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# Biotechnology Transfer

## Transferência de Biotecnologia

## Transferencia de Biotecnología

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## ABSTRACT

The study's purpose has been to deal with Biotechnology transfer in a confrontation with the general technology transfer and the recognition of the means and result obligations in agreements whose object is technology to be assigned.

**Keywords:** Agreement, Technology, Obligation, Mean, Result.

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**RESUMO**

O artigo trata da transferência de Biotecnologia em um confronto com a transferência geral de tecnologia e do reconhecimento do regime das obrigações de meio e resultado nos contratos que tenham como objeto tecnologia a ser cedida.

**Palavras-chave:** Contrato, Tecnologia, Obrigação, Meio, Resultado.

**RESUMEN**

El objetivo del estudio ha sido abordar la transferencia de biotecnología en una confrontación con la transferencia general de tecnología y el reconocimiento del medio y las obligaciones de resultado en los contratos cuyo objeto es la tecnología que se asignará..

**Palabras clave**: Contrato, Tecnología, Obligación, Medio, Resultado.

# INTRODUCTION

1ST PART - BIOTECHNOLOGICAL KNOWLEDGE

1.1 Biotechnology

1.1.1 Notion

Every technological application directed to Biology is a biological technology and from this phrase, the term Biotechnology originates. And all Biotechnology experts record and develop carefully, sometimes more sometimes less, their material object. They do so with the clarification that there is no emphasis on the subject of scientific categorization and merely construct its content or the field in which it will be applied.

In the embryonic forms of Philosophy of Science, but without conclusive results, much has been debated, even in specialized literature, regarding the scientific characterization of Biotechnology. Because of the effects it provides and the fact that it bears something different compared to other forms of knowledge, certain doubts reign among experts. The uniqueness grows by the scientific impulse that it causes and the impact on modern life. However, biotechnology is not a new branch of science. The fact that the authors do not harmonize in its configuration, leading to theoretical explanations that even approach the contradictions, and only extend the field of imagination. More recently, there is an orientation that, even without the consistent support of the writers, deserves greater emphasis: that Biotechnology is nothing more than a set of amalgamated technologies. Nonetheless, the practical importance of this discussion should not be denied, especially if one considers the general and integral purpose of science to consistently expand the rational activity of the human being and to free it from spontaneous forces through the passing of the almost irrational problems of nature in rational processes.

In a broad sense, and given its conclusive line of evolution, Biotechnology can be defined as the use of living organisms or parts of them (subcellular structures or molecules) for the production of goods and services. Although based on a double reductionist perspective (living organisms or parts of them and the production of goods and services), this definition encompasses a set of activities that man has been developing for thousands of years, such as the production of fermented foods. Also, it is in this line of reasoning that modern biotechnology is considered to be that which, considering the definition in double perspective, makes use of genetic information, incorporating techniques of recombinant DNA (known as deoxyribonucleic acid).

Over time and with the development of biological technologies, Biotechnology has become, in its purity, a discipline of intensive scientific advance, with interdisciplinarity unparalleled with other disciplines, and associated with strong links of complementarity with other technologies. It would not be absurd to report that the civilization of our time would find real stagnation in everyone's livelihood if the complexity of its archetypes were altered. While this specificity is emphasized, an economic function has been determined among the companies that are linked to it: the constant need for innovation, new product launches, and technology development. These characteristics, encompassed by those of necessity in the present world, return to the premises that without Biotechnology, individual life would regress by limiting man's activity to its primary moments. Parallel to the economic function, there is another civilizing in itself, and, why not say, educational in nature. It brings men closer and bridges the differences. While the individual admits the possibility of obtaining what is needed for the transformations of the world, it was able to sharpen its sense of scarcity, which only gained in scope when geographers and statisticians persuaded everyone to observe the limits of natural inputs in the constant effort of progress and the attainment of an era marked by food, health, and environmental harmony.

Therefore, Biotechnology itself is a source of effort that should guide research and development activities to discover new applications and generate synergies with other areas, despite the challenges of new problems and the costs of technologies. However, one must beware of the uncertainties and risks of the early stages of development of biological technology, the eventual failure or even failure of research. All the vigor of an area where a huge variety of outcomes is desired can be left in vain if those results are late or do not achieve their expected effects.

1.1.2 Biotechnology Technology

Without repeating here what has already been exposed in the places indicated, one should refer, however briefly, to the use of the terms and some basic definitions. And this is done by recent advances in biotechnological inventions. Even if they correspond to traditionally used terms, the best thing to do is to repeat the subject with a series of clarifications and to define terms and concepts.

In its Greek etymology (of *bios*, life), Biotechnology refers, roughly, to technologies that utilize living organisms. If the previous premise is a peaceful point, perhaps in its generality, a more precise definition would not find such uniformity.

