

iBOL as an Enabler of ABS and ABS as an Enabler of iBOL

Joseph Henry VOGEL¹

Professor of Economics, University of Puerto Rico-Río Piedras

Abstract: Despite legitimate misgivings about “thinking like an economist,” such thinking elucidates how the International Barcode of Life (iBOL) can help realize the benefit-sharing mandated by the Convention on Biological Diversity for access to genetic resources. The economics of information justifies a cartel over the genetic resources and associated knowledge.

Keywords: International Barcode of Life, access and benefit-sharing, Convention on Biological Diversity, biodiversity cartel, traditional knowledge

Introduction

“Thinking like an economist” is the mantra of my profession and I cringe whenever I hear it. I count myself among the dissident economists who believe that “thinking like an economist” has enabled the destruction of biological communities, both human and non-human.² Nevertheless, I would be the first to say “let’s not throw the baby out with the bathwater.” Much of the discussion about the International Barcode of Life (iBOL) proceeds as if formal economics did not exist. Such obliviousness does not really surprise me. Since the ratification of the United Nations Convention on Biological Diversity (CBD) in 1993, I have become inured to the lack of *any* economic thinking when the Conference of the Parties (COP) meets to discuss access and benefit-sharing (ABS).³ By examining iBOL in conjunction with my long trajectory in analyzing ABS, I hope to show that a baby can emerge sparkling clean from the murky waters of economics.

Where to begin? The preferred answer is: at the beginning. Unfortunately, space and time do not permit such thoroughness. To make my point about thinking—ugh—like an economist I will draw only from my most relevant publications which stretch back to 1992, well before ABS entered the lexicon

¹ The author wishes to acknowledge the direct support provided by the International Development Research Centre of Canada (Contract No. 112677), and the indirect support, by the National Science Foundation IGERT Grant (0801577) and the Australian Research Council Grant (LX0881935). Any opinions, findings and conclusions or recommendation expressed are those of the author and do not necessarily reflect the views of the IDRC, NSF, or ARC. Comments have been kindly provided by Ronnie Vernooy, Bob Stanley, Barbara A. Hocking, Tomme Rosanne Young, Teodora Zamudio, Camilo Gomides, Paul Bayman, and Steven E. Massey. The usual disclaimer applies. Figure 2 is derivative artwork by Josué Sánchez Manzanillo of the coversheet of the “iBOL Fact Sheet.”

² See Stephen A. Marglin, *The Dismal Science: How Thinking Like an Economist Undermines Community* (Cambridge, Massachusetts: Harvard University Press, 2008). Economics as “enabler” is the opening salvo.

³ See, for example, Joseph Henry Vogel, “The Unspeakable Economics of ABS,” *Bridges*, Vol. 12 no. 4 August 2008, 22. Reprinted in *BioRes Review*, October 2008. Available at <http://ictsd.net/i/news/bridges/27572/>

of UNSpeak (Box 1). In light of that trajectory, I hope to add value to recent texts about iBOL which have appeared in both top-tier journals and in-house publications.

The Acronyms of UNSpeak	
ABS	Access and Benefit Sharing
CBD	Convention on Biological Diversity
COP	Conference of the Parties
ICBG	International Cooperative Biodiversity Groups
MTA	Material Transfer Agreement
PIC	Prior Informed Consent

Box 1

iBOL as an Enabler of ABS

Precise language and a catchy introduction are *de rigueur* for *Scientific American*. The "Barcode of Life" by Mark Y. Stoeckle and Paul D.N. Hebert is no exception.⁴ By way of analogy, the authors explain the use of the word "barcode" to name this multi-million dollar initiative. Just as a supermarket uses barcodes to manage inventories, biologists hope to do something similar with a database of short DNA sequences. Although analogies can be illuminating, none is ever perfect. The purpose that the patent holders of supermarket barcodes had in mind when they filed with the United States Patent Office was "to provide an automatic apparatus that will execute with precision and dispatch classifying orders which are given to it and will yield up the results of the classifying process in an intelligible manner."⁵ What was the purpose that drove the barcodes of life? Creationists notwithstanding, the question shows that we are not really talking about an analogy, but a metaphor for a product of evolution, and evolution has no purpose. Therein lies an unintended consequence of choosing "barcode" as the name of the initiative: its ultimate limitation as an analogy makes one think about the very meaning of "analogy."

