THE DARWIN PROJECT
(1978-1986)

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"THE DARWIN PROJECT" MOTIVES, SCOPES AND OBJECTIVES
(1978 - 1986)

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This publication intends to make the Darwin Project known, initiative which has been supported by two institutions: the Institute of International Studies of the University of Chile, and the National Commission for Scientific and Technological Research, CONICYT.

The chief aim of the Darwin Project is to gather those who form part of the international scientific community—especially those scientists belonging to the invited-participating countries—to the toil of commemorating Charles R. Darwin on the 150th anniversary of H.M.S. "Beagle's" voyage around the world between the years 1831 and 1836.

On June 2, 1978 the Chilean Government established the National Darwin Committee, whose achievement should be to carry out the Darwin Project. However, the aims and the tasks of this Committee will be essentially academic and they will be framed up into the greatest observance of freedom of speech as well as the most spontaneous initiative of all the institutions and individuals participating in this undertaking. We hope that the careful reading of The Darwin Project will contribute to dissipate any doubt with regard to the above mentioned statements.

The National Darwin Committee Executive Board thanks CONICYT and the Institute of International Studies for the support already extended to its work. Without their generous help the accomplishment of the Committee should have been hardly successful.

AUGUSTO SALINAS ARAYA
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Darwin National Committee
INTRODUCTION

In times of crisis, sometimes man forgets his own circumstance for a moment and looks backward in time as if he may find an answer to his present quest in the past. Thus, the anguish of the present is a constant stimulus to write our history—perhaps with the tacit hope of finding a diffuse design of a curve which allows us to interpret better our present, and enable us to make a valid forecast of the disquieting future.

Today, we are at a particularly critical moment of our history; we have suddenly realized that we are temporary crew members of a space ship—Earth—whose dimensions and loading capacity are finite. But at the same time—and here lies our anguish—we perceive that we know very little of its care and maintenance. The survival of our species depends from this knowledge.

Our attitude towards historic past is in a certain way conditioned by the sort of crisis we have had to endure. Romanticism is proper to generations turmoiled by existential and identity conflicts. Thus, historians tend to revive ideally a mythical past, a Golden Age. This cannot be our attitude because our crucial situation certainly demands to be met in a more dynamic and creative manner. Now, we have to rescue what we have lost—or what we are about to lose which is no other than the relationship man-nature, which is coherent with the possibility of having a future as a Humanity, as a biological species.

In the forthcoming pages we shall try to explain an encounter with the past, and particularly, with a great man, Charles Darwin—with his work, and above all, with his enormous capacity to admire and understand nature and life. Essentially, what we want is to board again an imaginary "Beagle" and try to reconstruct the scenery lived, observed and described by the great English naturalist. We hope that the reading of what is so far the Darwin Project may be considered as a cordial invitation to join us in a common enterprise which is a real challenge to overcome the crisis of the contemporary world.
1. The journey of the H.M.S. "Beagle" (1831-1836)

The Departure

On the 27th day of December, a small brig of 242 Tons and ten cannons, under the command of Captain Robert Fitz Roy R.N., sailed from Devonport, a small port near Plymouth. Its mission was to continue the reconnaissance and drawing-up of hydrographic charts of the South American coasts, and carry out longitude measurements in different places of the Southern Hemisphere. This was not the first time that the H.M.S. "Beagle" was sea-bound carrying out orders of the British admiralty. Between 1826 and 1830 it had already carried out similar tasks. During its first trip its sailors had discovered a channel which they named Beagle, in the ship's honor, and captured -in repraisal for certain thefts and other felonies- three natives of Tierra del Fuego. They were Fueguia Basket, Jemmy Button and York Minster, who were now returning to their homes after a not too happy stay in Great Britain. Under the expert scrutiny of its captain, the ship had been submitted to changes and repair works which would allow it to withstand the perils of navigation in the Southernmost seas. A third pole was added so as to improve its maneuvering capacity, and four of its cannons were removed in order to increase its load. Part of this load, aside from food and medicines, was a great number of chronometers and preservatives for the specimens which would be collected during the long voyage.

In spite of its youth, Captain Fitz Roy was already an experienced sailor, expert in hydrography, and
very fond of all the arts and sciences of high navigation. Extremely rigid regarding his religious convictions and his professional duties, the captain of the "Beagle" was certainly not a man easy to get along with, as far as his travelling companions were concerned. His aristocratic background however - being the grandchild of a Duke and nephew of Lord Castlereagh - moderated his irritable character and his tendency to become angry easily. Robert Fitz Roy was a pioneer of meteorological studies, and later in his life, became chief of the first official British service which gave scientific weather predictions. After he was named Governor of New Zealand, his unpredictable character and tendency to consider a personal offense all opinions contrary to his own, made him fail in this high appointment. His depressive personality led him to commit suicide in 1865.

The Naturalist on Board of the "Beagle"

The expedition undertaken by the "Beagle" towards the end of 1831 was not essentially different from the ones which were carried out year after year by Her British Majesty in all seas. The only difference, however, was the presence of a young man aged twenty-three, among the seventy-four men who made up the ship's crew. Among the crew were the already mentioned natives from Tierra del Fuego, a missionary, a man in charge of instruments, an artist (Conrad Martins, who left precise sketches of the visited regions, all of great artistic value) and the servants of Fitz Roy and Charles Robert Darwin. This young naturalist embarked in the voyage spurred by Fitz Roy. He defined himself as "extremely fond of geology and in general, to all branches of Natural History".

