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Biodiversity, Traditional Knowledge and Patent Rights: The Case Study of *Phyllomedusa bicolor*

BIODIVERSIDADE, CONHECIMENTO TRADICIONAL E DIREITO DE PATENTE: O ESTUDO DE CASO DA PHYLLOMEDUSA BICOLOR

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Abstract
This article intends to analyze the possible structure of the appropriation of traditional knowledge through the patent rights system. The research question is whether the international legislation on patents and biodiversity may be contributing to the process of appropriating traditional knowledge and natural genetic resources associated with Brazilian biodiversity from the Amazon region. The aim is to cross-reference the empirical facts concerning the use of traditional knowledge and the effects of the legal treatment of patent rights. The theory to be constructed is that the international regulations on patent rights and biodiversity contribute to the process of appropriating traditional knowledge associated with Brazilian biodiversity. Therefore, empirical qualitative research is conducted, utilizing the rules of inference developed by Lee Epstein and Gary King and the grounded theory methodology. Finally, the case of *Phyllomedusa bicolor* (*Kampô* frog) was selected and studied to extract empirical data which can be used to enunciate the theory of appropriation of natural genetic resources and associated traditional knowledge from the South by the North.

Keywords
Empirical research; biodiversity and traditional knowledge; patent and cultural rights; economic and social rights; *Phyllomedusa bicolor*.

Resumo
Este artigo tem a intenção de analisar a possível estrutura de apropriação do conhecimento tradicional pelo sistema de direito de patente. A pergunta de pesquisa é se a legislação internacional sobre patentes e biodiversidade pode contribuir para o processo de apropriação do conhecimento tradicional e de recursos genéticos naturais associados à biodiversidade brasileira da região amazônica. O objetivo é cruzar dados empíricos acerca do uso de conhecimento tradicional e dos efeitos do tratamento legal de patentes. A teoria a ser explicitada é a de que a legislação internacional sobre direito de patentes e biodiversidade contribui para o processo de apropriação do conhecimento tradicional associado à biodiversidade brasileira. Portanto, uma pesquisa empírica qualitativa é conduzida, utilizando as regras de inferência desenvolvidas por Lee Epstein e Gary King e a metodologia da teoria enraizada nos dados. Assim, o caso da Phyllomedusa bicolor *(rã Kampô) foi selecionado e estudado para extrair dados empíricos que puderam ser utilizados para enunciar a teoria da apropriação de recursos genéticos naturais e conhecimento tradicional associado do Sul pelo Norte.*

Palavras-chave
Pesquisa empírica; biodiversidade e conhecimento tradicional; direito de patente; direitos econômicos e sociais; Phyllomedusa bicolor.

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Introduction

This article is the first of an ongoing project which intends to empirically examine the intellectual property rights system and its bureaucratic apparatus worldwide. Specifically, it aims to analyze the possible structure of appropriating traditional knowledge through the patent system. The research question is whether international legislation on patents and biodiversity may be contributing to the process of appropriating traditional knowledge and natural genetic resources associated with Brazilian biodiversity in the Amazon region.

This paper intends to demonstrate a relationship between the main international legal texts and the process of appropriating traditional knowledge and natural genetic resources, based on the idea that inventions deriving from any sort of traditional knowledge or utilizing any natural genetic resources keep their novel distinction, once they have been processed through the logic of conventional science (laboratory experiments, for example). As Vandana Shiva (2001, p. 22) asserts "[b]ecause IPRs and patents are a deepening and an extension of the processes of colonization, the resistance to patent monopolies is an important aspect of the contemporary movement for decolonization". This understanding will provide the basic evidence for this paper's theoretical proposition as far as it can be applied to Brazilian biodiversity and indigenous traditional knowledge.

The normative units of analysis are the 1994 Trade Related Intellectual Property Rights Agreement (TRIPS) and the 1992 Convention on Biological Diversity (CBD).[1] One of the goals of this long-term research project is to cross-reference the empirical facts concerning the use of traditional knowledge and natural genetic resources and the effects of the legislative patent system.

Following Charmaz's (2014) methodological guidelines, the emergent hypothesis is whether the international regulations on patent rights and biodiversity may be contributing to the process of appropriating traditional knowledge and natural genetic resources associated with Brazilian biodiversity, taking into account the vagueness of the normative terms and the empirical analysis of the *patentscope* database. However, one goal is to extract the first empirical elements from the *patentscope* database, which may indicate a transfer of natural genetic resources and traditional knowledge from the South to the North, as theoretically denounced by Shiva (2001).