In biology, analogy refers to the same solution for the same problem without any shared ancestry that evidences that solution (e.g., the problem "flight" and the solution "wings" in flies, bats, and birds). It is contrasted to homology, which can be a different solution for a different problem, but inhering to a shared ancestry (e.g., the forelimbs in humans, bats, and whales, used for hunting, flying, and swimming). As we have seen, the two barcodes are not perfectly analogous, but are they homologous? The answer is again no. Inasmuch as the barcode of the supermarket is inanimate, it cannot be homologous with the barcode of life in any biological sense.

⁴Mark Y. Stoeckle and Paul D.N. Hebert, "Barcode of Life" *Scientific American*, October 2008, 82-88.

⁵ Norman J. Silver, N.J. Venter, and Bernard Silver, 1949, "Classifying Apparatus and Method," U.S. Patent 2,612,993, filed Oct. 20, 1949 and issued Oct. 7, 1952. Available at <http://www.adams1.com/shareware/2612994.pdf>

Nevertheless, the two are homologous in a physical sense inasmuch as both can be quickly reduced to information. Such reduction is critical to my economic thesis that iBOL enables ABS and ABS can enable iBOL. But I am racing ahead of myself and will develop this point further after first considering some other salient points from the *Scientific American* article.

The authors offer a glistening vision of a future world where a handheld barcode reader allows, say, "a hiker on a mountain trail...insert[ing] a sample containing DNA—a snippet of whisker...or the leg of an insect...into the device, which would detect the sequence of nucleic acids in the barcode segment."⁶ The romanticism of a hiker, breathing in all that fresh air, is a nice rhetorical flourish. Unfortunately, it will be met by the not-so-nice denunciation of "biopiracy." At the Inaugural Workshop Pablo Turabo pointed out the "potential roadblock for iBOL where the [CBD] in various countries prohibited the exportation of all genetic material. If not amended, these laws could make it impossible for species to be shipped from their place of origin to core laboratories such as the Canadian Centre for DNA Barcoding."⁷

An "amend[ment]" to the CBD is no slam-dunk; under the CBD, the whisker is unequivocally a genetic resource and before it can be fed into the handheld gizmo, the competent authority will ask for evidence of prior informed consent (PIC) as well as an ABS agreement. Turabo's remarks are not *en passant* and securing either PIC or ABS is not *pro forma*, as any veteran to the nine COPs will attest. So, the iBOL "Research Overview" is endearingly naïve when it closes with point six: "Members of the iBOL consortium are committed to the regulatory framework established under the Convention on Biological Diversity. Transactions between iBOL members will respect all restrictions with respect to biomaterials transfers."⁸

The supremacy enjoyed by the CBD inevitably generates scorn among field biologists.⁹ I have sensed the anger, and I am only a peripheral messenger. Especially loathed is the non-governmental organization ETC (Erosion, Technology, and Concentration) which was formerly RAFI (Rural Advancement Foundation Institute). RAFI scored a major success in 2001 with the cancellation of the million-dollar Maya ICBG Project for ethno-bioprospecting in Chiapas, Mexico.¹⁰ Chuck McManis, professor of law, relates that the acronym has since morphed into a transitive verb: being "RAFIED."¹¹

⁶ See note 4, 83.

⁷ Mark Engstrom, Paul Herbert, and Laurence Packer, "Inaugural Workshop for The International Barcode of Life," University of Guelph, June 17-20, 2007, 6.

⁸ The International Barcode of Life, "Research Overview July 2008," 14.

⁹ Andrew Revkin, "Biologists Sought a Treaty; Now they Fault it," *The New York Times*, May 7, 2002, D1.

