses and the Israelites fought the Amorites for denial of "innocent passage through their

²⁴ Ittersum, *supra* note 7, at 524.

²⁵ See SCOTT, *supra* note 6, at vii.

²⁶ R. Fruin, *Een Onuitgegeven werk van Hugo De Groot*, in 3 VERSPREIDE GESCHRIFTEN 36 (Martinus Nijhoff); see also Ittersum, *supra* note 7, at 524. While written in 1604–05, *Mare Liberum* was not published until 1609 at the request of the Zeeland Chamber of the VOC. The publication was to reply to a demand from Spain, made in the course of the negotiations to end the 80-year War that the Dutch gave up their right to trade with the East and West Indies. C. G. Roelofsen, *17th-Century International Politics*, in HUGO GROTIUS AND INTERNATIONAL RELATIONS, 108 (H Bull, B Kingsbury, A Roberts, eds. Oxford University Press, 1990).

²⁷ HUGO GROTIUS, *THE FREEDOM OF THE SEAS* 3 (James Brown Scott ed., Ralph Van Deman Magoffin trans., Oxford University Press, 1916).

²⁸ *Id.* at 5.

²⁹ *Id.* at 2.

³⁰ *Id.* at 7 (emphasis added).

territory.”³¹ Agamemnon and the Greeks attacked the king of Mysia on the ground that “high roads were free by nature.”³² Finally, the Germans were reported by Tacitus to have accused the Romans of barring all access to “the rivers and roads, and almost the very air of heaven.”³³ In addition to providing some historical context for his principle, Grotius also explained the rationale behind the principle. He pointed out that the necessities of life had been unevenly spread around the globe and that some nations had developed skills that other nations lacked.³⁴ Grotius thus took the “interdependence” between the nations of the world as the main legal underpinning of free trade. He also took the argument to its logical extension; mutual interdependence required free trade and free trade in turn required free access to the element over which connecting roads were running, *in casu* the High Seas.³⁵

B. Mare Liberum: The Genesis of Property

¶9 Grotius distinguished three different terms used to signify the legal status of the sea. The sea was either “the property of no one (*res nullius*), or a common possession (*res communis*), or public property (*res publicae*).”³⁶ These classifications followed the classifications set forth in traditional Roman law. *Res nullius* formed part of the larger class of *res extra commercium*, or properties that did not form part of the estate of a specific individual.³⁷ However, these properties could be appropriated and become part of an individual estate.³⁸ *Res communes omnium* were things belonging to everybody: the air, floating water, the sea and the shore.³⁹ “No one could own these things, but they could be used and enjoyed by everyone.”⁴⁰ *Res publicae* were the rivers and the ports.⁴¹

¶10 For a full comprehension of the legal implications of these terms, Grotius traced their origin and evolution. Citing Cicero and Horace, he noted that in the beginning there was no particular right and nothing was private property.⁴² The fields were not separated by borders and “every

³⁰ *Id.* at 9.

³² *Id.* at 9-10 (emphasis added).

³³ *Id.* at 10 (emphasis added).

³⁴ *Id.* at 7.

³⁵ *Id.* at 10.

³⁶ *Id.* at 22.

³⁷ J. INST. 2.1.12-18.

³⁸ *Id.*

³⁹ *Id.* at 2.1.pr-11 (De rerum divisione).

⁴⁰ P. VAN WARMELO, AN INTRODUCTION TO THE PRINCIPLES OF ROMAN CIVIL LAW, 63-65 (Juta & Co., Ltd. 1976).

⁴¹ *Id.* at 65.

⁴² GROTIUS, *supra* note 27, at 23.

path was free, all things were used in common.”⁴³ The rationale behind this original freedom, according to the early philosophers, was simply that nature or God had given all things to the human race and not to any individual in particular.⁴⁴ This notion of original freedom, however, shifted over time as people started to use consumables.⁴⁵ According to Grotius, the first category of consumables comprised food and drinks.⁴⁶ Grotius claimed there could be no use of these things without a certain kind of ownership.⁴⁷ They must belong exclusively to a given individual in a way that precludes their use by another person. Once moveable consumables became subject to possession, immovables such as fields and buildings could not “remain unapportioned.”⁴⁸ While their use did not result in their consumption, they were necessary for the production and consumption of consumables.⁴⁹ Ultimately, they too were in such scarce supply that they could not “satisfy the use of everybody indiscriminately.”⁵⁰ Things that in former times had been held in common could now be deemed the property of individuals once they had occupied them.⁵¹