This research stems from specific cases concerning the use of traditional knowledge identified on a field trip to *Manaus* in the state of *Amazonas*, Brazil. Patent applications concerning

1 The 1994 TRIPS Agreement is a multilateral agreement on intellectual property rights whose main goal consists of harmonizing the intellectual property rights in different countries as a strategy of international commerce. The 1992 CBD can be defined as a multilateral agreement whose main objectives are the conservation of biological diversity, the sustainable use of natural genetical resources and the fair and equitable sharing of benefits derived from the biological diversity.

the cases of *Phyllomedusa bicolor* (*Kampô* frog) were collected taking into account ethnographic reports concerning the uses of traditional knowledge in the Amazon region as well as the use of natural genetic resources from Brazilian biodiversity. The World Intellectual Property Organization (WIPO) database, the *patentscope* (WIPO, 2018), was searched and explored to locate the patent applications taking into consideration if they had been granted.

This first report will approach the single case of *Phyllomedusa bicolor*, based on Alvaro Pires' methodological advice (PIRES, 2012). According to Pires (2012), it is not a problem to conduct a single case study if the aim of the qualitative research is not a generalization grounded on statistical inference, but an exploration of a problematic social structure, utilizing inductive analysis. In this vein, Charmaz (2014, p. 198) also complements,

> [w]hereas quantitative researchers use their data to make statistical inferences about target populations, grounded theorists aim to fit their emerging theories with their data. Quantitative researchers test preconceived hypothesis; grounded theorists can offer the grist for emergent hypotheses that quantitative researchers might pursue

Thus, the number of patents granted mentioning *Phyllomedusa bicolor* in their contents was collected in order to verify whether the international legislation may be contributing to the process of appropriating natural genetic resources or traditional knowledge. The first topic of this article describes the methodological points of departure and outlines the scope of the proposed case study. The second is a brief analysis of the main legislative documents. The third explains the construction of the charts based on the patent information retrieved from the *patentscope*. The fourth presents a preliminary descriptive inference, the axial code of this case, the categories extracted from the collected data, and preliminary abstract categories concerning the use of traditional knowledge and natural genetic resources from Brazilian biodiversity.

1. THE PATENTSCOPE AND THE CASE OF *PHYLLOMEDUSA BICOLOR*

Chang (2001) expresses his historical approach to the origins of intellectual property rights as well as the blatant disrespect of developed countries for the first agreements on intellectual property rights when he states that developed countries are now demanding greater efforts from developing countries to comply with international agreements on intellectual property rights, which exceed the efforts made by developed countries at the beginning of their own industrialization processes.

Biopatents are a means of exclusively profiting from the benefits of scientific development by developed countries as well as of possibly excluding local communities from developing their potential in the specific realms of economy, science, and technology (cf. SHIVA, 1991). Vandana Shiva (1991, p. 2740) denounces:

> All technological transformation of biodiversity is justified in the language of "improvement" and increase of "economic value". However, "improvement" and "value" are not neutral terms. They are contextual and value-laden. What is improvement in one context is often regression in another. What is value added from one perspective is value lost from another.

Biopatents are worth checking empirically, from the viewpoint of the main international regulations and their effects on the Brazilian biodiversity and associated traditional knowledge as Shiva (2001, p. 22) notes: "The movement against biopiracy and biopatents, or patents on life, is therefore a movement for the freedom of diverse species, the freedom of diverse cultures, and the freedom of women and all excluded groups of society".

Shiva (1991) criticizes the colonial intellectual property mechanism of excluding traditional knowledge from scientific *episteme*. Following Shiva's perspective, traditional knowledge should be thought of as part of prior art. In fact, the well-known legal concept of novelty requires a sense of innovation vis-à-vis prior art. Blakeney (2011), nonetheless, raises a fundamental question concerning the difficulty of gathering information related to traditional knowledge used in the process of patent analysis. According to Blakeney (2011, p. 34), the "WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC) has begun to address practical measures to establish linkages between IP Offices and traditional knowledge documentation initiatives". This does not mean that traditional knowledge would impede scientific progress. Rather, scientists may improve drugs, cosmetics, etc. using traditional and cultural expertise. However they would have to make a more effective effort to prove the novelty and inventiveness of their product.

The WIPO patentscope is an international dataset organized following the Patent Cooperation Treaty (PCT). Applicants have to follow the formal legal dispositions established in the PCT to apply for a patent (World Intellectual Property Organization, 1970). The PCT (World Intellectual Property Organization, 1970) demands that the petition designates the Contracting States where the applicant wants its patent to be acknowledged and granted. During the international phase, the PCT, according to articles 15, 16, and 18, determines how the international search for prior art will be executed (WIPO, 1970). Subsequently, the PCT will send the information to the national offices of designated States so that the analysis of the patent application can be made in each designated State in accordance with international and national legislations (WIPO, 1970).

Moreover, to efficiently search the patentscope, ethnographic reports were utilized in order to justify the insertion of a search criterion, such as the scientific name of the *Kampô* frog, as far as the case of *Phyllomedusa bicolor* is concerned. Cunha (2009, p. 244) summarizes ethnographic reports concerning the utilization of the *Kampô* frog's secretion by diverse indigenous peoples. According to Cunha (2009, p. 344), the first report on the utilization of this traditional knowledge was written by Constant Tastevin and then published in the journal "*La Geographie*" in 1925.