Charles Darwin had recently finished studies at
Cambridge and, spurred by his father, had prepared to become a good rural parson for the rest of his life, after falling at Edinburgh's School of Medicine. Young Darwin showed to be more prone to horseback riding and hunting than to book-reading; however, he was gifted with an extraordinary observation capacity, great patience and a natural inclination for collecting specimens. Such endowments permitted him to become acquainted with John H. Henslow, professor of Botany at Cambridge, who recommended him to Fitz Roy as a naturalist. Darwin had to overcome his father's opposition to such a "worthless adventure" and decided to benefit from this opportunity to get acquainted with remote lands, and "collect, observe and inform on any thing of value for Natural History". Years later, when referring to this voyage, Darwin had said, "the voyage of the "Beagle" has been by far the most important event in my life and has determined my whole career". 1/

**Historical and Scientific Importance of the "Beagle's" Expedition**

During the four years, nine months, and two days which lasted the voyage, Fitz Roy and his companions visited the Canary Islands, Green Cape Archipelago, Brazil, Uruguay, Argentina, Chile, Perú, Galápagos Islands, Tahiti, New Zealand, Australia, Coconut Islands, Mauritius Islands, Santa Elena and Ascensión of New Brazil, the Azores and after having travelled

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around the world arrived back to England on October 2, 1836.

From the Admiralty's point of view, the voyage was considered a complete success. The "Beagle" carried back to England no less than 82 views of different coasts, 80 hydrographic charts and maps and 40 maps of the visited bays and ports, in addition to the innumerable longitude measurements carried out. Furthermore, between 1842 and 1846 Darwin wrote three works on the geological observations during the trip. The first one of these works (and the most famous) deals with the formation of coral reefs (The Structure and Distribution of Coral Reefs of 1842) in which he states the hypothesis—which has been proven true—that such reefs and atolls had been formed on the flanks of volcanic islands which were in the process of sinking. The second of his works dealt with the volcanic islands (1844) and the third one on geology of South America (1846).

Meanwhile, some outstanding English naturalists began to classify and describe the species sent by Darwin to England. The results of this work carried out by Sir Richard Owen, Gould and Jenyns among others, were published in five volumes (1840-1848) under the generic name of Zoology of the Beagle. In his work Antarctic Flora (1845) J. D. Hooker catalogued some botanic species collected by Darwin. Darwin's own observations as well as the careful reading of Sir Charles Lyell's Principles of Geology (1830) began to weaken his religious beliefs during his voyage, but he preferred to keep them silent in order to avoid conflicts between Fitz Roy and himself.

No other book satisfied Darwin as much as The Voyage of the "Beagle". The constant demand of this book for
over a century confirms it. The Voyage of the "Beagle" has become a classic in the literature of adventure trips, both because of its style and great didactic value, since it shows the field work of a great naturalist. This work resumes the contents of the diary Darwin kept aboard the "Beagle" for almost five years, plus data, descriptions and observations written into eighteen notebooks. A first version was the third volume of the work called *Narrative of the Surveying Voyages of His Majesty's Ships "Adventure" and "Beagle" ... (1839) edited as the official report on the scientific cruises undertaken by the "Beagle" and the "Adventure" between 1826 and 1836. The volumes written by Fitz Roy and the former captain of the "Adventure", Philip Parker King, passed on inadvertently by the public, but *Journal and Remarks*, the volume written by Darwin, became a book-store success. During 1839 two more printings were put into circulation and the final version which was revised and completed by Darwin was published in 1845 under the title *Journal of Researches Into the Natural History and Geology of the Countries Visited During the H.M.S. "Beagle" Round the World Under the Command of Captain Fitz Roy R.N.* Fortunately, the following editions clipped it into a more simple and significant title: *The Voyage of the "Beagle"*

All such results would have been sufficient enough to reward the great effort of the Admiralty and the "Beagle's" crew. Nevertheless, the evidence collected during the voyage and its use in the formulation of Darwin's theory of the origins and evolution of species is what gave the second voyage the historical and scientific importance known to us today. It
is the opinion of a known specialist that "it was the vast and changing panorama of life, both living and extinct, observed by Darwin during the "Beagle's" cruise that set him on the road to The Origin of Species. 2/

By reading Lyell and observing the South American landscape, the young naturalist convinced himself that the theory of the author of Principles of Geology was the correct one; he knew that the physical characteristics of the planet were the result of the action of geological forces acting throughout great periods of time—incomparably longer than the 4,004 years theologians assigned to Earth's history since its creation. Because of this conviction, and by having stated the right questions at the precise moment, Darwin was able to formulate his first hypothesis on the existence of a stock common to all species.

On September 15, 1835, the "Beagle" arrived at the Galapagos Islands—the Enchanted Islands of the Spanish Conquistadores located almost at the Equator line, approximately 600 miles off coast. Based on the lecture of Lyell's work, Darwin was looking for continuity and similarities among living species as well as similarities between them and its predecessor. Just as Lyell had explained geological development through his uniformist theory, in the same way Darwin wanted to explain the "successions of organic types", both in space and time, by means of an equally logical and hypothesis. During his stay in Patagonia he noticed that the extinct species had been replaced by closely-related species,
as shown for example, in the surprising similarity between the fossil of the giant "armadillo" found in the Pampa, and the actual armadillo which scarcely came up to one-tenth of the corpulence of its predecessor. This made Darwin think that he was facing different varieties which had a common ancestor rather than different species.