The Committee on Biotechnology and Industrial Property Specialists of the World Intellectual Property Organization, at its February 1986 session in Geneva, commented on the significance of Biotechnology: "Biotechnology encompasses all techniques using living organisms, in particular, animals, plants and microorganisms, or any kind of biological material that can be assimilated to microorganisms or parts thereof, to bring about organic changes in them".

Considering the situation of this research, in which the technical word is determinant, it should be remembered that reference is made basically to genetics, microbiology, biology, and biochemistry, and their fields of application are directly related to agriculture, chemistry, pharmaceutical industry, health, food production, and environmental conservation.

Another clear and detailed definition is proposed by the United States Congress Office of Technology Assessment in its second report of 1984, which states that "biotechnology comprises all techniques that use living organisms (or part of them) to manufacture or modify products, to improve plants or animals, or to develop microorganisms for particular uses".

The living organisms used in biotechnology are:

(a) Organisms in their natural state;
(b) Organisms obtained by conventional means of selection, cross or mutation;
(c) Organisms modified by new techniques.

Examples of organisms in their natural state are microorganisms used in fermentation processes. Examples of organisms obtained by conventional means of selection are essentially biological procedures. And finally, there are examples of organisms modified by new techniques such as genetic engineering or cell fusion technique.

Biotechnology can then be classified into four groups:

1) Living organisms;
2) The procedures for obtaining living organisms;
3) Procedures using new and known microorganisms;
4) The products obtained with these procedures.

Living organisms mean animals, plants and microorganisms. Microorganisms are defined as all living microscopic beings that are naturally occurring or obtained by conventional methods or new techniques. And within the microorganisms are included, among others, viruses, bacteria, fungi, and algae.

The procedures for obtaining living organisms can be divided into two classes:

1) Conventional methods;
2) The unconventional or new methods.

Selection, cross and mutation methods are conventional. Genetic engineering or cell fusion technique is unconventional or new methods. The essential difference between the so-called conventional or traditional methods and the unconventional or new methods lies in the possibility that the latter, through manipulation of hereditary material, overcome pre-existing biological barriers, such as incompatibilities between species. It should be noted that these methods are not ends in themselves, but are intended for obtaining useful products through such living organisms or cell cultures.

Moreover, it is not too much to remember that the selection technique was the first one that was used to improve plants and animals. This is how, over time, more elaborate techniques were introduced, such as cross different genotypes, cross pedigrees and mutations, which consist of using physical or chemical means to bring about changes in a genotype. And it is possible to modify the genes of plants, animals, and microorganisms by introducing artificially modified hereditary material. The mutation technique is also used to obtain new microorganisms. This happens with the application of new or unconventional methods to obtain living organisms, and it is within these methods that genetic engineering and the technique of cell fusion stand out.

Genetically engineered is the technique of recombined DNA, and consists of isolating a gene from its natural context and using it in such a way that, at the biological level, a quantity of it (or chemicals) can be obtained practically unlimited. This is accomplished by the steps of isolating or separating a DNA fragment, inserting that fragment into a recombinant vector, introducing the recombinant vector into a microorganism or a "host" cell to obtain a recombinant cell, selecting the recombinant cells and provoke its activity under conditions favorable to gene expression, and thus obtain the desired product. And from this one obtains, for example, insulin and interferon.

The cell fusion technique consists of fusing two cell types that have a particular characteristic and selecting cells that have characteristics of both types and used cells. This technique is used to improve plants and to produce hybridomas, monoclonal antibody producers.

1.1.3 Applications

This new technology improves overall well-being and enhances competitive advantages, especially in the pharmaceutical and chemical sectors, in order to generate consequences, for example on agriculture and food, as well as environmental effects. It can also be argued that the integration of biotechnology with this wide range of sectors was not uniform, but it can be said without a doubt that the pharmaceutical sector is the considerable part in which biological technology continues to predominate.

In a great diversity of plans and orientations, it should be said that modern biotechnology has developed and enriched the distinct roles of the production factor process. And in our day, and why not say promisingly that in the future, it could be the core technology, capable of fulfilling a key function or supporting technology, in securing new life forms.

Undoubtedly, ontological proximity to the development and application of new technology is the existence of social, economic and even environmental transformations. And these important and peculiar consequences, although, advance, and offer much more conditions for the emergence of new types of relations between economic agents and forms of alteration and improvement of the productive forces and, one could not forget, a situation undeniable advantage, which is improved performance in competitive capacity in the relevant market. It is also necessary to state that these social consequences, especially human living and health conditions, have real mutations, since they tend to improve the achievements and development of the population, in a uniform harmony and in broad dynamism, with economic results and general social.

By looking at the way of life of the people in present times, a determined set of methods, types, and forms of activity contribute to concrete general well-being, such as the discovery of new vaccines for human diseases and genetic engineering to reduce the transmission of animal diseases. And with the same synthesis that we dealt with in the previous questions, it should be remembered that the essences of these new ideas offer, in environmental terms, the instruments for the development of activities widely considered in a sustainable way, such as the protection of natural resources and biodiversity. Through so-called prevention or bioremediation strategies, sustainability will find vast circles of influence beyond all other forms of permanence and preservation.