¶11 Typically, it was sufficient if, after taking physical possession, the individual maintained the intention to possess. In the event, however, of things that resisted seizure, like wild animals, the occupation had to be uninterrupted.⁵² Consequently, “possession of movables implie[d] seizure,” whereas possession of immovables required the determination of boundaries.⁵³ This transformation from common to private property was followed by the development of public property. Public property exhibited characteristics of both common and private property. While public property was technically owned by a particular state, it was usually free for all citizens of the state to use. Interestingly, both private and public property arose in the same way and did not mutually exclude each other. Grotius observed, for example, that the land of Athens belonged to the Athenians but that the same land was split among individual owners.⁵⁴

¶12 Grotius reached two conclusions from these definitions of property. “[F]irst, that which cannot be occupied, or which never has been occupied,

⁴³ *Id.* at 24 (quoting SENECA, OCTAVIA 413-14).

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ *Id.* at 25.

⁴⁹ *Id.*

⁵⁰ *Id.*

⁵¹ *Id.*

⁵² *Id.*

⁵³ *Id.* at 25-26.

⁵⁴ *Id.* at 26.

cannot be the property of anyone, because all property has arisen from occupation.”⁵⁵ Second, “all that which has been so constituted by nature that although serving some one person it still suffices for the common use of all other persons, is today and ought in perpetuity to remain in the same condition as when it was first created by nature.”⁵⁶ Based on these conclusions, Grotius then listed many objects that by nature were open to the use of all; the water, the sun, the air and the waves.⁵⁷ All of these were not susceptible to occupation, and their common use was destined for all.

C. Mare Liberum and the Right to Fish

¶13 As a *res omnium communes* the sea seems incapable of private exploitation. This is not an absolute, however. While some things created by nature for the use of mankind remain common to all, other things may, through the industry and labor of each man, become his own.⁵⁸ Grotius argued that if any part of a common good is capable of occupation, it may become the occupant’s private property.⁵⁹ He turned to various classical writers for support for this argument, of whom Plautus put it most eloquently:

When the slave says: ‘The sea is certainly common to all persons’, the fisherman agrees, but when the slave adds: ‘Then what is found in the common sea is common property’, he rightly objects, saying: “But what my net and hooks have taken, is absolutely my own.”⁶⁰

¶14 Fish become property of the first taker, for two reasons. First, the uncertainty of ownership could not otherwise be avoided.⁶¹ Second, it was equitable that a premium be put on diligent labor and industry.⁶² However, the private property derived from the occupation of a suitable part of a common good is not absolute. Any occupation or private appropriation is conditional on the satisfaction of two fundamental imperatives. First, necessity, such as famine, may make common again things formerly owned privately.⁶³ Necessity, according to Grotius, “reduces everything to the natural law, because the mother of positive law is utility and utility should

⁵⁵ *Id.* at 27.

⁵⁶ *Id.*

⁵⁷ *Id.* at 27-29.

⁵⁸ *Id.* at 2.

⁵⁹ *Id.* at 29.

⁶⁰ *Id.* (quoting PLAUTUS, *RUDENS*, Act. IV, Scene 3).

⁶¹ Hugo Grotius, *Defense of Chapter V of the Mare Liberum* 116 (1615) reprinted in *THE FREE SEA*, at 116 (David Armitage ed., Liberty Fund, Inc., 2004).

⁶² *Id.* at 116.

⁶³ *Id.* at 86.

yield to necessity.”⁶⁴ “By this law, if food becomes scarce on board a ship,” Grotius wrote, “what each man has, is gathered in a common store.”⁶⁵ Second, a part of a common good will only become private property to the extent that such occupation does not impair its common use.⁶⁶ For example, the Roman praetors were able to grant their subjects the right to occupy the shores within the limits of the Roman Empire.⁶⁷ However, these Romans did not have the right to prevent anyone else from accessing the shore and doing all things that were traditionally considered permissible. Applying this standard to the case of the fisherman, the fisherman could claim private property on the fish his nets and hooks have taken, as long as he does not impair the common use of the fish in the sea. Put another way, he may not preclude anyone else from fishing. In addition, he is subject to any public rule purporting to conserve fishing stocks because the rule is intended to protect the common good.