When the "Beagle's" crew disembarked in the Galapagos Islands, Darwin came up to a more complex problem. Up until that moment, South American fauna and flora had fitted within a frame which characteristic was a continuity in the variation of organic forms, coinciding with gradual changes of the environment. However, the Galapagos Archipelago was a radically different case: while the environment was essentially the same in all the islands, each one had a different flora and fauna. The different zoological and botanical varieties of the Galapagos undoubtedly seemed to be related among them, and what was even more surprising, they all reminded similar South American species. They were the varieties which descended from a common stock. Thus, Darwin saw his problem clearly: if he wanted to prove his hypothesis that the species existing today are the actual representatives of a genealogical tree whose roots disappear in the darkness of time, then he would have to prove why species near in space and time could be so different and why other species so distant geographically and geologically could be so similar. "The voyage of the "Beagle" had turned a courteous and somewhat indifferent young man into an adult. This man, bestowed with great perception and originality, gained from this adventure the opportunity of exercising his talents in "armadillos" and glyptodonts, stones and rocks which fell over and over in the
currents of the Andes, turtles and volcanos and birds' beaks. Back in England he would put all these pieces together in a new synthesis, and the world as a concept, would never be the same again".

All this had been possible because he had excavated and discovered the carcass of an edentate, had witnessed how the Andes pushed each other further up during an earthquake, and because he had read Lyell and Humboldt. The fundaments of his ideas were so diverse as the pieces of the puzzle he had set up. Indeed, it could not have been otherwise. 3/

2. The Long Way Towards the Origin of Species (1837-1859)

Darwin and Exposing the Problem

In his Autobiography Darwin wrote: "On March 7, 1837, I took lodgings in great Marlborough Street in London and remained there for nearly two years until I was married. During these two years I finished my Journal, read several papers before the Geological Society, began preparing the MS for my Geological Observations and arranged for the publication of the Zoology of the Voyage of the "Beagle". In July I opened my first note-book for facts in relation to the Origin of Species, about which I had long reflected and never ceased working on for the next twenty years". 4/


Later, on remembering that period of time when he returned to England, Darwin said that as he was preparing the Voyage of "Beagle" for publication he realized the enormous amount of facts which indicated a stock common to species.

In July 1837, Darwin began to work in his *Origins of Species* using true "Baconian principles"—that is, collecting facts and more facts, based on his own experience or readings, without formulating any hypothesis. Darwin knew perfectly that any theory on "transmutation of species" should rest—for the sake of public acceptance—on a solid base of irrefutable evidence, partly due to the fact that previous evolutionist theories were completely discredited (particularly the one proclaimed by Lamarck in his *Zoological Philosophy*, 1809), and also because the last work on the matter had been said by Cuvier through his catastrophist and anti-evolutionary doctrine, which due to the author's prestige had imposed itself in the intellectual and academic milieu of France and Europe.

Just as important for Darwin was the conservative spirit which prevailed in England at that time, and the everlasting distrust of the more traditional sectors towards men of science whom they regarded responsible of paving the road to the French Revolution and its ravages, due to their impious ideas. On the other hand, when Darwin returned, England was living through the fear of strikes and popular uprisings in its social context; and, from an intellectual point of view, the rise of the so-called "Natural Theology", whose followers believed that the study of nature was the most adequate road to prove the goodness and existence of the Creator. Charles Darwin knew that his ideas could erode
sensibly this doctrine, and would not precisely help to calm English conservatives. This preoccupied him about the results of his work.

In October 1838, Darwin read and studied thoroughly the Essay on the Principle of Population written in 1795 by Robert Malthus. On that occasion he finally found the hypotheses he needed so much. He was already familiar with the concept "struggle for survival" utilized previously by Lyell and others to explain the situation in the animal and vegetable kingdoms. This process explained to Lyell the extinction of so many species. Darwin, however, applied this concept to the explanation of the appearance of new species. What he had to explain, in the first place, was how new varieties of plants and animals appeared, and in the second place, why some of these varieties could survive at the expense of its competitors. He then realized that given the existence of such varieties, the struggle for survival was won by the best fitted, through a process or mechanism which Darwin named very properly natural selection, distinguishing it from "artificial selection" practiced by breeders of domestic animals. On the other hand, Darwin knew perfectly well the fact (already noted by Linneus) that in a determined population there exists a great amount of varieties; this is taken in advantage by the breeders so as to obtain through crossbreeding more adequate samples for human benefit.

The "Theory of Descendancy Modified Through Variation and Natural Selection"

The experience gained during the "Beagle's" voyage gave Darwin the necessary evidence to prove his theory.
According to it, there existed two factors which acted constantly on a determined species: the physical environment (climate, geomorphology, soils, etc.) and the biological environment (food, predators and competitors). On the other hand, in the beginning of his *Origin of Species*, Darwin points out the existence of varieties within a species, which are submitted to the action of the mentioned environments, and to the selective process originated by the struggle for survival. Any change taken place in the physical environment causes qualitative adaptation differences to appear among existing varieties; some of these varieties (the less adapted) will disappear, while others, better adapted to the new environment, will survive. In this sense, if these differences in the adaptation ability are determined genetically, gradual changes will be taken place both in the genetic constitution of the species as well as in its forms. For this reason, C.H. Waddington defined this process which Darwin called "natural selection" as an inevitable consequence of genetic aptitude variation. Therefore, natural selection is not an agent in the transformation of species, but a process which arises naturally from a condition pertaining to living beings.

Transformism caused by the natural selection process is added by Darwin to his conviction (based on paleontology) that there exists an evident progressiveness in the successive and gradual changes of species. "This preservation of favourable individual differences and variations, and the destruction of those which are injurious, I have called Natural Selection, or the Survival of the Fittest". 5/

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Transformism and progressiveness are, then component parts of what we know as the evolution of species. Progressists such as Herder and Cuvier were not transformists. On the other hand, a definite transformist such as Lamarck, did not value the evidences of organization progress in living beings.