The central postulate is that Biotechnology provides a change in the state of affairs and substantial changes in incremental effects, and in its own time and under appropriate conditions what would be true disruptive attitudes, or even radical inclusions, despite knowing that the latter are rare and infrequent, though unpredictable. In this sense, it should be noted that each of these effects entails a challenge that can underpin a variety of public policies in the mean and long term.

### 1.2 World and regional panorama

#### 1.2.1 History

Modern biotechnology, that is, the thinking of biological technology of the most recent period of science, originates in the United States of America. This country (USA) was the pioneer in the development of biotechnology and is still the undisputed leader in this field. And yours are also the first companies to form in this sector, from the late 1970s to the early 1980s. Outside of the North American space, one can mention European companies, established in the 1990s, with the characteristic of being small or medium compared to US counterparts.

It will not be difficult to overstate the influence of US research worldwide, as the United States still dominates this knowledge in all its most well-known segments: plant and animal genetics, food, and medicine. These three areas focus on an interinstitutional complex set up on a tripod: public laboratories, universities, and biotechnology companies. Europe reproduces this model and, with less emphasis on public laboratories, Japan, and China. The United States of America, Europe, and Japan made public expenditures directed specifically at the health sector (public spending on biotechnology research and development in 2005: US$ 23 billion; European member countries of the Organization for Economic Co-operation and Development (OECD) $ 4 billion and other OECD member countries $ 1.5 billion.

And it is already predicted that for the year 2030 the applications of the sector analyzed could represent about 3% of the Gross Domestic Product (GDP) of OECD countries. In absolute terms, this percentage will be higher than the GDP of developing countries. This data does not include the future impact of biofuel use on developed economies.

So profound is the transformation of Biotechnology in the modern world that even economic crises have not generated major decreases in its research and development. These changes in the economic situation have encouraged cost rationalization and increasingly concentrated activity. It is extremely difficult to draw a complete picture, but it should be noted that for small and medium enterprises the practical result has been an increase in research and development capacity and an increase in their productivity.

The peripheral and regional economies, which belatedly aroused to the impact of biological technology, found and established their space by accelerating important aspects of the biotechnology industry, such as the pharmaceutical, chemical, food, and agricultural industries. These activities were developed by technology transfer, but today some of them already maintain the development of cutting-edge activity in some sectors, such as India and Brazil, if we do not consider the Far East anymore and Israel as peripheral economies. Brazilian biotechnology institutions and companies benefit directly or indirectly from Brazil's surplus effort in agribusiness. It seems to be said that, despite Brazil's agricultural turnover, biotech companies are still small compared to foreign ones, but they already have some technical excellence and are closely linked to science and technology systems. Health-related research in Brazil had a notable impetus from the initiative of public universities, research institutes, and government companies, including the *Empresa Brasileira de Pesquisa Agropecuária (Embrapa)* [Brazilian Agricultural Research Corporation].

Molecular biology and its application to the production of diagnostics, vaccines, and therapeutic agents have received much attention, especially for tropical diseases, but undeniably agriculture has been the most successful in comparative results. It should be recognized that the Brazilian government has made efforts to promote biotechnology, not only to meet public health claims, but also with the ultimate goal of stimulating industrial development. It is not possible to indicate the characteristics of the Brazilian private sector, given its dynamism and business concentration, but a special distinction should be highlighted: the creation of poles, parks as biotechnological centers in all five geographic regions of the country.

1.2.2 Biological technology and its importance in today's world

If we dispense with the natural improvement, evolution, and progress of humanity in its social and economic achievements, scientific and technological knowledge are essential elements of the reflection of the real evolution of the world. Moreover, they serve to achieve an advantageous position in all the concrete content of aspects of the historical trajectory of human development. It is quite understandable to think of an area in which no manifest form of technology is present, and this goes from simple, everyday operations such as paying for a public transport service, to nuclear power generation or space exploration. It is to be understood that this whole set of technological knowledge represents a very high value, not only strategic and political, but also economic, therefore, susceptible of being the object of commercial business, which, thanks to its potential repercussions on society, will be, to a greater extent or a lesser extent, the form of transition from the boundaries of science from good from the purest abstract point of view to the concrete point of view.

Reality is not limited to just this kind of contradiction (abstract and concrete), especially on such a broad subject as Biotechnology. But it is necessary to remember that internal contradictions preside over the object of a research and the process of its knowledge.

If the research was to be deepened in one of the ways of the sciences in general, we would have to fork other contradictory and useful aspects for the study of technology supply, besides the above mentioned abstract and theoretical points of view, such as those that would be simple and complex, the general and the particular, or the static and the dynamic, if we consider only some aspects of the connection of the sciences.

1.2.3 Biotechnology in the world

Biotechnology can be understood as genetic engineering and particularly as manipulation of recombined DNA. Even in different areas, such as traditional technologies such as pharmaceutical technology, which keep living organisms involucible and which can normally reproduce, which causes some disturbance very early in the evolution of laws and the fact that many of the products and processes that are patentable are derived from natural products and processes.