Gorman (1993) also describes in his text "Making magic" that the *Matses*, an indigenous tribe in the Amazon region, revealed to him the benefits of the *Kampô*'s secretion, which he personally experienced. Furthermore, Gorman (1993) also shared the results of his anthropological experience with John Daly *et al.* (1992) who have developed experiments in order to confirm the scientific soundness of the properties of the secreted substances, i.e., *dermorphin*, *delthorphin*, and *dermaseptin*.

Erspamer *et al*. (1993, p. 1099) relate the *Phyllomedusa bicolor* to different ethnographic reports, including Gorman's. Erspamer *et al.* (1993, p. 1106) conclude that "the gastrointestinal symptoms (vomiting, diarrhea) observed in the early phase of *sapo* intoxication may be predominantly, if not entirely, an expression (sic) of caerulein intoxication", found in the frog's secretion. In addition, Lima (2012, p. 140) states that there are more than fifteen indigenous groups in Southwest Amazonia which make use of the *Phyllomedusa bicolor*'s secretion. Dornelles, Marques e Renner's (2010, p. 107) study confirms that the toxins found in the genus of *Phyllomedusa*, from the family *Hylidae*, have analgesic, antibiotic, and wound-healing properties.

Using the aforementioned brief literature review as a point of departure, the data collection at the *patentscope* was executed using the words "*Phyllomedusa bicolor*" as search criteria. Once established that the occurence of the term *Phyllomedusa bicolor* (without quotations marks) in the patent files was consistent with the use of traditional knowledge as described in the ethnographical studies, the WIPO site was accessed to collect patent records that would mention the scientific name of the *Kampô* frog. As a result, 82 occurrences were recovered from the database.

Each patent application receives a number. This number is also a hyperlink, which directs the user to the patent dataset. Once there, it is possible to access the bibliographical national data or the PCT reference. If the hyperlink directs the user to the bibliographical national data, it is necessary to find the international application number, which is a hyperlink that directs the user to the PCT bibliographical data. On the other hand, if the hyperlink refers to the PCT reference, access is automatically granted to the PCT bibliographical data. While accessing this diverse content, it was discovered that the international application numbers coincide with the PCT reference numbers. This analysis provided grounds to narrow the final result to 11 granted patents out of the 82 occurrences initially found.

However, before interpreting the patent applications, it is relevant to understand the core standards of the main international legislation regarding patent rights and biodiversity protection.

2. Brief analyses of the legislative documents

Bearing in mind the objective of this research, it is necessary to clarify which rules govern the construction of granted patents and how these rules reflect both tacit assumptions and explicit meanings while analyzing the database (patents granted). Legal regulations, in general, establish that the patenting of a final product excludes the use of that particular invention

by third parties without permission or authorized license. Moreover, the TRIPS agreement affirms, though in arguably vague language:

> (3) Members may also exclude from patentability
> (b) plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement. (WTO, 1994)

This qualitative research reviews through critical analysis the recurrent practice of disregarding the legal principle that plants or animals are non-patentable (as stated on article 3 aforementioned) as well as the principle that biological diversity should be used sustainably, taking into consideration indigenous and environmental rights. According to Dhar and Rao (1992, p. 275), "only the developed country proposals remain in the 'take-it-or-leave-it' draft of Arthur Dunkel. Dunkel, while presenting his draft, stated that there would be no substantial re-opening of the 'Agreement'". In fact, TRIPS formally expresses the developed countries' priorities to the detriment of developing countries' necessities (CHANG, 2001; HALBERT, 2017). Guaran (2009, p. 207) reinforces this perspective:

> The overall development in developing countries may be hampered for want of access to a protected technology. In the short run, discontinuing protected products will dislocate industries in developing countries. Even in the long run, as claimed by developed countries, protecting IPR will not promote investment in indigenous technology because developing countries lack fundamental prerequisites – monetary funds, research facilities, and scientific and technical personnel. (GUARAN, 2009, p. 207)

This raises a relevant question: what can be considered innovative and/or inventive in the context of researching biological diversity?

Blakeney (2011, p. 17) asserts that TRIPS does not provide a clear distinction concerning the case of DNA, as it occurred in the case of "*Phyllomedusa bicolor*". Due to the lack of a precise definition, this could lead to the "tragedy of the anticommons",[2] raising obstacles for genetic improvements in general (BLAKENEY, 2011, p. 17).

2 The term is utilized by Blakeney (2011, p. 17): "HelIer and Eisenberg who suggested that genetic research tool patents could create a 'tragedy of the anticommons' in which multiple patent owners would tie-up genetic materials in a thicket of IP patent rights".