The Origin of Species and its Impact in Science and Society

The majority of the already exposed ideas—those which constitute the fundamental thought of Darwinism—were written by Darwin in 1839. Half-way through 1842, the English outstanding naturalist wrote a brief summary of his theory which by 1844 had increased to 231 pages; however, the publication of the final work had to wait fifteen more years due to Darwin's desire to collect the greatest amount of evidence before submitting his manuscript to the printing office. What caused the publication of The Origin of Species was the letter written to Darwin by Alfredo Russel Wallace, an English botanist, communicating him that he had formulated a theory similar to his own, working independently, unknowing of Darwin's works. Thanks to the intercession of Lyell and Hooker, both agreed to read a work on the theory of natural selection before the Linneus Society, on July 1, 1858.

In November 1859, The Origin of Species by Means of Natural Selection of the Preservation of Favoured Races in the Struggle for Life appeared on sale; the first edition of 1250 samples was immediately sold out. This spurred the printing of six more editions until 1872. It has been said that, aside from the Bible, no other work has been so influential—from whichever point of view—on contemporary
thought.

Where lies the great importance attributed to The Origin of Species? Undoubtedly, its contents did not flatter the human race, and it almost completely deteriorated the belief in a Creator of a known order. Furthermore, Darwin's ideas attempted against the very fundamentals of science which postulated for an intelligible and ordered universe. According to Darwin, the harmony of the living was not the wise work of a Divine Architect, but the product of the action of natural forces. Darwin's universe is disarrayed, chaotic, because it is undergoing constant change. Neither has a purpose nor a final cause.

The contribution of The Origin of Species in the achievement of a valid explanation of the world of organized beings has become undoubtedly the most universally accepted principle in modern biology. In the first place, it showed that previous theories (including the Biblical principle of creation) were indefensible when faced with evidence of organic mutation. In the second place, the existence of an evolutive process was demonstrated clearly and convincingly, through a great amount of evidence showing that existing organisms has not been created separately, and had evolved gradually from primitive organisms. And last, because it introduced the theory of natural selection, which allows a natural mechanism through which a transformation of species can and must be produced. "Natural selection rendered evolution scientifically intelligible: it was this more than anything else which convinced professional biologists like Sir Joseph Hooker, T.H. Huxley and Ernst
Haeckel". 6/ All in all, what most impacted religious feelings and Victorian morality of those times was man's new place in nature. "Man could no longer be regarded as the Lord of Creation, a being apart from the rest of nature. He was merely the representative of one among many Families of the order Primates in the class Mammalia". 7/ This was one of the most important causes of the indignant reaction against Darwin from a great part of society and European and American intellectuals. The president of the University of Columbia declared in 1873 that if Darwin's theory were true the existence of God would be impossible. If such was the product of modern science, "give me then, I pray, no more science. I will live on in my simple ignorance, as my fathers did before me". 8/ Protestants and Catholics alike criticized the materialism implicit in Origin. Indeed, Darwin never denied the existence of a Supreme Creator, but, as Lamarck, insisted that the appearance of life in the planet Earth and its subsequent branching in divergent forms was the product of natural forces, which effect could be expressed in laws similar to the ones which regulated the order of stars and the movement of bodies. Already in 1842 he expressed his disbelief in the existence of "innumerable acts of creation"; on the other hand, he claimed that


7/ Huxley, op. cit. p. xv.

creation and extinction of species were "effects of secondary cause".

The polemics between the representatives of the Anglican Church and Darwinism reached dramatic highlights in the meeting organized by the British Association in Oxford in June 1860. During one of the sessions, Bishop Samuel Wilberforce referred to Darwinian theory with little knowledge and a great deal of sarcasm and irony. When he finished his address he asked the lecturer who followed him "whether was it through his grandfather or grandmother that he claimed to descend from an ape". The lecturer who followed after Bishop Wilberforce was no other than Thomas H. Huxley, the most zealous and loyal defender of Darwin's thought. He stated that Darwin's explanation of the origin of species was excellent, and proceeded to give the audience a brief summary of The Origin of Species at the end of lecture he said that he would not be ashamed at all in descending from an ape, "but rather, he would be ashamed to be related to a man (Wilberforce) who used his great qualities to obscure and ridiculeize truth". This was the first great public triumph of Darwinism.

The Catholic Church was much more flexible and tolerant when faced with the onset of Evolutionism. Although the tacit condemnation of the transformist theory was implicit in the Syllabus published in 1864 by Pope Pius IX to oppose "progress, liberalism, and modern civilization".

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the Catholic intellectuals could read, discuss and even defend freely the contents of *The Origin of Species*. The solution to all possible controversy between Catholic and evolutionists seems to be in the encyclical letter *Humani Generis* (1951) by Pope Pius XII. It stated that the theory of evolution should be examined and discussed by scientists and theologians as well—at least in the part pertaining to the human body, which according to this theory, would have evolved from pre-existent organic matter. Nevertheless, Catholic faith obliges all its believers to believe and support that the soul of every man has been created by God.

It could be asserted that morality, as well as political ideologies, come from sources other than science. However, the authority of scientific thought and the force of its rationality is so strong that any idea or movement of any class aspires to be "scientific" and obtain the approval of science. The greatness and extent of Darwinian conception of the living world made that critics and followers see in the theory of *The Origin of Species* the source of all disgraces which flail the modern world, or, on the contrary, a doctrine which made coherent efforts to improve contemporary society. Herbert Spencer, the apostle of "social Darwinism", was among the ones who outstood for his application of Darwinian ideas to the construction of a modern concept in social science. In his book *Creation and Evolution*, he formulated the basic principles of an evolutionist ethics. According to these principles, a moral conduct was one which contributed to the best possible adaptation of man to his environment, thus assuring a progressive evolution of the human *genere*. Since happiness was also a result of satisfactory adaptation,
morality and happiness were synonymous; essentially, they were one thing.