Once again, we note that Biotechnology refers to technologies that utilize living organisms. And the technical word refers to genetics, microbiology, biology and biochemistry and their fields of application, which are related to agriculture, chemistry, the pharmaceutical industry, health, food production and the conservation of environment.

Living organisms used in biotechnology are living organisms in their natural state (such as organisms used in fermentation processes), organisms obtained by conventional means (the essentially biological procedure) of selection, cross-breeding or mutation, and organisms modified by new techniques such as genetic engineering or the cell fusion technique.

1.2.4 The concentration of biotechnological knowledge

Scientists and researchers seem to see with lucidity the peculiar character of biotechnology, and its fundamental difference in the framework of general knowledge. This intensely felt and strongly expressed scientific insight has enabled, especially a group of countries, to successfully meet the challenge of the well-being of the peoples and the dominant needs of our civilization. It is at this point that one asks about the material needs of the individual and the ability to provide practical and useful results to meet them. Without going into detail, the concentration of biotechnological production and knowledge represents one of the most discrepant or contradictory features of the progress and improvement of conditions in modern life. And it is based on this premise of contradictory success, which draws from objective facts how much research and development efforts and expenditures are polarized and, in turn, how considerable the lack of homogeneity between technology producing and consuming countries. Experience teaches us that everything changes, and that nothing is stable in the field of scientific and technological knowledge. However, whether due to developmental differences before the current knowledge itself, the lack of research funding capacity or the support of a research team, this multicolored division of the use of technology is reduced to a few shades when it comes to knowing who produces the knowledge. From a benefits standpoint, technology reaches everyone, but it is not structured and evenly matched by the small group of countries that have met the challenges of the practical results of mastering technological tools. Under the influence of this contradictory premise, we note that only 15% of world production comes from most technological innovations in the world, while less than half of the world's population is can adapt these technologies to production and consumption. And even one can say that the rest of the population, or one-third of the world's population, is technologically isolated, unable even to adapt foreign technologies or even to initiate research and development of its own.

In a summary, which might well bear the quality of an overview of the production of biological technology, the formation of the fundamental ideas of biotechnology was not only for scientific progress but also for forging a unique and privileged situation. It has become a real paradox in the appearance of the fundamental principles and ideals of scientific explanation, incompatible with the tradition of accelerating progress by promoting and disseminating technological advances. The purpose of scientific creation changes to become an economic concept interest in its accelerating movement of scientific progress, and to generate more concentrated knowledge. Summarizing this economic effect, the course of transformations of science instruments and experiments would include not only the rise of general well-being but the economic concentration of technology. Alongside the common fundamental features of concentration of production and technological development, the production of biotechnological knowledge occupies a peculiar position because it has fewer representatives than the list of technology-producing countries in general.

Finally, if in general technological production it is a small part of the world that produces knowledge, the knowledge of biotechnology is limited to a few countries. There are reasons to think of a solution to these problems, but there is also reason to recognize the disinterested attitude of institutions in biotechnology research. This would mean underlining the lack of frameworks or resources for investments in research and development, but one can equally attribute this to the neglect or disdain with which the purposes of national development are set by each society. Acceptance of these statements implies facing seemingly insoluble problems. On the other hand, how to come up with other results if the United Nations Conference on Trade and Development (UNCTAD) under study has found that only nine OECD countries concentrate 90% of world spending on new technologies, while the share of developing countries spending on research and development represents only 6% of world spending?

1.2.5 The high cost of biotech production

Technological production is associated with processes of innovation, research, and development, which entail a high economic cost that, in most cases, can only be assumed by those who have sufficient resources to meet these demands. Regrettably, industrial property - the discipline in charge of protecting new developments - has not only not solved this problem, but in some way has caused it to worsen or damage itself. The paradigmatic example of this situation lies in the invention patent system, which within this discipline represents the most common way of protecting technological knowledge. Due to the principle of territoriality that governs the protection of industrial property, the holder of a new technology that can be protected, through the patent system, must go to as many territories as they want to exclusively explore the invention in each of them and carry out the administrative procedure to achieve the grant of the patent. To this end, it will be necessary to pay official fees that each country sets, plus the professional fees of a local agent, who represents them in the registration process.

These peculiarities that are considered added, together with the high costs of research and development, associated with the protection of the results of these activities lead, in most cases, holders of intellectual property rights over biotechnological knowledge are companies with important power, either because they have developed their technology or because they have acquired rights contractually.