Furthermore, animals and plants are part of biological diversity, thus should be protected and regulated in accordance with the UN Convention on Biological Diversity. The UN Convention on Biological Diversity, Article 8 states:

> Each contracting party shall, as far as possible and as appropriate,
> (j) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices. (UNITED NATIONS, 1992)

The Convention poses another relevant question: can the use of a substance from animals or plants be considered sustainable if the traditional knowledge of local communities is not taken into account as an essential variable in the cost-benefit equation? Moreover, would it be legitimate to patent the substance extracted from animals or plants already used in local communities?

Downes (2013, p. 437) confirms that:

> The Convention on Biological Diversity (CBD) was negotiated in the context of a "bipolar" dynamic between developing countries (the South, perceived as rich in genetic resources but poor in the technology needed to exploit them) and developed countries (the North, perceived as technology-rich but resource-poor).

According to Pauchard (2017, p. 3), the CBD incorporates the requests from developing countries when it grants to each country the sovereign right over natural genetic resources located in their territory, which "means that the material ownership of GR [genetic resources] belongs to the States and that they have sole competence to decide under what conditions access to 'their' GR can be granted and resulting benefits shared". Pauchard (2017, p. 5) also clarifies that the Group of Like-Minded Megadiverse Countries (Bolivia, Brazil, China, Colombia, Costa Rica, Democratic Republic of the Congo, Ecuador, Ethiopia, Guatemala, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Mexico, Peru, Philippines, South Africa, and Venezuela) played a very active role in the defense of compliance measures from user countries during the elaboration of the Nagoya Protocol, adopted by some countries in 2010. The Nagoya Protocol improved the concept of natural genetic resources expressed in the CBD, as the concept now includes not only the living organisms found in nature but also enzymes, flavonoids, alkaloids, and all sorts of biochemical compounds extracted from natural genetic resources (PAUCHARD, 2017). This should direct-

ly impact the analysis of patent applications concerning the use of traditional knowledge and genetic resources.

Furthermore, including the extracts of living organisms as part of natural genetic resources implies that the compounds found through the contact with the Matsés and other indigenous groups in the Southwest Amazonia can function as valid codes to verify the process of appropriating natural genetic resources from the Southern by the Northern countries. Formally, the normative instruments are interrelated with the idea of the perpetuation of colonial power (QUIJANO, 2000). In practice, this version of natural genetic resources that are retrieved from the combination of legal CBD norms and the Nagoya Protocol may not effectively influence either the formulation of national legislation related to biological diversity or the usual application of TRIPS.

Finally, this brief analysis of legal documents aims to guide the extraction of relevant codes from some of the information recovered from the *patentscope*.

3. Explaining the chart construction

Once data from the *patentscope* was collected, it was necessary to filter and select the relevant information, taking into account the relationships between the theoretical code and the legislative analysis. The first aim here is to understand who the participants of the patent legal system are and how their intention (briefly mentioned in the legislative analysis and in the aforementioned literature review) is disclosed by the information present in granted patents including elements of natural genetic resources and traditional knowledge from local communities in the Amazon region. It is important to elucidate that some of the granted patents were translated using the WIPO translation mechanism, for example, those in Japanese.

Following Charmaz's methodological guidance, the information present in the patent system was analyzed to check if it could reveal more of the intent of developed countries as well as the nature of the patent system as it pertains to the TRIPS Agreement, the CBD (UNITED NATIONS, 1992) and the Nagoya Protocol (UNITED NATIONS, 2010). Considering all data collected using as keywords *Phyllomedusa bicolor* in the advanced search field of the *patentscope*, it was necessary to verify which of the patent applications had been submitted under the legal conditions of PCT. Once this data was organized in a chart, it was possible to identify that most of the patent applications had identical numbers, abstracts, and names. Furthermore, the numbers were hyperlinks, which led to other patent descriptions. In fact, these other patent applications were very similar to the original ones.

After analyzing the data and links, it might not be hasty to suppose that the patent application, considering the number of Designated Countries appointed by the applicant in the international application, may be divided into different requests once the application

is directed to each of the Designated Countries with a traceable origin denominated as "patent family".[3]

Taking all this into account, the Designated Countries, the applicants, the inventors, the grant number, and the grant date were selected from the eleven granted patents that mention the keywords "*Phyllomedusa bicolor*" to help extract a preliminary code that might unveil the first abstract category of analysis, that is, the existing colonial power (QUIJANO, 2000).

Every line of both charts presents a different patent found in the *patentscope*. Before sending the patent application (submitted under the PCT) to each Designated Country (as claimed in the petition), an international prior art search is executed. After this procedure, every Designated Country will follow its legislation and, thus, the grant dates are going to differ from country to country. Because of this, all the cells, which contain common information concerning the grant date, were merged, while keeping separate the countries that granted the patent on a specific date.