¶15 In addition to the mutual interdependence, Grotius offered another rationale for the *Mare Liberum*. Countering the oft-made argument that his work is an *oratio pro domo* for the Dutch,⁶⁸ he points out that the case he is making “is the more reasonable, because their (the Dutch) advantage in this matter is bound up with the advantage of the whole human race, an advantage the Portuguese are trying to destroy.”⁶⁹ He asserts that the competition he is advocating reduces the profits of monopolists, “to the corresponding advantage of all other men.”⁷⁰ In other words, the *Mare Liberum* and the competition it allows serves mankind in the most beneficial manner.

¶16 Applying *Mare Liberum* to the efforts to patent the human genome, the status of the Human Genome as a *res omnium* would not, per se, bar private appropriation of parts thereof, provided such appropriation does not impair its common use and provided that the privatized parts could become common again in the case of an emergency. These two conditions provide for a remarkable up-to-date, if inarticulate, framework to govern the exploitation of the human genome. First, under the “no impairment to common use” test, any claims to appropriate all or a part of raw genomic sequences making up the human genome would be invalid; as such claims would certainly impair common use of the human genome. Second, the “necessity” test provides ample justification to address any “necessities or emergencies that might arise as a result of abusive use of appropriated

⁶⁴ *Id.*

⁶⁵ *Id.*

⁶⁶ GROTIUS, *supra* note 27, at 30.

⁶⁷ *Id.* at 30-31.

⁶⁸ *E.g.* Fruin, *supra* note 26, at 36; Ittersum, *supra* note 7, at 511-48.

⁶⁹ GROTIUS, *supra* note 27, at 70.

⁷⁰ *Id.* (citing Vasquez, *Controversiae Illustres*).

sequences, as may the case with genetic test, by rendering common again things formerly owned.”⁷¹ A discussion of how “recommonization” takes place (e.g. research exemption, compulsory licensing) is beyond the scope of this iBrief.

¶17 Not surprisingly, the *Mare Liberum* was met with criticism.⁷² Specifically, Grotius’s contemporaries argued that the *Mare Liberum* was a cover, proclaiming in fact a liberty common to all nations to fish indifferently on all kinds of seas.⁷³ One commentator, William Welwod, argued that community property bred disagreement and that whatever is owned communally is neglected due to natural viciousness.⁷⁴ This argument was more fully articulated four centuries later when Garrett Hardin published *The Tragedy of the Commons*.⁷⁵ Welwod also pointed out that community property carried with it the difficulty of administration,⁷⁶ a point that will become more manifest in Part II.

II. HOW TO EXPLOIT A COMMON HERITAGE OF MANKIND: LESSONS LEARNED FROM PARDO

A. *Exploitation of the Common Heritage: the North vs. the South*

¶18 Having established that the Common Heritage principle does not bar appropriation per se, we will now apply the litmus test of the common heritage principle: How can it be reduced to practice? The Declaration stipulates that the benefits of genome research be made available to all and that nation states establish a framework of international co-operation with developing countries.⁷⁷ While the Declaration itself fails to work out the details for such a framework, some commentators have proposed the establishment of a global genome trust.⁷⁸ For example, the U.S. National Research Council has suggested that the interests of donors of human DNA samples, collected from populations across the globe, could be represented by an international organization that would serve as a trustee and fundholder for all the sampled populations.⁷⁹ Patents would be issued in the

⁷¹ THE FREE SEA, *supra* note 61, at 86.

⁷² See, e.g., William Welwod, “Of the Community and Propriety of the Seas”, (1613) *reprinted in* THE FREE SEA, at 65-74 (David Armitage ed., Liberty Fund, Inc., 2004); John Selden, *Mare Clausum* (1618).

⁷³ Welwod, *supra* note 72, at 65-74.

⁷⁴ *Id.* at 66.

⁷⁵ Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244-45 (1968).

⁷⁶ Welwod, *supra* note 72, at 66.

⁷⁷ Declaration, *supra* note 14, at art. 12.

⁷⁸ See, e.g., Looney, *supra* note 21, at 267.

⁷⁹ NATIONAL RESEARCH COUNCIL, *supra* note 22.

name of this trustee organization, and the trustee would grant licenses to any party willing to share a portion of the net proceeds from products made from any patented gene, gene sequence or cell line with the trustee organization. The trustee organization, in turn, would be required to ensure that the licensing revenue benefited the participating populations, which would have representatives in the trustee organization.⁸⁰ This section will examine the viability of the trustee by revisiting the foremost example of an application of the common heritage principle: Pardo's solution to the appropriation of the deep-seabed resources.