In addition to the above, another effect that generates the high-cost state of production and protection of technological knowledge is that their contribution to the recipient country's production scheme is minimal, due, on many occasions, to the processes of adaptation of conditions local authorities assume an additional economic effort to acquire technological knowledge. This information was collected in a UNCTAD document presented in the course of negotiations on the International Code of Conduct on the Technology Transfer, which sets out:

*"The dependency of developing countries is considerably higher and the contribution of acquired technology is lower than for other final technology importing countries because developing countries do not, in most cases, have the capacity for organization, research, and engineering to be able to adjust, adapt, and assimilate imported technology to their own needy."*

PART 2ND TECHNOLOGY TRANSFER

2.1 Notion

By technology transfer is meant a complex displacement of situations, in which the material object is technological knowledge. Jurists seem to take the idea of transfer as covered by the contractual theme. Thus, they often employ the technology transfer figure as associated, or even a class of contract, with the technology transfer contract. Some authors go beyond the technical function of the contract and use the license agreement broadly to refer to the grant made by a patent holder, utility model, technical assistance or even industrial secret. Some prefer a more restricted meaning and use the figure as a license agreement. The lack of harmonization does not preclude the recognition that these contracts are all mixed or related (since the associated does not form a new contractual species, as occurs with the mixed), with variations in unknown numbers.

In these contracts, an assignee is granted the necessary knowledge to compose the technology to be used. They are usually accompanied by a series of provisions on the conditions required by the assignor, including the quality and use of the trademark. Equally ordinary is the most well-known remuneration in its Anglo-Saxon version of royalties. Royalties would correspond, according to the specialized literature, to the term realties, in Portuguese, which is used in this text.

2.2 Most common clauses in technology transfer agreements

The mixed or related nature of technology transfer agreements does not preclude the formation of a common core of provisions resulting from their purpose, although the parties are convinced that other clauses may be placed on the business.

Among the known clauses is the following:

(1) Determination of assignor's duties;
(2) The duties of the assignee;
(3) Temporal character of technology: definitive or temporary;
(4) Form of payment;
(5) Currency unit;
(6) Bases for the calculation of royalties;
(7) Tax effects on the transfer;
(8) Duration of the contract;
(9) Indication of the minimum (or maximum) production of products generated by the technology;
(10) Limitations and conditions for the use of technology;
(11) Market in which the assignee may act;
(12) Technical assistance to be provided to the assignor;
(13) Duty to preserve technology secrecy;
(14) Requirements as to how to employ the technology;
(15) Quality of materials to be used;
(16) Quality of goods produced;
(17) Guarantees and penalties for breach of contract;
(18) Causes for termination of the contract;
(19) Retrocession of all developed technology;
(20) Designation of the forum competent to settle the conflict;
(21) Arbitration prediction.

2.3 The obligations of means and result

The course of development of the legal sciences, as of all science in general, reveals itself in different ways, in equally different historical stages. And one trend is toward technology transfer in the form of contractual obligations: the obligations of means and results.

To elaborate a system of communication between creditors and debtors, the Law is based on relative forms and marked by an economic content. This explains the obligation directly and objectively. The question then immediately arises: What is the relationship of the obligation to technology transfer agreements?

There would be many ways to respond. One would then have to ask if an agreement would not be a source of rights and duties for the contracting parties? And the statement of the answer explains, according to many opinions, that these rights and duties related to the parties are precisely the obligations.

The French jurist Demogue was responsible for the theoretical construction of the idea of obligation most peculiar to the technology transfer contract: the obligation of means and result. His self-enunciating form of classification highlights that in the obligation of result, the execution is reached when the debtor fulfills the final objective; while that one in the middle, the deviation of certain conduct or omission in certain precautions committed by the debtor not to achieve the expected result.

Therefore, in a technology transfer, the agreement carries the corresponding purpose of successfully assigning the product of negotiation: technology. And in favor of this scheme is the common thinking that if the technology was not transferred, the contract would have been frustrated in its purpose. Much work related to technology transfer contracts builds on this true moving condition to achieve the end result of the business.

Under the above conditions, the transfer of biotechnology should also be a use of two-way correspondence of the obligatory consequences of this theoretical construction as used in the commercial world, such as the technology transfer agreement.

As it turns out, there is a certain similarity between the effects of the technology transfer agreement and the biotechnology transfer agreement, since both seek the same thing, that is, a result. And a combination of ideas from one contract and another would lead to a common formation and direct use of all the experience already known and used in technology transfer contracts in general.

The difference is only that the biological chain on which Biotechnology is based may not be realized. The combined formation of the decisive elements for the outcome may not occur. And this is evident by the different conditions of climate and temperature, among others, in the generation of concrete results, expected by the application of a contract with obligations, markedly the result, as occurs in the common cases with technology transfer.

If the pluralism of life is known, and we know that the environment is as complex as the other known complexities, it seems to be a mistake to solve the problem of biotechnology transfer without ignoring the mechanical and organic antithesis and something alive and something that has no life.