Leaders of capitalism and Manchesterian liberalism also saw in *The Origin of Species* the intellectual support necessary for a laissez-faire and individualist doctrine in the realm of business. On the other hand, some of Spencer's disciples, such as the Northamerican W.G. Summer, declared themselves against all social laws in benefit of the poor, crippled and "less fitted" because the dictation of such laws permitted the survival of the less fitted and went against the vitality of modern civilization.

Communism and positivism, two powerful ideologies contemporary to *The Origin of Species*, saw in Darwinian theory a serious drawback to its cause. As is known, positivism disdained all efforts to go back to origins. Comte has fought against Lamarck for this reason, and Littré was doing the same against Darwin in 1863 when he wrote that "we were not in the origin of things and neither shall we be in the end of things. Therefore, we have no way of knowing this origin and this end". 10/

In the years that followed the appearance of *The Origin of Species*, some European revolutionaries believed to see the theoretical frame of their political action in Darwin's work. They were mostly right because the English naturalist asserted that the world of live organisms constantly emerged from an evolutive process and this evolution was done through purely material means. Even Karl

Marx offered to dedicate to Darwin the English translation of *Das Kapital*. On the other hand, the German pathologist Rudolph Virchow, founder of cellular pathology, rejected the theory of evolution because he considered it "socialist" and in 1877 attacked Darwin's followers blaming them for the revolution. To this, Ernst Haeckel answered that Darwinism and socialism "agreed together as water and fire". Indeed, it is rather difficult to see in Darwin's theory a valuable contribution to the cause of Marx and his followers. They began to criticize the sources of Darwinian thought, particularly, the *Essay on Population* by Malthus, criticizing his theory on the divergence between demographic growth and the growth of resources. To Marxism, any modern technology which permitted an overabundance of food and resources discredited the somber forecasts of Malthus and his acolytes.

Possibly, the major theoretical stumbling block between Darwinism and Marxism could be the result from comparing "evolution" to "revolution"—there does not seem to be a possible agreement between the two. Undoubtedly, both processes act on the basis of struggle; for Darwin, the struggle is between two individuals of a same species competing for survival; for Marx, it is among the different social classes. In this last one, solidarity prevails within each class; for Darwin, it is precisely there where the most furious struggle takes place. Finally, Marxist theology claims that class struggle becomes obsolete once the establishment of Communism is set, while to the evolutionists, the struggle for survival is a permanent characteristic of living organisms.
Gaps in Darwinian Theory. Neo-Darwinism

It has been said that Darwin had always been an amateur, a naturalist who, with methods of the eighteenth century changed the concept of nature held in the nineteenth century. Indeed, Charles Darwin lacked formal education in most scientific disciplines, in spite of that, his genius was sufficient to allow him to learn and construct hypotheses all by himself. Even so, his own ignorance and the backwardness of biological sciences as compared to physics and mathematics were the main reasons for the notable gap in his theory. The first one is the incapacity of science at that time to explain the existence and origin of genetic variations which gave way to the diverse varieties within a species. The second gap was -in Darwinian theory- the lack of a mechanism which explained how the characteristics of a successful variety ("fit") in the struggle for existence may be inherited by its descendants. Both of these omissions were satisfactorily explained only in this century, thanks to men as Mendel, Morgan, and De Vries.

The progress of genetics, starting from the enunciation of Mendel's law, allowed to understand the mechanism which transmitted hereditary qualities, reaching this way a new expression of natural selection, which is efficient only when it acts on alterations of the frequency of determined genes in each population. This new enunciation of natural selection in terms of the frequency of genes has been named Neo-Darwinism.

11/ A good introduction to the study of evolution may be found in the work of S.A. Barnett et. al., A Century of Darwin (London, Heinemann Educational Books, Ltd., 1962).
3. The story post-*The Origin of Species* (1859-1882)

The publication of *The Origin of Species* changed completely the viewpoint which, until 1859, intellectuals and men of science had given to biologic evolution. It was no longer a matter of discussing whether or not there existed an evolutive process valid for all organisms, but in what form it was carried out. As it has been said repeatedly, after Darwin man occupied the place in nature it corresponded him, and this new concept initiated a biological revolution which every day acquires more vigor and transcendency. It would be asserted that theory of evolution, together with cellular and genetics theory, make up the vertebral column of modern biology.

The work of Charles Darwin between 1837 and 1858 transformed the cruise of the "Beagle" in the greatest ever scientific expedition. Indeed, the frontiers which have been opened to humanity as a result of the evidence collected in this voyage, can be compared only to the discovery of America, or to the first trip to the Moon in 1969. Darwin's achievement, almost 150 years ago, together with the sailors who went with him, continues being an example of discipline, nautical knowledge, and scientific rigour.

Charles Darwin continued his fertile work for 23 more years after the publication of *The Origin of Species*. He died in his home at Down, near London, on April 19, 1882, and was buried in Westminster Abbey, together with Sir Isaac Newton.