¶19 Under Pardo's proposal, the bounties of the deep seabed would be declared "the common heritage of mankind."⁸¹ In order to effectively manage the common heritage, Pardo required a properly established international regime to assure peaceful use, orderly exploitation in the interests of mankind, with particular regards to the needs of poor countries, and freedom of research, with the results available to all.⁸² The international regime would act as a trustee for all countries over the oceans and the ocean floor.⁸³ The agency was to be endowed with wide powers to regulate, supervise and control all activities on or under the ocean and the ocean floor.⁸⁴ It was to also have the power to regulate the commercial exploitation of the ocean floor by issuing exploration rights.⁸⁵ Pardo's proposal prompted the United Nations to start negotiations that would create such an international regime during the Convention on the Law of the Seas.⁸⁶

¶20 Throughout the proceedings of the Convention, a key controversial issue was how the resources of the deep seabed, having been declared the common heritage of mankind, were to be exploited.⁸⁷ Did Pardo's common heritage principle comport with collectivist or unilateral exploitation? Or as Baslar put it: "The crux of the issue since the advent of the common

⁸⁰ *Id.*

⁸¹ Address by Arvid Pardo to the 22nd session of the General Assembly of the United Nations (1967), U.N. GAOR, 22nd sess., U.N. Doc. A/6695 (1967).

⁸² *Id.* Pardo's proposal is reflected in U.N. General Assembly's 1970 Declaration of Principles Governing the Seabed and the Ocean Floor and the Subsoil Thereof, Beyond the Limits of National Jurisdiction, G.A. Res. 2749, UN GAOR, 25th Sess., Supp. No. 28, at 24, U.N. Doc. A/8028 (1970).

⁸³ Address by Arvid Pardo to the 22nd session of the General Assembly of the United Nations (1967), U.N. GAOR, 22nd sess., U.N. Doc. A/6695 (1967).

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ E.g. J. M. Spectar, *The Fruit of the Human Genome Tree: Cautionary Tales About Technology, Investment, and the Heritage of Humankind*, 23 LOY. L.A. INT'L & COMP. L. REV. 1, 27-29 (2001).

heritage of mankind has always been about what kind of model of management would best serve the common interest.”⁸⁸

¶21 The issue divided the North from the South.⁸⁹ Most developed countries in the North held the view that, pending the negotiations that were to lead to the adoption of the Convention, unilateral mining of the mineral resources of any area of the sea beyond the limits of national jurisdiction could proceed as a permissible exercise of the freedom of the high seas.⁹⁰ Under the northern view and international law as it then stood, the main beneficiaries of mining would be a handful of developed States, regardless of whether the source of international law was the flexible “exploitability criterion” set forth in the 1958 Convention, the *res communis* doctrine or under the *res nullius*.⁹¹

¶22 In contrast to the northern view, most developing countries from the South argued that the deep seabed resources were unique and belonged to the whole of mankind.⁹² They employed the common heritage of principle as a tool to implement the ideas underlying the establishment of the New International Economic Order (NIEO)⁹³ set forth in the 1974 Declaration by the United Nations General Assembly.⁹⁴ The UN resolution provided that a new international economic order should be founded on several enumerated principles, particularly sovereignty over national resources in developing countries.⁹⁵ The NIEO provided for a comprehensive alteration of the world economic system, claiming that the disparities in income between states are unjust and caused by unfair economic arrangements.⁹⁶ The proposed wealth transfer from the North to the South was justified on the rationales of charity and/or guilt.⁹⁷ The arguments of the South were supplemented by some observers from the North, appealing to self-interest; that relieving poverty in the South by transferring wealth would help build markets for Northern exports and avoid conflicts and mass immigration.⁹⁸

⁸⁸ BASLAR, *supra* note 13, at 49.

⁸⁹ See Lieutenant Martin A. Harry, *The Deep Seabed: The Common Heritage of Mankind or Arena for Unilateral Exploitation?*, 40 NAVAL L. REV. 207 (1992).

⁹⁰ CHURCHILL, *supra* note 8, at 226.

⁹¹ *Id.* at 224-25.