Life stands before itself and nothing but death. If there is no life, there is powerlessness and inanity. It is in this comfortable antithesis of the organic and the mechanical that all unfolding must take place. The mechanical view of technology transfer does not lead to adherence to the use of the result obligation under the general qualitative conditions for the quantitative probability conditions of a biotechnology transfer. An example would be the arrangement of the structure of a certain type of microorganism to be used in climatic conditions different from its original formation. And that outcome will depend more on the conditions required for an appraisal of middle obligations than on outcome. It is that without the expected effort, the result may not occur, unlike the result even the effort to achieve it was the most common and average, under the conditions of the contract. This is how a factory can be already assembled with prefabricated elements and achieve the result with the satisfactory operation of the machines.

## PART 3RD TRANSMISSION OF BIOTECHNOLOGICAL KNOWLEDGE

### 3.1 The importance of technology transfer for knowledge diffusion

Technological promotion and its consequent development are the real priorities in a technology assignment. And the most abbreviated way of not returning to the early days to achieve state-of-the-art results is by providing technology already produced. Otherwise, all research and development would have to repeat the most elementary moves in succession to achieve the knowledge required in competitive markets, such as the consumer in present times. This policy of an original knowledge construction would require large and continuous investments, which may very well be solved with an equivalence of technological knowledge attainable through a transfer.

Also, companies competing in a given relevant market expect to benefit from the lower cost compared to research and development spending on new products. Business risks are not usually accompanied by original knowledge production initiatives, but rather by the relentless pursuit of profits in their endeavors. This result that adjusts benefit costs is regularly resolved by acquiring someone else's technology through a negotiated transfer.

### 3.2 The social function of biotechnology transfer processes

Technology transfer implemented through the license transfer agreement may have more than just economic significance, reaching the possibility of fulfilling a social function. This view has been reflected in different normative texts and harmonization initiatives. A clear example of this social vision can be found in Articles 7 and 66 of the Agreement on Trade-Related Aspects of Intellectual Property Rights, better known by the English acronym TRIPS.

It is collected in a report from the Working Group on Trade and Transfer of Technology to the General Council of the World Trade Organization (WTO), where the social projection of technology transfer processes is manifested, stating that they constitute one of the excellence mechanisms for improving living conditions in developing countries.

The arguments outlined above serve to illustrate the social function of technology transfer processes that, as supported by pronouncements from different international institutions, become a powerful tool for achieving the goal of improving the economic and social conditions of countries with a lower degree of economic and technological development.

### 3.3 The agreement as a means of diffusing technology transfer

The historical-cognitive basis of modern agreements goes back to the period of Roman civilization, which not only structured the figure of the contract, but defined it with the main feature to be used in this text: that it is an agreement of wills on the same point. The importance of remembering this highest valuation of will is that once the contract is concluded, with the observance of the formalities of style, the contract will be able to generate obligations - a factor of the most essential essentiality, without which there would be no rights and duties of the parties.

Notwithstanding the formal rigor of contractual forms, over time and the development of activities in general, the function of the agreement has changed, and without losing its purity and structure, it has shaped interests in the complexity of life in our times, without changing their binding force.

Without the agreement, *homo economicus* would stop its activities, because it is the agreement that provides for everyone's livelihood, without which individual life would regress, and man's activity would be limited to the primary moments of the human course.

Another virtue to consider. Alongside the economic function, the agreement serves as a civilizing and developmental form. It is the agreement that promotes the circulation of wealth, brings men closer and reduces differences by providing everyone with legal instruments to achieve the ends determined by economic interests, and why not say, the interests of society as a whole. All that remains to be remembered is that it is through the agreement that technology develops and propagates.

It is through contractual forms and obligations that advances in technology spread. And all of this is reflected in the idea that an agreement of wills can force one person to give in to another to take advantage of their knowledge of a special manufacturing process, original or only known information or practice.

For the analysis, clarification, and solution of the transmission of knowledge, it should be pointed out that it occurs by simply handing over plans, drawings or other papers, by providing the material that incorporates the knowledge or, finally, by the practical teaching of its application, either by means of technicians sent for this purpose, or by the admission, in its own factory, of people designated to learn, practicing the manufacturing process.

3.4 Difficulties encountered in intellectual property for technology transfer processes

The unfolding of the whole field of knowledge and human activity also found its reflexes in the elaboration of the legal principles that guide the construction of a system of protection of the rights that would result from the development and improvement of the goods resulting from all the effort and work.

The discipline of intellectual property adopts a plurality of techniques and instruments to protect the interests of their owners. There is no doubt that there is not just one but many forms of intellectual property protection. And in all of them, one speaks of a typicality and a *numerus clausus* of exclusive rights.

Consequently, the election of one of the main guiding elements of intellectual property emerges, by establishing the relationship between the forms of intellectual property and their corresponding legal protection - a proposition made by Tullio Ascarelli that constitutes the key to the classification of Biotechnology.

If one accepts the premise that there is legal protection for each form of manifestation of intellectual property, would the different aspects of Biotechnology be capable of deserving a unique and exclusive protection? This question will guide the guidelines of this research.