The first column on Chart 1 indicates the number (in parenthesis) and the name of the patent, as retrieved from the *patentscope*. The second column refers to the International Application Number, recovered from the *PCT Biblio.Data* tab. The third column pinpoints the Designated Countries where the patent was granted. The fourth column shows the grant number and the fifth column, the grant date. Both the grant number and the grant date were found on the National Phase tab in the *patentscope*.

CHART 1 – **GRANTED PATENT AND INTERNATIONAL APPLICATION**

NAME	INTERNATIONAL APPLICATION	GRANT NUMBER	DESIGNATED COUNTRY	GRANT DATE
1 (US6440690) PEPTIDES FOR THE ACTIVATION OF THE IMMUNE SYSTEM IN HUMANS AND ANIMALS	-	6440690	US	08.27.2002
2 (US20040073977) TRANSGENIC PLANTS EXPRESSING TEMPORIN PEPTIDES	CA2000/000288	7081568	US	07.25.2006
3 (RU02306148) LATARCIN PEPTIDE WITH ANTIMICROBIAL ACTIVITY	-	-	RU	09.20.2007

(it continues)

3 The patent family consists of patents granted in different countries to protect the same invention. In other words, all applications for the same invention form a patent family.

4 (US20090298741) TROPHIC FACTOR COMBINATIONS FOR NERVOUS SYSTEM TREATMENT		7862826	US	01.04.2011
5 (WO2011001097) DERMASEPTIN B2 USED AS AN INHIBITOR OF THE GROWTH OF A TUMOR	PCT/FR2010/051347	2947455 5898071	FR CA JP	01.03.2014 16.10.2018 11.03.2016
6 (WO/1999/056766) METHOD FOR TREATING ISCHEMIA	US1999/009452		EP AU NZ	07.10.2002 05.15.2003 01.07.2003
7 (WO1999056767) METHOD FOR TREATING CYTOKINE MEDIATED HEPATIC INJURY	PCT/US1999/009457		AU EP MX NZ	12.19.2002 01.02.2003 08.19.2005 08.07.2003
8 (WO2000055337) TRANSGENIC PLANTS THAT ARE RESISTANT TO A BROAD SPECTRUM OF PATHOGENS	CA2000/000288	- 6835868 -	AU US CA	10.07.2004 12.28.2004 05.29.2012
9 (WO2005079523) NOVEL TELEOST DERIVED ANTIMICROBIAL POLYPEPTIDES	PCTUS2005005398	-	US	01.24.2012
10 (WO2002028425) METHODS FOR TREATING MUSCLE INJURIES	PCT/US2001/027193	- 1008738190000 6423319	NZ MX AU CA DK KR US	12.01.2006 18.12.2007 01.09.2005 07.08.2007 01.11.2010 11.12.2008 23.07.2002
11 (WO2012019660) PROCESS OF TRANSFECTING PLANTS	EP2011/002279	- 5898681	MX EP AU JP	04.05.2017 12.13.2017 01.22.2015 04.06.2016

Source: Elaborated by the author.

The grant date of each patent reveals relevant data, that is, all of the patents were granted after the 1992 CBD and five of them were granted after the 2010 Nagoya Protocol (UNITED NATIONS, 2010). Most of the Designated Countries, which have accepted the patent application and analyzed it in accordance with their internal legislation, are developed countries, except for Mexico (the only developing and peripheral country on the list above). Moreover, all of the others are known for their technological prowess, in contrast with a lack of natural genetic resources. This preliminary data collection may be used to indicate, first

of all, the possible contradictions related to the excessive impositions from developed countries on developing countries authorized by TRIPS (cf. CHANG, 2001); and secondly, some evidence of a possible new kind of colonial exploitation of Southern countries (QUIJANO, 2000). Furthermore, the predominance of developed countries in the list above is rather revealing of how this legal monopoly may interfere with a relative balance between developing and developed countries in international commerce, as described by Susan Sell (2003 and 2011).

On Chart 2 the first column indicates the number (in parenthesis) and the name of the patent, as retrieved from the *patentscope*. The second and third columns show the applicants and the inventors, respectively. These data were retrieved from either the *PCT Biblio. Data* tab or the *National Biblio. Data* tab.