⁹² HARRY, *supra* note 89.

⁹³ BASLAR, *supra* note 13 at 210-16.

⁹⁴ Declaration on the Establishment of a New International Economic Order, G.A. Res. 3201, at 3, U.N. GAOR, 6th Spec. Sess., U.N. Doc. A/9559 (1974) (declaration adopted without a vote).

⁹⁵ HARRY, *supra* note 89, at 210-11.

⁹⁶ *Id.*

⁹⁷ W. Scott Burke and Frank S. Brokaw, *Ideology and the Law of the Sea*, in *THE LAW OF THE SEA: U.S. POLICY DILEMMA*, 43, 45 (Bernard H. Oxman, David D. Caron, Charles L. O. Buder eds., ICS Press, 1983).

⁹⁸ *Id.*

As part of the implementation of the NIEO, the South then advanced a novel variant of the *res communis* doctrine. The model would permit the South to control and appropriate the benefits of exploitation and give it access to the technology necessary to exploit the resources, despite its inability to contribute to seabed development.⁹⁹ As Pardo had suggested, this required the establishment of an international seabed authority that was to have the power to engage in seabed mining and to control mining by licensees.¹⁰⁰

¶23 The resultant United Nations Convention on the Law of the Sea (Convention)¹⁰¹ predominantly supported the goals of the South and the NIEO. The communist countries initially denounced the creation and administration of a “common ownership of all mankind” as one more international machinery serving the predatory aims of capitalists’ monopolies.¹⁰² Yet, the centralized production regime created under the Convention could hardly be called anything but communistic. As one commentator has observed, the full complexity of the system proposed under the Convention can “only be fully appreciated by reading through the provisions of Part XI, Annexes III and IV, and the two Resolutions.”¹⁰³ For purposes of our reality check of analogous proposals for the exploitation of the human genome however, a summary of the system is provided in the following section.

B. The Convention: Governance and Research of the Common Heritage

¶24 The Convention created a legal regime governing the prospecting, exploration and exploitation of deep seabed mining.¹⁰⁴ The Convention declared the “Area” and its resources the common heritage of mankind and establishes a supranational Authority with taxing and licensing powers and the right to mandate technology transfer.¹⁰⁵ The Area was defined as the

⁹⁹ *Id.* at 48.

¹⁰⁰ CHURCHILL, *supra* note 8, at 228.

¹⁰¹ United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397.

¹⁰² View expressed by the Union of Soviet Socialist Republics at the 23rd session of the General Assembly (1968), 1592nd meeting of the First Committee, *in* OFFICE OF LEGAL AFFAIRS, UNITED NATIONS, THE LAW OF THE SEA: CONCEPT OF THE COMMON HERITAGE OF MANKIND 49 (United Nations 1996).

¹⁰³ CHURCHILL, *supra* note 8, at 231.

¹⁰⁴ *See* United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 (Part XI and Annexes III, IV and V, containing basic conditions of prospecting, exploration and exploitation and the statute of the Enterprise) [hereinafter UNCLOS].

¹⁰⁵ *Id.* at art. 156-57.

seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction.¹⁰⁶ Under the common heritage doctrine, Nation-States would become stakeholders in the Ocean commons and all rights in the resources of the Area were vested in mankind as a whole.¹⁰⁷ No State could “claim or exercise sovereignty over any part of the Area or its resources” except in accordance with the Convention, the Charter of the United Nations and in the interests of maintaining peace and security and promoting international cooperation and mutual understanding.¹⁰⁸

¶25 The Convention granted plenary power to the International Seabed Authority (Authority), which was composed of all States Parties to the Convention.¹⁰⁹ The Authority was divided into three principal organs: the Assembly, the Council, and Secretariat.¹¹⁰ The Assembly was the plenary body composed of all Authority members; it elected the Council and Secretary-General, assessed contributions, gave final approval to the rules and regulations of the Authority, approved the budget, and decided on the sharing of mining revenues received by the Authority.¹¹¹ Each nation received one vote in the Authority.¹¹² The Council was the executive body of the Authority and had primary responsibility for the administration of seabed mining regime.¹¹³ It approved work plans for mining and developed rules for the equitable sharing of the financial benefits to be derived from the seabed.¹¹⁴ The Council was assisted by an Economic Planning Commission and a Legal and Technical Commission.¹¹⁵ As the operating arm, carrying out mining, transport, processing and marketing activities in the seabed directly, the Convention introduced the mining entity: the Enterprise.¹¹⁶ The Enterprise, through mandatory transfer, was guaranteed access on request to seabed mining technology owned by private companies. The Authority was financed by contributions from members, funds received in connection with its activities and from the Enterprise.¹¹⁷ The Enterprise was to be subsidized by the signing nations and compete against its licensees.¹¹⁸ The initial costs of setting up the institutional

¹⁰⁶ *Id.* at art. 1, para. 1.