While the discipline of intellectual property is the most suitable means of protecting technology, since it is identified with the rights of the producers of technological knowledge, its advocates are taken into consideration only because they agree with the dominant theses of producing countries, who suffer almost decisive influence. And since it is strongly centralized, it tolerates only a stronger orientation of this concentration, claiming more effective consolidation and systematization on the part of all producers and leaving only the stigma of absorption or passive behavior a real stigma for the remaining countries.

The principal effect of this protection, which has exercised and continues to exert the most profound and lasting influence, is the special limit of industrial property rights as it is established, that is to say, by a state grant. An original and unparalleled experience is the general access of the population to the benefits associated with pharmaceutical development that gave its creators a power based on an instinct of domination that borders on the limits of state sovereignty, when at most it does not cool or weaken it.

A succession of events leads to the problem of concentration of knowledge and occupies the center of the issues of the technology transfer system. It is also the main obstacle to be overcome. It has a demolishing function in the multiplication of knowledge to be disseminated, the territorial character of the rights of the exclusive constitutes the second major difficulty. Territoriality and its accompanying principle - the principle of territoriality - affect most intellectual property rights, and more exclusively technology transfer. To understand this idea of territorial boundary, it is necessary to remember that the possibility of being exploited simultaneously in different parts of the world means that the high costs indicated to serve as a basis. And it is in this reality, neither ideal nor essential, that the adequate economic resources to meet these costs could enjoy the protection granted by the state.

In this regard, one can appreciate the difficulty in striking a balance between pharmaceutical interests, which argue about the need to obtain exclusive rights to what is developed in order to move forward with their research processes, and the interests of society at large, who need to have affordable medical treatments to deal with diseases such as cancer and AIDS (Acquired Immunodeficiency Syndrome) at reasonable prices.

3.5 Imbalance in negotiating power of parties to a technology transfer agreement

The very form that for centuries has valued and protected the products of the intellect, and has served all those who have created or developed useful knowledge in their various types of protection around the world, has created barriers that, in combination with international trade laws, generate true vertical line scales until economic development.

And the state of world commerce and the economy confines intellectual products into their basic categories: copyrights, patents, trademarks, business secrets, and new categories, which may well be represented by the integrated circuit, best known for its Anglophone chip version, about the solid tablet constituting and appearing.

This general scheme has been successful for its intended purpose, but it is unable to adapt the new known forms of creativity and innovation to other non-technology producing countries. It is sufficiently ingenious enough in its capacity for protection and guardianship, but proportionally moves on a world scale to transform other non-technology producing countries into mere consumers and protectors of rights that, in reality, do not know in its essence or conception.

Technology does not flow in its knowledge, but in its use. And the effects it develops, while playing a facilitating role in the use of new and useful technology, do not stimulate bilateral trade growth, nor do they take full advantage of the pace of economic development.

By adopting this system of importing technology, an entire country submits itself to a perpetual costly economic dependency, and imposes a real disadvantage, to form an imbalance of the business parties that will play some positive role in the transfer of business, biotechnology, and technology in general.

3.6 The ways to carry out a biotechnological transfer

To resolve this situation, governmental and university scientific policies aimed at biotechnological projects in research and development should be encouraged. And the latter will result in a substantial increase in the number of scientific publications and an equivalent increase in the number of patents. Parallel to technology transfer, we should consider in this research that the restructuring of government policies for biotechnology should follow the following steps: (1) open access scientific publications, (2) scientific books, (3) patents; (4) related products to those on the market.

The choice of inventive activity has to be susceptible of industrial application, meeting the three basic legal requirements for patenting. The best example to illustrate the research is the most related case as a central research theme, which is the Chakrabarty case.

Although it is not a grandiose and exciting thesis to describe and classify biotechnological transference, any understanding of the use of the conceptual method has, beyond a wide space of argument, the possibility of being demonstrated. As the basis for all legal reasoning as to how the jurist would describe a transfer of biotechnology, the first concepts extracted were exactly the abstract ones. It is necessary the memory developed precisely in the theoretical conception, in the first one worthy of repercussion about the biotechnological knowledge: the Chakrabarty case.

It is not possible, of course, to indicate the general characteristics that accompanied the debate and the development of the Chakrabarty case. Interpreting the developed phenomena, one can qualify some of the particular aspects of what happened. On March 17$^{th}$, 1980, the United States Supreme Court voted, by the majority, to grant patent rights for a lineage of bacteria. The species was of the genus Pseudomonas, a carrier of foreign DNA (deoxyribonucleic acid) segments, called plasmids, capable of conferring distinct genetic characteristics of what was naturally found in the bacterium.

This researcher, Ananda Chakrabarty, claimed to have "invented" a non-naturally occurring microorganism that exhibited important properties for general use, especially from improper oil spills, as it would have the ability to consume spilled oil.

This controversy was the initial milestone of legal studies on the importance of the patent system of living things and its contribution to biological technology, or more specifically to biotechnology. However, its contribution goes far beyond the patent system itself, as it will take center stage in future problems of biotechnology transfer.