CHART 2 – **GRANTED PATENTS AND THEIR APPLICANTS AND INVENTORS**

NAME	APPLICANTS	INVENTORS
1 (US6440690) PEPTIDES FOR THE ACTIVATION OF THE IMMUNE SYSTEM IN HUMANS AND ANIMALS	MOR, AMRAM	MOR, AMRAM VOULDOUKIS, IOANNIS NICOLAS, PIERRE
2 (US20040073977) TRANSGENIC PLANTS EXPRESSING TEMPORIN PEPTIDES	UNIVERSITY OF VICTORIA INNOVATION AND DEVELOPMENT CORPORATION	MISRA SANTOSH KAY WILLIAM W.
3 (RU02306148) LATARCIN PEPTIDE WITH ANTIMICROBIAL ACTIVITY*	INFORMATION NON-AVAILABLE	KOZLOV SERGEJ ALEKSANDROVICH (RU)КОЗЛОВ СЕРГЕЙ АЛЕКСАНДРОВИЧ (RU)VASILEVSKIJ ALEKSANDR ALEKSANDROVICH (RU)ВАСИЛЕВСКИЙ АЛЕКСАНДР АЛЕКСАНДРОВИЧ (RU)VORONTSOVA OL'GA VALENTINOVNA (RU)ВОРОНЦОВА ОЛЬГА ВАЛЕНТИНОВНА (RU)POLJANSKIJ ANTON ALEKSANDROVICH (RU)ПОЛЯНСКИЙ АНТОН АЛЕКСАНДРОВИЧ (RU)VOLYNSKIJ PAVEL EVGEN'EVICH (RU)ВОЛЫНСКИЙ ПАВЕЛ ЕВГЕНЬЕВИЧ

(it continues)

		(RU)FEOFANOV ALEKSEJ VALER'EVICH (RU) ФЕОФАНОВ АЛЕКСЕЙ ВАЛЕРЬЕВИЧ (RU)EFREMOV ROMAN GERBERTOVICH (RU) ЕФРЕМОВ РОМАН ГЕРБЕРТОВИЧ (RU)ARSEN'EV ALEKSANDR SERGEEVICH (RU) АРСЕНЬЕВ АЛЕКСАНДР СЕРГЕЕВИЧ (RU)GRISHIN EVGENIJ VASIL'EVICH (RU)ГРИШИН ЕВГЕНИЙ ВАСИЛЬЕВИЧ (RU)
4 (US20090298741) TROPHIC FACTOR COMBINATIONS FOR NERVOUS SYSTEM TREATMENT	WISCONSIN ALUMNI RESEARCH FOUNDATION	MURPHY CHRISTOPHER J. MCANULTY JONATHAN F. MITCHELL GORDON S. GOLDER FRANCIS J.
5 (WO2011001097) DERMASEPTIN B2 USED AS AN INHIBITOR OF THE GROWTH OF A TUMOR	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (C.N.R.S); UNIVERSITÉ PIERRE ET MARIE CURIE (PARIS 6); UNIVERSITÉ PARIS EST CRÉTEIL VAL DE MARNE; DELBE, JEAN; AMICHE, MOHAMED; LADRAM, ALI; GALANTH, CÉCILE; NICOLAS, PIERRE; HAMMA, YAMINA; VAN ZOGGEL, JOHANNA ALLEGONDA ANNA; COURTY, JOSÉ	DELBE, JEAN; (FR) AMICHE, MOHAMED; (FR) LADRAM, ALI; (FR) GALANTH, CÉCILE; (FR) NICOLAS, PIERRE; (FR) HAMMA, YAMINA; (FR) VAN ZOGGEL, JOHANNA ALLEGONDA ANNA; (FR) COURTY, JOSÉ; (FR)
6 (WO/1999/056766) METHOD FOR TREATING ISCHEMIA	UNIVERSITY OF KENTUCKY RESEARCH FOUNDATION [US/US]; 207 ADMINISTRATION BUILDING LEXINGTON, KY 40506-0032 (US)	OELTGEN, PETER, R.; (US). KINDY, MARK, S.; (US). PAUL D. BISHOP; (US)
7 (WO1999056767) METHOD FOR TREATING CYTOKINE MEDIATED HEPATIC INJURY	UNIVERSITY OF KENTUCKY RESEARCH FOUNDATION [US/US]; 207 ADMINISTRATION BUILDING LEXINGTON, KY 40506-0032 (US)	OELTGEN, PETER, R.; (US). MCCLAIN, CRAIG, I.; (US). BARVE, SHIRISH; (US). BISHOP, PAUL, D.; (US)
8 (WO2000055337) TRANSGENIC PLANTS THAT ARE RESISTANT TO A BROAD SPECTRUM OF PATHOGENS	UNIVERSITY OF VICTORIA INNOVATION AND DEVELOPMENT CORPORATION [CA/CA]; P.O. BOX 3975, R. HUT, MCKENZIE AVENUE, VICTORIA, BRITISH COLUMBIA V8W 3W2 (CA) (FOR ALL	MISRA, SANTOSH; (CA). KAY, WILLIAM, W.; (CA)

(it continues)