¹⁰⁷ *Id.* at art. 136-37, para. 2.

¹⁰⁸ *Id.* at art. 137.

¹⁰⁹ *Id.* at art. 156-57.

¹¹⁰ *Id.* at art. 158.

¹¹¹ *Id.* at art. 159-60.

¹¹² *Id.*

¹¹³ *Id.* at art. 161-62.

¹¹⁴ *Id.* at art. 162.

¹¹⁵ *Id.* at art. 163-65.

¹¹⁶ *Id.* at art. 170; *see also id.* at Annex IV (Statute of the Enterprise).

¹¹⁷ *Id.* at art. 171.

¹¹⁸ *Id.* at art. 170; *see also id.* at Annex IV (Statute of the Enterprise), art. 11.

infrastructure of the mining regime were estimated to range between \$ 350 and \$700 million.¹¹⁹

¶26 Under the Convention, states and international organizations have a general right to conduct marine scientific research, subject to its provisions, and a general obligation to promote scientific research and cooperate in the conduct of research.¹²⁰ Groups wishing to prospect could do so only if they complied with the Convention and the rules of the Authority concerning certain training programs.¹²¹ These programs related to marine scientific research and programs for the transfer of technology to the Enterprise and to developing States with regard to activities in the Area.¹²² They further included facilitating the access of the Enterprise and developing States to the relevant technology under fair and reasonable terms and conditions.¹²³ The prospector was also required to notify the Authority of the proximate area of his prospecting activities.¹²⁴ Prospecting could be conducted simultaneously by more than one prospector in the same area or areas.¹²⁵ While prospecting did not confer any rights on the prospector with respect to resources, a prospector could recover a reasonable quantity of minerals to be used for testing.¹²⁶

C. The Convention: Terms of Exploitation of the Common Heritage

¶27 Only the Enterprise, States Parties, and their private enterprises could apply to the Authority for approval of plans to work in the Area.¹²⁷ In order to be eligible for exclusive exploration and exploitation rights, an operator had to meet certain qualification standards.¹²⁸ While the Enterprise could apply to prospect any part of the Area, other applicants were restricted to certain reserved portions of the Area and were subject to a host of additional requirements.¹²⁹ Each application, other than those submitted by the Enterprise or by any other entities for reserved areas, had

¹¹⁹ Arvid Pardo, *An Opportunity Lost*, in *THE LAW OF THE SEA: U.S. POLICY DILEMMA*, 13, 23 (Bernard H. Oxman, David D. Caron, Charles L. O. Buderer eds., ICS Press, 1983).

¹²⁰ UNCLOS, *supra* note 104, at art. 200, 238-62.

¹²¹ *Id.* at Annex III, art. 2.

¹²² *Id.* at art. 143-44.

¹²³ Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea, 1994, *available at* http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindxAgree.htm [hereinafter Agreement].

¹²⁴ UNCLOS, *supra* note 104, at Annex III, art. 2.1(b).

¹²⁵ *Id.* at Annex III, art. 2.1(c).

¹²⁶ *Id.* at Annex III, art. 2.2.

¹²⁷ *Id.* at Annex III, art. 3.

¹²⁸ *Id.* at Annex III, art. 4.

¹²⁹ *Id.* at Annex III, art. 8.

to cover a total area “sufficiently large and of sufficient estimated commercial value to allow two mining operations.”¹³⁰ The Authority could accord the operator the exclusive right to explore and exploit one of the two sites, with respect to a specified category of resources and enter into a contract with the applicant incorporating that plan (the “parallel system”).¹³¹ If the Authority granted exploitation rights to one site, it had to designate the other site as “reserved area.”¹³² The Enterprise would then be given the opportunity to decide whether it would carry out activities in a reserved area.¹³³ Both exploration and exploitation could only be carried out in areas specified in the above plans and in accordance with the terms of a contract to be concluded between the Authority and the operator.¹³⁴