¹⁰ Joshua Rosenthal, "Politics, Culture and Government in the Development of Prior Informed Consent and Negotiated Agreements with Indigenous Communities," pages 373-393 in Charles McManis, (ed.), *Biodiversity & Law*, (London: EARTHSCAN, 2007).

¹¹ Charles R. McManis, "Fitting traditional knowledge protection and biopiracy claims into the existing intellectual property and unfair competition framework," pages 425-510 in B. Ong

Fortunately, to think like an economist is to think opportunistically. The iBOL Project may correspond not only to the worthy goals of the “activists,” purportedly “fair and equitable benefit-sharing,” but actually become the enabler of “fair and equitable benefit-sharing.”¹² The “how” lies in exploring further the homology of the barcode of life and the supermarket barcode in their shared root of “information.”

By the second paragraph of the *Scientific American* article, Stoeckle and Hebert have identified the object of the barcodes as “genetic information.” Over the 16 years of the CBD, biological samples have never been treated as “genetic information” despite an occasional reference to such effect. Policy discussion treats samples as if they were tangibles that *can* be tracked and monitored.¹³ Thinking like an economist, another mantra comes to mind: “you cannot put a fence around information.” Imagine that hiker high up in the Sierra Madre who just slipped the cat’s whisker into his vest pocket. Any attempt to monitor and track the genetic resource is a Sisyphean task. Do we perform a body cavity search at the airport? Should the whisker have been sequenced on the trail already and subsequently discarded, do we scan his pen drive? Happily, there is more than one way to skin a felid or, in our cyber age, copy-and-paste a file. The first step is the requirement that patent applications disclose any species accessed in R&D.¹⁴

The molecular biologist interrupts and steps into the row. Why would any government want to do that? The economic answer is that incentives must be aligned between the industries that research and develop natural products and the countries that decide the fate of habitats. Industry must contribute toward the opportunity costs of conserving genetic resources, specifically the value foregone in not logging the forests, not damming the rivers, not mining the mountains, and so on.¹⁵

How do we align incentives? The political answer reached at the Rio Earth Summit in 1992 was: S-O-V-E-R-E-I-G-N-T-Y. Various articles of the CBD overturn the doctrine of common heritage of mankind (*res nullius*) and allow each ratified party to negotiate ABS over its genetic resources with industry.

(ed.) *Intellectual Property and Biological Resources* (London: Marshall Cavendish Academic, 2004), 460.

¹² In the case an NGO is truly nihilist, it should be dismissed.

¹³ For a comprehensive analysis of the absence of the correct classification of genetic resources as information in the COPs, see Santiago Pastor Soplín and Mauel Ruíz Millar, “El Desarrollo de un Régimen Internacional de Acceso y Distribución de Beneficios Equitativo y Eficiente en un Contexto de Nuevos Desarrollos Tecnológicos,” *Iniciativa para la Prevención de la Biopiratería, Documentos de Investigación*, SPDA Año III No. 9 Mayo 2008.

¹⁴ This argument has been fully elaborated in Joseph Henry Vogel, “Reflecting Financial and Other Incentives of the TMOIFGR: The Biodiversity Cartel,” pages 47-74 in Manuel Ruíz and Isabel Lapeña (editors) *A Moving Target: Genetic Resources and Options for Tracking and Monitoring their International Flows* (Gland, Switzerland: IUCN, 2007). Available at <http://data.iucn.org/dbtw-wpd/edocs/EPLP-067-3.pdf>

¹⁵ For the economics of this argument, see Joseph Henry Vogel, *Genes for Sale* (New York: Oxford University Press, 1994).

Who could object to such freedom? Thinking like an economist, I did. I predicted that such sovereignty would turn out to be a Trojan Horse, and I derive no joy from the fact that history has proved me right.¹⁶ Let me explain the economic basis for my pessimism by way of the homology in information.