The "Beagle", his old adventure companion, continued sailing throughout the seas, carrying the Admiralty's flag until 1845, and was finally discharged from its duties in 1870.
II. "Operation Darwin"

1. Origin and Development of Darwin Project (DP)

Half-way through 1976, a group of professors of the Institute of International Studies of the University of Chile began to investigate the topic "Darwin and Chile: A Case Study of Interaction in Scientific Matters Between and Excellence Center and a Peripheral Society". This project obtained maximum priority in the financement contest of research projects organized by our University. It relied on two basic points: a) a study of historical and scientific aspects of the visit of the H.M.S. "Beagle" to Chile (1834-1835) and b) the impact of Darwin's work in Chilean ideas and culture towards the end of the nineteenth Century. This was not the first time we were concerned with Darwin and his theory, but now we had the opportunity to contribute in an original form to the knowledge of the great English scholar and his influence in a non-European culture.

A short time after we began, we realized the enormous impact of Darwinian thought in historiography, education, politics and social development of Chile between 1860 and 1914, to the point it was almost impossible to understand our own cultural process without examining more deeply the reasons Darwin's supporters and opponents claimed in Chile as well as in the Old World and North America. Furthermore, we realized that the elapsed time had not erased entirely the passions unleashed by the controversy on The Origin of Species; moreover, some conflictive points had only been revitalized, acquiring new forms and dimensions. Therefore, if we wished that our conclusions should have some validity and benefits, all sorts of analysis had to be restated from
our own historical perspective. At the same time, by reading *The Voyage of the "Beagle"*, we were enlightened for more than one reason; the precise description of Darwin showed us a scenery so different from Chile at present, that sometimes seemed to us that author was referring to a territory unrelated to our daily experience. Only when the presence of man was registered in a sporadic and superficial form, as in the case of our southern landscapes, did the Darwinian scenery emerge with all its pristine beauty, much in the same way it had shown itself before the amazed eyes of the young naturalist of the "Beagle", almost 150 years ago.

Parallel to this purely academic activity, and in regard to our position in a research center whose main interest lies in the study of international relations and its different actors, we were concerned with the increasing deterioration of our intellectual image abroad and the loss of prestige which, traditionally, our country has always enjoyed in the academic international milieu. This is certainly not the appropriate place or occasion to analyze and discuss such facts. Nevertheless, we can assure that then, as well as now, we claimed the need to support and stimulate at any price basic scientific research, being this the only form of assuring the survival of values and cultural and social institutions dear to our historical traditions which have been our pride since the beginnings of our nation. Furthermore, we deem indispensable the active presence of a clear and decided scientific opinion in our development as a modern nation imbued with the spiritual values of the Western World. The significant absence of the voice of the scientific community in circumstances and problems which demanded a logic rational opinion, clearly formulated
and backed by the prestige of science, contributed powerful to
convince us of this need. This reality, which in another place
we have named "the silence of scientists", has manifested
itself particularly in problems as serious for the nation as
the lack of a defined policy on the maintenance of our
environment and natural resources. Thus, it was apparent
that the weight of the opinion of our scientists had been lost
in the traffic of our recent history, specifically, since
1970. Our aim, then, was to ensure the presence of our
scientific community in decisions concerning such issues as the
adequate formulation of an economic development policy where
only the experience and capacity of men of science could permit
the correct visualization of such variables as the correct
management of ecosystems, or the complete appreciation of our
natural environment. In order for this to take place -even in
a minimum degree- it would be necessary to incentivate
scientific research in certain areas and disciplines, so as to
create the capacity to evaluate and take advantage of our
natural resources. In the second place, there also should be
designed appropriate channels to transmit the information and
accumulated experience to decision-making levels. The putting
in action of such an initiative implied a challenge we were
certain it would be faced positively by our scientific
community. Such challenge means to participate according to
our capacity in a world-level task involving scientists,
educators, politicians and technicians, this task being
objective and dispassionate analysis of our survival possibili-
ties, and the consequent proposition of criteria for an adequate
solution of this problem.

The permanent study of The Voyage of the "Beagle",


and our constant preocupation for the survival of scientific research in Chile, have almost unconsciously merged in one unique idea. Some factors common to both frames of analysis contributed to this. To mention some: the preocupation of certain academic sectors in regard to a lesser degree of development in biology of population and organisms as compared to the rapid growth of molecular biology. Another example is the imminent need to cover obvious gaps such as the one showed by the disaster of the oil-tanker "Metula", in the Strait Magellan. Another factor is the absence of academic participation in projects such as the "Chiloé splinters", which could become a tangible threat to the fragile ecologic equilibrium of important zones in our territory 12/. The sceneries described and observed by Darwin have demonstrated us an ideal and much-desired Chile, a primitive and uncontaminated territory to which we should strain to come.

In different occasions, reference has been made to the backwardness of the ensemble of disciplines which made up former natural history, respecting experimental biology. In a public forum organized by a weekly publication, Dr. Patricio Sánchez expressed "when one compares, for example, these two streams developed in Biology, in Chile, it is very clear that at this moment the older of the two the one which commenced in the nineteenth Century and which refers to (the study of) Chilean reality, is extraordinarily under-developed". ("Futuro sin Sonrisas, "Ercilla, No 2083, 2-8 July, 1975, pp. 33-35). Also, in 1975, in the College of Sciences of the University of Chile, serious attempts were made to impulse the growth of the biology of organisms.

Regarding the project "Chiloé Splinters", this is a joint enterprise between the Chilean Development Corporation (CORFO) and a Japanese multinational to exploit 125,000 acres of autochthonous forests in the island of Chiloé, which has stirred a nation-wide polemic between developmentalists and conservationists.
nearer instead of parting away from it irreversibly. The challenge we wished to formulate was taking shape. To face it adequately, we should have to board again an imaginary "Beagle" and re-encounter the Chile we had almost lost.