¶28 In addition to the previously mentioned provisions, the Convention included a number of other stipulations and requirements. For instance, the Convention established a fifteen-year limit on the annual production of seabed nickel.¹³⁵ The underlying motivation for the limit was to protect the prices and production levels produced by less-developed land-mining countries, heavily dependent on export-income.¹³⁶ The Convention also required applicants to make technology available to the Enterprise and developing States which it used in seabed activities, on fair and reasonable commercial terms, if the Enterprise could not obtain such technology on the open market.¹³⁷ As a general principle, the Annex prescribed that “title to minerals shall pass upon recovery in accordance with the Convention.”¹³⁸ Title to all minerals in the Area fundamentally belonged to mankind as a whole.¹³⁹ Title to the minerals could then vest in the person that recovered them from the Area, provided that person complied with the provisions of the Convention.¹⁴⁰ It would be up to the Authority to provide for the equitable sharing of financial and other economic benefits derived from

¹³⁰ *Id.*

¹³¹ *Id.* at Annex III, art. 16.

¹³² CHURCHILL, *supra* note 8, at 250.

¹³³ UNCLOS, *supra* note 104, at Annex III, art. 9, sub 1.

¹³⁴ *Id.* at annex III, art. 3.5.

¹³⁵ *Id.* at art. 151; *see also* Lance N. Antrim & James K. Sebenius, *Incentives for Ocean Mining under the Convention*, in THE LAW OF THE SEA: U.S. POLICY DILEMMA, 79, 89 (Bernard H. Oxman, David D. Caron, Charles L. O. Buderer eds., ICS Press, 1983).

¹³⁶ Robert A. Goldwin, *Common Sense vs. the Common Heritage*, in THE LAW OF THE SEA: U.S. POLICY DILEMMA, 59, 66 (Bernard H. Oxman, David D. Caron, Charles L. O. Buderer eds., ICS Press, 1983).

¹³⁷ UNCLOS, *supra* note 104, at art. 144.

¹³⁸ *Id.* at Annex III, art. 1.

¹³⁹ *Id.* at art. 137.

¹⁴⁰ *Id.* at Annex III, art. 1.

activities in the Area through any appropriate mechanism.¹⁴¹ In addition, the Convention provided for detailed regulation of data transfer¹⁴² and training programs and promoted the acquisition, dissemination and development of marine technological knowledge, including measures to help transfer this technology to developing countries.¹⁴³

D. The 1994 Amendment Agreement

¶29 As observed by one commentator, no sketch could do justice to the baroque architecture of the Convention.¹⁴⁴ Not surprisingly perhaps, several industrialized states refrained from signing the Convention, due to its exceptionally precise regulations and precedential impact.¹⁴⁵ When the developing states started to realize that they would have to bear the costs associated with the institutional architecture, informal negotiations were launched in search of a compromise.¹⁴⁶ In the Post Cold War neo-liberal climate of the early nineties, these negotiations resulted in the 1994 Implementation Agreement.¹⁴⁷ This Agreement simplified the structure of the Authority, provided for additional safeguards to protect the interests of the mining community and replaced the mandatory technology transfer provisions with a set of guidelines.¹⁴⁸ These guidelines obliged contractors to cooperate with the Authority in obtaining technology for the Enterprise and developing States on fair and reasonable terms, consistent with the effective protection of intellectual property rights.¹⁴⁹ The Agreement further eliminated production limits and provided that the Enterprise and commercial miners would stand on an equal footing, neither being subsidized.¹⁵⁰ All other provisions of the Convention remained intact. Although a few prospecting agreements have been concluded with pioneer investors, to date, even under the terms as modified by the 1994 Agreement, the framework for the exploitation of the deep seabed resources has failed to attract any significant investment.¹⁵¹ This lack of investment is primarily due to market developments and the discovery of substantial new land-

¹⁴¹ *Id.* at art. 140.

¹⁴² *Id.* at Annex III, art. 14.

¹⁴³ *Id.* at Annex III, art. 15.

¹⁴⁴ CHURCHILL, *supra* note 8, at 231.

¹⁴⁵ David H. Caron, *Reconciling Domestic Principles and International Co-operation*, in *THE LAW OF THE SEA: U.S. POLICY DILEMMA*, 3, 5-6 (Bernard H. Oxman, David D. Caron, Charles L. O. Buder eds., ICS Press, 1983).