	DESIGNATED STATES EXCEPT US). MISRA, SANTOSH [CA/CA]; (CA) (FOR US ONLY). KAY, WILLIAM, W. [CA/CA]; (CA) (FOR US ONLY)	
9 (WO2005079523) NOVEL TELEOST DERIVED ANTIMICROBIAL POLYPEPTIDES	UNIVERSITY OF GEORGIA RESEARCH FOUNDATION, INC. [US/US]; BOYD GRADUATE STUDIES RESEARCH CENTER, THE UNIVERSITY OF GEORGIA, ROOM NO. 633, ATHENS, GA 30602-7411 (US) (FOR ALL DESIGNATED STATES EXCEPT US). EVANS, DONALD, L. [US/US]; (US) (FOR US ONLY). KAUR, HARJEET [IN/US]; (US) (FOR US ONLY). JASO-FRIEDMANN, LILIANA [UY/US]; (US) (FOR US ONLY). LEARY, JOHN, H., III [US/US]; (US) (FOR US ONLY). PRAVEEN, KESAVANNAIR [IN/US]; (US) (FOR US ONLY	EVANS, DONALD, L.; (US). KAUR, HARJEET; (US). JASO-FRIEDMANN, LILIANA; (US). LEARY, JOHN, H., III; (US). PRAVEEN, KESAVANNAIR; (US)
10 (WO2002028425) METHODS FOR TREATING MUSCLE INJURIES	ALLERGAN, INC. [US/US]; 2525 DUPONT DRIVE IRVINE, CA 92612, US (ALLEXCEPTUS) BROOKS, GREGORY, F. [US/US]; US (US ONLY) AOKI, KEI, ROGER [US/US]; US (US ONLY)	BROOKS, GREGORY, F.; US AOKI, KEI, ROGER; US
11 (WO2012019660) PROCESS OF TRANSFECTING PLANTS	NOMAD BIOSCIENCE GMBH [DE/DE]; TÜRKENSTR. 16 80333 MUNICH (DE) (FOR ALL DESIGNATED STATES EXCEPT US). GIRITCH, ANATOLI [UA/DE]; (DE) (FOR US ONLY). SYMONENKO, YURI [UA/DE]; (DE) (FOR US ONLY). HAHN, SIMONE [DE/DE]; (DE) (FOR US ONLY). TIEDE, DOREEN [DE/DE]; (DE) (FOR US ONLY). SHVARTS, ANTON [RU/DE]; (DE) (FOR US ONLY). ROEMER, PATRICK [DE/DE]; (DE) (FOR US ONLY). GLEBA, YURI [LT/DE]; (DE) (FOR US ONLY)	GIRITCH, ANATOLI; (DE). SYMONENKO, YURI; (DE). HAHN, SIMONE; (DE). TIEDE, DOREEN; (DE). SHVARTS, ANTON; (DE). ROEMER, PATRICK; (DE). GLEBA, YURI; (DE)

Source: Elaborated by the author.

Considering the eleven granted patents, all the applicants seem to be either established or rooted in Northern countries. Chart 2 is significant for the emphasis on the preliminary theoretical category, that is, the existing colonial power of developed countries over developing countries, as well as the possible effects of TRIPS on the reinforcement of this type of colonial power. Again, Susan Sell's main arguments (2003) reveal the relevance of intellectual property rights in the international business realm, taking into consideration the great effort made by twelve transnational companies to have TRIPS approved during the GATT negotiations in the early 90s (SELL, 2003). By intertwining the proposed category and the historical literature on the TRIPS Agreement (SELL, 2003; CHANG, 2001), it is not unreasonable to acknowledge that the case of *Phyllomedusa bicolor* contains elements which can be extracted in order either to elaborate or to reinforce a theoretical category based on the dominance of developed countries over developing countries.

4. Limitations concerning data collection and interpretation

Considering the aim of this research, the *patentscope* has not been thoroughly searched for information concerning the designated Contracting Countries in the patent application files, for the granted patents retrieved from the *patentscope* did not seem to contain the elements formally required by the PCT. This data is quite efficient in detecting what countries (mainly, those belonging to the Amazon region) have been designated as countries that will have to grant or refuse the patent application. Nowadays, the PCT has more than 150 Contracting Countries (WIPO, 1970).

The designation of various countries may hamper the collection of further data about the granting of a patent ("the thicket"). It is, in fact, an arduous task to find out how each of the Designated Countries in the request, based on the PCT, decided the success or failure of an international patent application. It is important to admit that the problem is not easily solved by technological means, such as Artificial Intelligence or any type of data mining software because it is not a matter of just retrieving information. It is essential to access specific content as well as analyze it while taking into account the experiences regarding the fundamentals of traditional knowledge.

The granting or the refusal of a patent is issued in accordance with the national legislation of the Designated Country. Nonetheless, not every country provides information on the national phase of a patent application analysis to the *patentscope*, which may jeopardize the integrity and the accuracy of the dataset when it comes to verifying which patents have been granted in which countries.

Finally, it is important to point out that the *patentscope* does not provide precise or exact information about the refusal of a specific international patent application.

5. Discussion of the results

When collecting, systematizing, and scrutinizing patent information retrieved from the *patentscope* as well as international legislative documents, it is essential to bear in mind the following questions, which have been selected and reorganized from a longer detailed list elaborated by Charmaz (2014, p. 53).