On September 1, 1976, we sent a letter to the President of the National Commission for Scientific and Technological Research (CONICYT) submitting for his consideration a project which we had named "Darwin Operation". Its main objective was to plan in the best possible manner the commemoration of the 150th anniversary of the visit of the H.M.S. "Beagle" to our coasts, carrying the naturalist Charles Darwin. The President of CONICYT was told of the convenience and necessity of inviting wide sectors of our scientific community in a national-level task which would consist mainly in an homage to the author of *The Origin of Species* and in an interdisciplinary investigation on the deterioration of the Chilean scenery after a century and a half Darwin described it so precisely. At the same time, the Institute of International Studies supported institutionally this idea, which was consistent with the interest of this academic center to promote international discussions about environmental problems and to contribute to the approachment of the international scientific community, definitely a main actor of contemporary world panorama 13/.

13/ This interest has been shown in numerous seminars and courses organized by the Institute of International Studies, which gave originated publications of great importance and currency for the formulation of adequate policies. Some of them are:
Indeed, all along we had foreseen the idea of transforming the "Darwin Operation" in a multinational scientific action, being this the only way we could fulfill the objectives we had set.

The answer of the organism governing the planification of Chilean scientific and technological research was favorable. As a result, a committee was created to study the proposed project, elaborate a program to place it in motion, and structure legally an organism which would be adequate to fulfill the multiple tasks suggested by the document of the Institute of International Studies.

This committee began to meet informally in October 1976. In the succeeding meetings, a definite action project began to take form, and was submitted for consideration and approval to various areas (academicians, University authorities, government spokesmen and representatives of private enterprise an business).

La Semana Científica y Tecnológica, a scientific publication edited by CONICYT, informed in its edition of December 16, 1976 (Year V, Nrs. 222-223) the official constitution of the planning committee occurred on December 2, and various agreements. In addition to the objectives and purposes established in the original project, the committee innovated in two significant aspects: a) given the case that Darwin had visited various South American countries other than Chile, and the fact that the voyage of the H.M.S. "Beagle" had extended through a circumnavigation of the globe, covering practically all the Southern Hemisphere and some European territories of the Atlantic, and given also the fact that the conditions and environmental complexities of our country are
similar to the mentioned countries and territories, we decided to broaden—at least theoretically—the geographic scenery of our activities by inviting the nations visited by him between 1832-1836—including, obviously, England—to participate in our project; b) during the discussion of the project, the idea of planning an interdisciplinary research line which would analyze the transformation of the landscape visited and described by Charles Darwin in the period between his stay and 1980 was discussed. We thought this idea should be the nucleus of the research program, and its importance would lie in the possibility of constructing precise indicators of environmental deterioration in vast territories. These indicators may be used in the elaboration of development and conservation policies for renewable natural resources.

During the first months of 1977, the Darwin Project (DP) was made known and discussed in different milieu, both in Chile and abroad. The enthusiasm awakened by this idea stimulated and permitted us to continue onward receiving and introducing into the original project all the ideas and suggestions which contributed to make it better or expand its range of action.

It could be said that, in this period, the DP acquired an internal dynamism and its own physionomy, which spurred us to communicate our idea to organisms and personalities abroad.

The Executive Secretariat of the Committee in charge of the Darwin Project (which corresponded to the Institute of International Studies, originator of the project) informed this initiative to the state agencies of the Latin American countries visited by Darwin. We received a positive answer from these agencies almost immediately, specially from CONACYT of Argentina,
CNPQ of Brazil, the General Secretariat of Economic Planning of Ecuador, and from the National Research Council of Perú. In November 1977, the executive secretary of the committee was invited by the Governments of Spain and England in order to establish direct contacts between Chile's Darwin Committee and diverse institutions, authorities and scientists of these countries. During this auspicious tour the bases were set for mutual cooperation and support. In due time, they will originate scientific cooperation agreements in the areas and disciplines covered by the DP.

The success achieved stimulated the executive secretariat and CONICYT to create a national-level organism whose institutional structure would allow it to continue with the determined tasks and carry out agreements and financing operations, technical assistance and intellectual and scientific cooperation both in Chile and abroad. Towards the end of 1977, the Charles Darwin National Committee was made known and made official through the Supreme Decree No 540, of June 2, 1978. The Comité Nacional Darwin is presided by Dr. Ricardo Krebs, a highly prestiged historian, former Dean of the College of Humanities of the Catholic University of Chile, and President of the same University in 1969.

In this legal body different institutions and national organisms are represented. They take part in the study of projects and in the process of planning and decision-making through representatives designated by them and who are

14/ La Semana Científica y Tecnológica, 17 de Noviembre de 1977, Año VI, N°s. 266-267.
members of a Council presided by Dr. Ricardo Krebs, by the Vice-President (representing CONICYT) and by the Executive Secretary. National Darwin Committee will initiate its activities officially on September 14 of this year, and will immediately begin to study the project which will be submitted and will plan the program of the commemoration of the 150th Anniversary of Darwin's visit to South America.

2. The Darwin Project: Which is the Idea?

A New Call for Scientific International Cooperation

The Darwin Project (DP) maintains fidelity to its original idea. It merely consists in rendering homage to the memory of one of the greatest scientists in history and his work, which even today, one-hundred and fifty years since his death, is a constant source of inspiration and an example for all men of science. This homage, however, aims to outstand particularly the historical importance of the H.M.S. "Beagle's" cruise which started almost 150 years ago. (December 27, 1831 December 27, 1981). Surely, The Origin of Species was the main reason behind the "Beagle's" integration to the history of nautical and scientific accomplishments; nonetheless, the old brig of scarcely over 200 tons and a valiant crew allowed Darwin to gather information which later enabled him to formulate the theory of evolution of species by natural selection.