¹⁴⁶ CHURCHILL, *supra* note 8, at 237.

¹⁴⁷ Agreement, *supra* note 123.

¹⁴⁸ *Id.* at Annex sec. 5.

¹⁴⁹ *Id.* at Annex sec. 5; *see also* CHURCHILL, *supra* note 8, at 249.

¹⁵⁰ CHURCHILL, *supra* note 8, at 248 (referring to the 1999 Agreement, section 2 paragraph 3).

¹⁵¹ *Id.* at 224.

based reserves of nickel, copper and cobalt.¹⁵² Yet, it seems safe to assume that the baroque architecture of the framework and the associated uncertainty over return on investment contributed to the demise of the Convention.¹⁵³

¶30 The lessons learned from Pardo's proposal are evident if the reader contemplates the enormities of the application of the system established by the Convention, *mutatis mutandis*, to the exploitation of the human genome. Apart from the sheer number of provisions and their level of detail, they took almost twenty-five years to negotiate. This is certainly too long for those involved in the biomedical research enterprise, researchers, companies and patients alike, to wait before moving genome knowledge from the bench to the market-place. While the efforts of Celera, the company that improperly threatened to privatize the entire genome, should be deplored for attempting to remove raw genomic sequence data from the public domain, the company's slogan that speed matters can hardly be denied. This, of course, is not to suggest that no international cooperation is possible. The successful completion of the HGP by the International Consortium bears testimony to the contrary. However, when establishing an international framework for the *commercialization* of the human genome and the sharing of any benefits, by way of a global fund or trust, the lesson to be learned from the Convention is that such a framework may be prone to overregulation due to the number of stakeholders involved and the divergence of their interests and views.

¶31 Notably, one result of the Convention's failure to reach a lasting solution has been the creation of a much simpler mechanism to achieve benefit-sharing. Various states have imposed a tax on the removal of deep seabed minerals. For example, the U.S. Deep Seabed Hard Mineral Resources Act of 1980 imposed a tax on any removal of a hard mineral resource from the deep seabed pursuant to a deep seabed permit.¹⁵⁴ In a similar fashion, I have proposed a special tax on tissue and cell products that have been directly developed from human sources.¹⁵⁵ Taxation is an effective, if indirect, mechanism for distributing the benefits of a particular activity throughout a community. The proceeds of such a tax could be earmarked to sustain, for example, government subsidies of affordable

¹⁵² *Id.* at 253.

¹⁵³ Spectar, *supra* note 87, at 29.

¹⁵⁴ Deep Seabed Hard Mineral Resources Act, Pub. L. No. 96-283, §§ 402, 403 94 Stat. 553 (1980) (codified at 30 U.S.C. §§ 1401-1473 (2000)).

¹⁵⁵ Jasper A. Bovenberg, *Whose Tissue is it Anyway*, 37 NATURE BIOTECHNOLOGY 929 (Aug. 2005).

healthcare insurance or orphan disease programs, to make the advances of genome research available to all.¹⁵⁶

CONCLUSION

¶32 The current approach to dealing with the human genome is found in the UNESCO Declaration. As has been demonstrated, the Declaration stipulates that the human genome, in its natural state, shall not give rise to financial gains, implying that the common heritage principle bars private appropriation. The Declaration also calls for the establishment of a legal framework aimed at making the benefits of genome research available to all. However, analysis of international precedents demonstrates, first, that the lesson learned from Grotius is that the status of a *res omnium* does not, per se, render a good incapable of private appropriation, provided such appropriation does not impair its common use and provided that the privatized parts could become common again in the case of an emergency. Second, when establishing an international framework for the exploitation of the human genome and the sharing of any benefits by way of a global fund or trust, the lesson learned from Pardo is that such a framework may be prone to excessive, unbalanced and counter-productive regulation. This is not only due to the number of stakeholders involved and the divergence of their interests but also to the sheer number of provisions, the level of detail of such collectivist frameworks, and the time it takes to negotiate them. The twenty-five years needed to negotiate a resolution for the distribution of sea bed resources is too long for a product like the human genome where speed matters for researchers, companies and patients. A more plausible way to ensure benefit-sharing could be the introduction of a tissue tax. Such a system would distribute benefits of genome projects to the entire world community in an efficient and expeditious manner.

¹⁵⁶ *Id.*