The first relevant questions for this specific research are: How was (were) the document(s) produced? And for which purposes? In this case, the main target is to evaluate how the patent information is elaborated and recorded. Nonetheless, beforehand, it is essential to verify what kind of natural product, genetic resource or traditional knowledge may be involved in the act of formulating the final product or object of the patent.

Understanding the origins of the patent information requires a necessary comprehension of the traditional knowledge and the natural genetic resources that inspired the inventor and contributed to the development of the invention. In order to fulfill this task, it is necessary, as far as the case of *Phyllomedusa bicolor* is concerned, to confirm if the granted patents' description includes some of the following *biochemicals* described by Erspamer *et al.* (1993): *phyllocaerolein*, *phyllokin*, *sauvagine*, *deltorphin*, *demorphins*, *bradykinin*, *eledoisin*, *phyllomedusin*. One of the following stages of this research may be cross-referencing the searches using as criteria the aforementioned terms or any other scientific terms for natural genetic resources associated with traditional knowledge, and the chart concerning patents that mention *Phyllomedusa bicolor* or any natural genetic resource associated with traditional knowledge. The process of understanding the description of the patent is paramount while validating the categorization of traditional knowledge and natural genetic resources in contrast with the CBD parameters (UNITED NATIONS, 1992) and the Nagoya Protocol (UNITED NATIONS, 2010).

The second questions are: What is the structure of the document? And which meanings are embedded in its form/content? How do those meanings reflect particular social, historical, and perhaps organizational contexts? The analysis stemming from these questions refers to the relationship between the international legislative documents and the granted patents and should take into account social, historical, and economic factors.

More specifically, it is relevant to rewrite the aforementioned questions into these: is the patent system organized to exclude other forms of life, culture, and knowledge? What are the meanings that can be deduced from the cross-reference of legislative documents and the granted patents? What explicit and implicit meanings can be retrieved from the final document (the granted patent)? Reading the description of the patents selected for this study may reveal more about the implicit meanings of TRIPS Agreements and the disregard for the CBD's dispositions. It is crucial to remember that intellectual property rights authorize the monopolization of knowledge and scientific achievements, thus limiting the possibility of exchanging research results as well as restricting and limiting competition in a specific product market during the period of the legal monopoly. Bearing this in mind, there are enough reasons to verify

the impacts of patent rights on the development of new products or the use of already existing traditional knowledge.

The names of some of the granted patents include terms such as *dermaseptin* and *peptides*, connected to the *Phyllomedusa bicolor*'s secretion. This is, as a matter of fact, relevant data, which may indicate the utilization of natural genetic resources from Southwest Amazonia (Southern countries of America, which are also bound by the PCT as Contracting Countries). Moreover, the chart above shows that all the patents were mostly granted to Northern countries, such as the United States (US), Canada (CA), Japan (JP), France (FR), and Russia (RU). Consequently, these elements are indicative of the use of traditional knowledge and natural genetic resources beyond the developing countries. From the data above, the "use of traditional knowledge and natural genetic resources beyond Southern frontiers", can be extracted. This categorization is part of an abstract category which consists of the existing colonial power still held by developed countries. This category is intertwined with the ideas of a lack of normative, social recognition, and Shiva's statement against the legally created monopoly regarding intellectual property rights.

Finally, it is worth further inquiry and debate as to traditional knowledge is to be considered part of *prior art*, as well as how the traditional knowledge database is going to be constructed in accordance with a variety of communities' habits and customs and how access is going to be granted to patent officials to analyze patent applications. In fact, once this has been carried out, inventors and applicants will have to make a real effort to prove the novelty of their products and their utility beyond what is already used in local communities where the natural genetic resources are found.

Conclusion

International regulations on patent rights and biodiversity may be contributing to the process of appropriating traditional knowledge and natural genetic resources associated with Brazilian biodiversity, taking into account the vagueness of the normative terms as well as the empirical analysis of the *patentscope* database. The aim here was to extract the first empirical elements from the *patentscope* database, which may indicate a transfer of natural genetic resources and traditional knowledge from the developing to the developed countries, as theoretically denounced by Shiva (2001).

From the data collected, it was possible to extract a preliminary category, based on the idea that colonialism is still dominant in international relations between developed and developing countries as observed in the possible transfer of natural genetic resources and traditional knowledge from the developing to developed countries.

It is relevant to acknowledge so far that the data retrieved from the *patentscope* cannot be an explicit corroboration of appropriating traditional knowledge because the technique or tools derived from the traditional knowledge are not expressly demonstrated in the

information extracted from the data collected from the *patentscope*. The elements presented in the case study of *Phyllomedusa bicolor* demonstrate that information acquired during an anthropological experiment in the Amazonia is used in 11 patent applications that already have been granted and issued mostly to developed countries. Thus, it highlights undeniable facts that can substantiate the aforementioned emerging hypothesis.

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