In the streets of the developing world, a thriving market exists in pirated movies. The hawker typically asks \$1 per DVD which is approximately 5% of the retail price. Why not \$19?...\$18?...\$3? or even \$2? The answer is competition. Each hawker has a strong incentive to underbid other hawkers and the price drops to the marginal costs of reproduction and hawking. No monopoly rent is ever paid to the creator of the artificial information, viz., Hollywood.¹⁷

The same holds true for natural information. Most bioprospected metabolites are diffused across species, and most species are diffused across political boundaries. Each sovereign country underbids its neighbor and ABS falls to the marginal costs of collection plus the transaction costs of consummating an MTA. When reported, royalties are typically 1% or less.¹⁸ Note well that the biotech executive who concludes such a deal will have "respect[ed] all restrictions with respect to biomaterials transfers" under the regulatory framework established under the CBD.¹⁹ The scenario cannot therefore be described as biopiracy. Everything was painstakingly legalized. I prefer to call it "biofraud," a neologism for the asymmetry in the CBD: respect for a monopoly patent over artificial information for the transnational conglomerate, yet global competition over natural information for the developing country.²⁰ Such a steal could also be called a *negocio redondo* in Spanish.

¹⁶ The comprehensive explanation can be found in Joseph Henry Vogel, "Sovereignty as a Trojan Horse: How the Convention on Biological Diversity Morphs Biopiracy into Biofraud," pages 228-247 in Barbara A. Hocking, (ed), *Unfinished Constitutional Business? Rethinking Indigenous Self-Determination* (Australia: Aboriginal Studies Press, 2005). The first published statement of sovereignty as a disaster is evident in the title of Case VI, "Bioprospecting: The Impossibility of a Successful Case Study without a Cartel" in Joseph Henry Vogel, "White Paper: The Successful Use of Economic Instruments to Foster the Sustainable Use of Biodiversity: Six Cases from Latin America and the Caribbean," *Summit of the Americas on Sustainable Development*, Santa Cruz de la Sierra, Bolivia, 6-8 December 1996, *Biopolicy Journal*, vol. 2, Paper 5 (PY97005), 1997. Available as <http://www.bdt.org.br/bioline/py>

¹⁷ Elsewhere I have used the example of music CDs. See note 3.

¹⁸ S. Peña-Neira, C. Dieperink and G. Addink, "Equitably sharing benefits from the utilization of natural genetic resources: the Brazilian interpretation of the Convention on Biological Diversity," draft article presented at the 6th Conference of the Parties to the Convention on Biological Diversity, The Hague, Netherlands, April 19, 2002.

¹⁹ See note 8.

²⁰ Joseph Henry Vogel, "Nothing in Bioprospecting Makes Sense Except in the Light of Economics," pages 65-74 in Naomi Sunderland, Phil Graham, Peter Isaacs, and Bernard McKenna (eds), *Toward Humane Technologies: Biotechnology, New Media and Ethics*, (Rotterdam, Sense Publishers Series, 2008).

In Spanish, "Nada en bioprospección tiene sentido excepto a la luz de la economía" *Revista Iberoamericana de Economía Ecológica* Joseph Henry Vogel, *REDIBEC*, No. 1, October 2004.

A digression is warranted. William Faulkner famously said that history is not even past.²¹ In the early days of “discovery,” appropriation was through rape and pillage.²² By the beginning of the nineteenth century plunder was no longer convenient, as the newly independent countries were also portraying themselves as victims of colonial abuse. So, appropriation evolved into successive accords, each one more confiscatory than the last, the Choctaw treaties being especially noteworthy.²³ Genetic resources and associated knowledge are now the latest and last frontier. Thinking like an economist, I will not focus on the disquieting continuity of MTAs with the history of appropriation. I will only focus on the inefficiency. Bilateral MTAs mean grossly insufficient compensation to meet the opportunity costs of conservation. As Dan Janzen has said most colorfully “[e]very corner of the world which isn’t explicitly protected is going down the toilet.”²⁴

Thinking like an economist provides the solution.²⁵ Recognizing the asymmetric cost structure of information—high fixed costs, low marginal costs—the economist recommends that the government protect the innovator or the conservationist from competition. For artificial information, we have monopoly intellectual property rights (e.g., patents, copyrights, trademarks and so on) and a slew of international conventions (see WIPO).²⁶ For natural information, we have *nada*.