## CONCLUSIONS

From the experience of a supposedly safe analysis, the main tendency proclaimed and disseminated by the most modern universities, both national and foreign, is manifested, to strive for the socio-political development of peoples, for the aggrandizement and dignity of the human person, in their most varied meanings, as, for example, in the research undertaken resulting from the most rooted and truly fundamental problems between technology and biological development. The national process of technological evolution, dealt with in this particular research, went through certain stages that, despite being fast or slower, according to the difficult conditions, did not at any time ignore the highly relevant level of activity related to technological promotion, the capacity of the national institutions and, of course, the effort against the development of the country.

The contrast between the anti-developmental forces - represented by the reaction to research and deliberate noninvestment, coupled with the deficit of cadres - and those that excel in Brazil's development - were not ignored, but rather treated as something that must be considered and evaluated as one of the manifestations of the tension between two true lines of action in the world economic policy. The most resistant means of elevating the progress and development of the country, or even of other countries, were considered in the research, especially by the aggressive orientation of large economic groups, in an attempt to prevent the process of technological liberation on a world scale. Developing countries - something not to be forgotten - are the main recipients of the actions of these ethnocentric groups organized in the form of multinational corporations, which at most reinforce concentrated wealth in their home countries and where they usually have your thirst.

From what is to be emphasized, it is evident that the internship was guided by the sense of achieving a balance between social interest and private interest, between the right of intellectual property owners and technological promotion. Proceeding in this reasoning, the research rejected what could be called the anachronistic character of the classical property model, either as a paradigm or as a source of rights involving technology, as well as the old and outdated liberal argument or a supposed absolute freedom to conduct or destination of knowledge and technology in the modern economy, notwithstanding this statement exorbitated the object of the research carried out. To these liberal premises and without social purposes it is necessary to point out that the Constitution of the Republic removed the doubts that existed for Brazilian society regarding the results of technological research and its corresponding protection by the intellectual property regime: social interest and technological development must be observed and the economic status of the country (art. 5, XXIX).

The significance of the intellectual property in studies of technology transfer in general, moreover, must be stressed and exalted by scholars of biotechnology transfer. Despite the presence of distinct cognitive approaches, it was the professionals (intellectual property) who made it possible to construct a large theoretical framework (technology transfer), unparalleled in its dynamism. And in their classification, intellectual property scholars have elevated the contract to the most fertile field of the technology transfer application.

Two premises are required for the scattered fields of biological technology transfer. The first is that the significance of the work, appreciated by practical results, for the transference that generates technology does not apply in absolute correspondence to the transference of biotechnology. It is that the dynamic focus of nature and life will be demanding a true system of its own for both.

From a dynamic point of view, the formation of living elements, such as microorganisms, which can reach the brink of evolutionary theories, does not fit in with the static and lifeless elements that normal mechanisms of technology transfer present or ordinarily use. Here, in this study, the old distinction between static and dynamic seems to have a direct and specific application.

This static-dynamic approach is the starting point for distinguishing the biological reactions of the technology studied here from those that fit with procedures that complement each other, such as machines, raw materials, and electricity.

Biotechnology transfer yet - or maybe always! It will require risks not known by the ability of living things to alter their own ways and to suffer external inflows of temperature and pressure. That is why the attempt to embrace biotechnology by general technology and biotechnological transfer by technology meets limits. Thus, the influence of the successful theory of result obligations on technology transfer contracts does not harbor the biotechnology transfer contacts that will continue to be guarded by the environment obligation regime.

The elaboration of a new form of scientific knowledge based on an interdisciplinary view of biological knowledge for technology could generate special interest in demystifying the fundamental premise elaborated by Tullio Ascarelli, that there will be a tutelage for each form of manifestation of intellectual property. Thus, Biotechnology would be determining a deviation in all knowledge built in our country, based on the works of Tullio Ascarelli.

It is in this regard that a question of exceptional importance arises as to the relationship between forms of intellectual property and their protection or legal protection. The combined succession of chemical and biological elements does not seem to us to create a new regime of scientific classification of intellectual property. Tullio Ascarelli's proposition once again adds itself to the industrial property through its own understanding: they are isomorphic!

Isomorphism will be the formula of application in two-way correspondence to Biotechnology and Chemistry and Pharmaceuticals, because they are complex structures in their entities and which apply to each other, indistinctly, like parts with a similar role in their structures. Notwithstanding the complexity of the biological elements, Tullio Ascarelli's statement is not inconsistent with the discoveries of biotechnology, but stands with its own feet.

In other words, the key to the success of the theories developed by Tullio Ascarelli lies in the fact that he correctly captured the protection of the intellectual property, without prejudice to the complications of the phenomena studied by the different areas of knowledge and that are capable of deserving protection by the intellectual property protection.

This leads to the conclusion that the non-application of the result obligation in correspondence of the general technology transferred to biotechnology and the non-separation between Ascarelli's work and protected and transferred biotechnology are concluded.

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