What we need to prevent a price war among sovereign countries is an oligopoly over natural information which is, in plain English, a biodiversity cartel.²⁷ The legal vehicle to institutionalize the cartel would be a special protocol to the CBD that would establish a cartel over genetic resources, and

²¹William Faulkner, *Requiem for a Nun* (New York: Random House, 1951), 92.

²² Plymouth is the exception and its prominence in U.S. primary education is little more than a propaganda operation. By the time the pilgrims landed in 1620, the niche had opened due to more than a century of Old World diseases spreading North from Spanish contact in the Florida peninsula. See Jared Diamond, *Guns, Germs, and Steel* (New York: W.W. Norton, 1997).

²³ Freely available on the internet, are the Treaties of “1786,” “1805,” “Dancing Rabbit Creek of 1830,” and “with the Confederacy, 1861,” <http://www.uwm.edu/~michael/treaties/>

²⁴See note 7, 7.

²⁵ The economist can provide only the technical component of any complex solution. The non-technical components will emerge through what Garrett Hardin called “mutual coercion, mutually agreed upon” in “The Tragedy of the Commons,” *Science* 162 (1968), 1243-1248. For such components regarding PIC and ABS, see the forthcoming anthology, Joseph Henry Vogel, (ed.), *The Museum of Bioprospecting, Intellectual Property, and the Public Domain: A Place, A Process, A Philosophy* (London: Anthem Press, 2010). Inspired by Deidre [formerly Donald] McCloskey’s observation that economics needs more humor, the anthology is a romp with a fictitious octogenarian who savages the seven contributing academics about bioprospecting, intellectual property, and the public domain.

²⁶ See “Gateway to” in the home site of the World Intellectual Property Organisation, <http://www.wipo.int/portal/index.html.en>

²⁷ Joseph Henry Vogel, (ed.), *The Biodiversity Cartel: Transforming Traditional Knowledge into Trade Secrets*, The InterAmerican Development Bank/Consejo Nacional de Desarrollo, CARE, USAID, SANREM, and EcoCiencia (Quito, Ecuador: CARE, 2000). Available in Spanish as *El cartel de la biodiversidad*.

another over associated knowledge which is also homologous in information (see Box 2).

Article 8(j) of the CBD: Thinking Outside One Box...and in Another

Our hiker may think that traditional knowledge does not pose any problem as long as he doesn't question any indigenous person he may happen upon. Think again. A thought experiment can reveal the fallacy in such logic. Imagine he walks in the environs of an indigenous settlement. By its mere proximity, he has enhanced the probability of collecting specimens in a garden and gardens epitomize associated knowledge.

The lifetime work of the ethno-biologist Darrell Posey shows that many "primary forests" have co-evolved with communities over millennia. A conservative interpretation of Article 8(j) of the CBD is that such communities can require both PIC and an ABS agreement. However, to implement Article 8(j) multiple legal problems arise regarding

1. The status of such knowledge (published and therefore, public domain? or unpublished, and potentially a trade secret?)
2. The *persona* of the "community"—amorphous or formalized?
3. The benefits to be shared: Projects selected democratically within the community? Or by the shaman, who may be the only member with knowledge not in the public domain?

Solutions to these and other problems have been fleshed out in *The Biodiversity Cartel: Transforming Traditional Knowledge into Trade Secrets* (see note 27). Its recommendations derive from thinking outside the box in which specimens can be monitored and tracked, and inside another in which genetic resources and associated knowledge are homologous in information. Although such reduction is also a box, it is one that still yields much low-hanging fruit, if I may mix metaphors.

To respect the letter and spirit of Article 8(j), any iBOL support for a biodiversity cartel over genetic resources must also mean support for another cartel over traditional knowledge, transformed into trade secrets.

Box 2

"The devil is in the details" is a worthy cliché. Which countries of a cartel should make a claim? How much would each get? A simple solution would be a share in proportion to habitat of the species bioprospected. If Brazil occupies 56% of the Amazonian basin and Ecuador a mere 2%, the former would get 56% of the royalty and the latter, 2% for a metabolite found in species distributed throughout the basin. In 1992, I incorporated such reasoning in my call for a "Gargantuan Database." Updating *Genes for Sale*, I would now call it iBOL²⁸

²⁸ Joseph Henry Vogel, *Privatisation as a Conservation Policy* (Melbourne, Australia: CIRCIT, 1992). The in-house publication was vetted and slightly adapted for re-publication in 1994 by Oxford University Press as *Genes for Sale*, see note 14. Perhaps I chose against the barcode metaphor in *Privatisation* based on the then current events. One of the most memorable stories of the 1992 U.S. presidential campaign occurred at a check-out counter in Orlando, FL. The barcode scanner dumbfounded George H.M. Bush. Pundits would later comment that Bush's bewilderment about a technology, hardly new even then, helped defeat him in the razor-thin race. Andrew Rosenthal, "Bush Encounters the Supermarket, Amazed," *The New York Times*, February 5, 1992, A1.

With the cartelization of genetic resources and associated knowledge, the disclosure of any species in patent applications, samples should flow freely for the purposes of classification.

The implementation of iBOL worldwide can become the enabler for a fair and equitable ABS which industry has successfully scuttled through the COP process. The thumbnail sketch above explains how iBOL will enable ABS. Now for the second half of my title: How does ABS enable iBOL? The answer is money.

ABS as an Enabler of iBOL

When iBOL confronts the COP over PIC and ABS, pressure will mount to kowtow to industry, whose courtesans will trot out the tired plea for a "taxonomic exemption" and belittle the "activists" as obstructionists. Before being seduced by power, the movers and shakers of iBOL should beware: the opportunity costs of agreement may be iBOL itself. The decision of the Supreme Court of California in *Moore v. Regents of University of California* shows that once a sample is set loose in the U.S., there is no way to lay claim to any benefit.²⁹ The lesson for ABS worldwide is not to let any sample out of the country of origin even for the purposes of classification. Should samples somehow leave by hook or by crook and end up in iBOL databases, activists will chant "biopiracy" and all that excellent PR will go down Janzen's toilet.

Let's assume that iBOL somehow wrangles an exemption to PIC and ABS and turns a deaf ear to the activists. The question becomes: does iBOL really want to depend forever on the largesse of governments, each one eager to free ride off the next? To date, Canada has been quite generous. But how long will that last? And how fair is it for Canada to have to foot the bill of an international public good? What resources will have to be spent on PR just to maintain current funding levels? The biodiversity cartel is a self-sustaining mechanism that is both efficient and equitable. As long as money flows from ABS to iBOL, iBOL can become a countervailing power to the vested interests promoting the despicable bilateral MTAs.³⁰

Alas, the pesky devil still hides in a thicket of details. Hazzarding one last cliché, I dare say that many solutions can be pulled out of the memory hole. For example, Chapter 7 of *Genes For Sale* is entitled "The Rationale, Design, and Implementation of the Gargantuan Database" and Chapter 9, "Finance" which includes a section entitled "Who Will Finance the Gargantuan Database?" The answer is unquestionably fair: the countries that enjoy the royalties distributed. I also treated explicitly the scenario of a widely distributed metabolite for which the transactions costs of distribution outstrip

²⁹ *Moore v. Regents of the University of California*, 51 Cal. 3d 120, 271 Cal. Rptr. 146, 793 P.2d 479. Available at <http://www.mdinsurance.state.md.us/sa/documents/MoorevRegents-SupremeCourtOfCA-1990.pdf>

³⁰ The concept of "countervailing power" owes to John Kenneth Galbraith and his intellectual descendants. See, for example, *American Capitalism: The Concept of Countervailing Power* (Boston: Houghton Mifflin, 1952).

the royalties collected. I concluded that, in such cases, the royalties collected “should be used to diminish the fixed costs of the gargantuan database.”³¹ Elsewhere I explained that to keep level the much vaunted playing fields, the royalty rate should be invariant no matter what the diffusion of the metabolite across species, and species across political boundaries, and no matter whether the remittance is to cartel members or to the Gargantuan Database.³²

Will iBOL support a biodiversity cartel in the ongoing COP discussions about an “International Regime on ABS?” I am hopeful, not because I believe that iBOL will do the right thing—people seldom do. My reason for hope is that doing the right thing behooves iBOL, materially so. Adam Smith’s most famous phrase about the butcher, the brewer and the baker, is still apt: it will not be from the benevolence of iBOL that iBOL enables fair and equitable ABS, but from regard to its own interest. Now, what could be more economic in thinking than that?

Ending with an Image: The Word Count Ticks

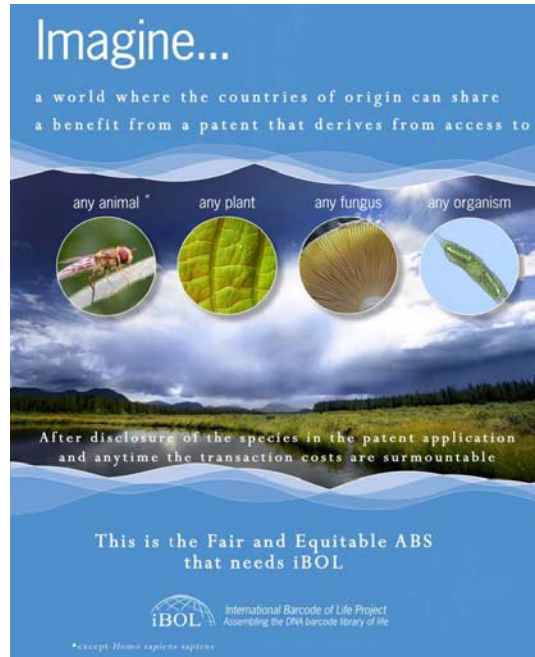
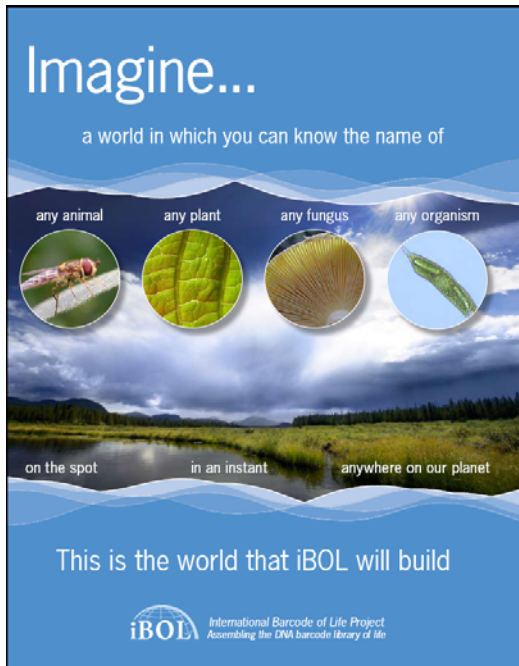
Carl Sagan quipped that a picture (i.e., one frame) is worth not 1,000 words, but the equivalent of 10,000 words or “bytes” of information.³³ A mere 2,000 words was the limit iBOL set for this article. With this sentence and the copious footnotes, I have already surpassed that limit by 50%. So, I ask iBOL for indulgence. Once granted, I will sneak in the equivalent of another 10,000 words and have the last word photographically—Figure 1.

³¹ See note 15, 87.

³² This point is elaborated in Joseph Henry Vogel, “From the ‘Tragedy of the Commons’ to the ‘Tragedy of the Commonplace’ Analysis and Synthesis through the lens of Economic Theory,” pages 115-136 in Charles McManis, (ed.), *Biodiversity & Law*, (London: EARTHSCAN, 2007).

³³ Carl Sagan, *The Cosmic Connection: An Extraterrestrial Perspective* (New York: Dell Publishing, 1973), 237-238.

BEFORE



AFTER

2009. Derivative artwork (right side) by Josué Sánchez Manzanillo of the cover of the iBOL Fact Sheet (left side)

Figure 1. Suggested revision of the cover of the iBOL Fact Sheet