The character of Darwinian work and the image of Charles Darwin demand that this commemoration should have a connoted academic spirit, because what we are commemorating is the triumph of human capacity and scientific objectivity regarding traditional knowledge and beliefs. This was a victory which set forth the world we now live in, with all its stinginess and grandeur. Therefore, we have decided to carry out this homage based on
two main points: a) a historical-critical analysis of Darwinian work from the perspective of present experience and knowledge and, b) a multidisciplinary study of the regions, nations and territories visited by Charles Darwin between 1832 and 1836. To be sure, ours is an ambitious idea, both in the space and time we want to carry it out, because our study would cover practically all of the Southern Hemisphere, and it would be conducted during a time period lasting approximately seven years (1979-1986). For this reason, and as a way of assuring the success of this undertaking, we are making an appeal to individuals and institutions who want to support our cultural enterprise, so we may jointly face in open cooperation an initiative which, due to its wide range of problems covered, must be achieved successfully.

Characteristics of this Enterprise

The International Geophysical Year (IGY) seems to be a relatively appropriate Model for the task we are about to undertake. It has been defined as "the most ambitious and at the same time, the most successful cooperative enterprise ever undertaken by man". In any case, IGY is the greatest, most complex and comprehensive scientific initiative ever conceived, since there participated 67 nations and around 35,000 men of science who carried out research in some 8,000 stations distributed throughout the world from Pole to Pole, totalling a cost above 2 billion dollars. During the 20 years

elapsed since IGY (1957-1958) some people have claimed that the International Geophysical Year was not really an international enterprise, but rather a series of national-level activities coordinated internally. In turn, these national activities, once approved and financed by their respective Governments were almost exclusively under control and supervision of scientists, thus entirely apolitical.

According to Lloyd W. Berkner, Vice-President of the IGY Committee, "all programs were carried out by scientists with the approval, cooperation and assistance of the different governments, but not under their direction". 16/ The activities of IGY were highly individual and not governmental, because every scientist involved in the task carried out its research on a determined problem according to his personal interest, shared by many other scientists. IGY was indeed an academic cooperative undertaking with governmental assistance. Our project pretends to continue the path traced by IGY, although facing obvious and necessary space and conceptual limitations, notwithstanding the fact it shall be carried out during a considerably longer period of time. In the first place, the DP will be carried out mainly in the Southern Hemisphere, particularly in the territories visited, observed and described by Charles Darwin. On the other hand, the viewpoint applied in the DP is radically different from the one applied during IGY, because it gave primary importance to the study of physical and chemical phenomena affecting our lobe, covering a disciplinary spectrum which went from glaciology to the analysis of solar activity. Whereas the Darwin Project is an initiative to

16/ Ibid. p. 331
know better our environment, whether it be social, physical or biological. The criterion hereby applied underlines the study of ecosystems through all those disciplines and areas of knowledge which deal with the subject matter. We are also interested in a better knowledge of Darwin and his work from a contemporary perspective, through a mature and in-depth exam. Finally, we emphasize the fact that our fundamental concern is historical, and therefore, deeply human. Thus, our principal difference from IGY is conceptual and not merely geographical, because our object of study is the relationship between man and his environment during a 150 year period.

There are yet other differences which separate us from the proposed model, but they are more formal than in-depth. It has been said that IGY consisted of the sum of individual and national efforts made possible thanks to international cooperation. However, the absence of the private sector is evident in the financerient as well as in the conduction and coordination of research projects - basically, the absence of private enterprise, universities, Scientific societies, etc.

Ever since 1958 until present times, the panorama of international relations has changed substantially, envolving towards the assignment of roles of comparatively greater importance to non-traditional actors of this stage. To mention some: the great multinational enterprise, the raw material cartels, certain guild and cultural institutions of supranational rank, etc. Our project, therefore asks for a support petition and an invitation to private, non-state organisms and institutions to participate in it. The objective is to take
advantage of this juncture so as to elaborate a budget appropriate for our action, but comparatively modest if compared to IGY's. Finally, we shall ask for support and collaboration from the international scientific community, represented by various organisms and societies of great prestige, thus acknowledging the transcendental role of men of science in the world panorama. This viewpoint will allow to examine critically the possibility of carrying out interdisciplinary actions conducted cooperatively by national agencies, international organisms and private groups whether they be financial, guild and academic. Notwithstanding the fact that we may continue to use traditional channels of financement we believe that among our actions there are some which allow for a direct financement, in relation to their intrinsic commercial value. Mostly, they deal with extension operations, such as the filming of scientific documentaries, publication of textbooks, tourist promotion, etc. We are convinced that in this area part of our effort will cause a great interest in the public and it may generate significant methodological changes in education.

Since this is a project born in an academic center which studies international relations, the DP gives great importance to the betterment of the world situation; consequently, its primordial objective is to contribute substantially to the greatest possible understanding and nearness of the nations invited to be an active part of the

17/ We already have had auspicious contacts with some international agencies and private foundations regarding the financement of some of our research project. We also have in our favor the cooperation and technical assistance promised by prestidged public and private organisms from Europe and Latin America. The private sector's interest to cooperate with us in certain phases of the DP has been a great stimulus to our activities. This has been manifested through entrepreneurs, guild representatives, and spokes in of development corporations.
program, trusting that this initiative will be followed by other regional groups.

Just as in the IGY, the Darwin Project will examine the role of science and technology in the solution of international problems through the joint work of scientists, government officials, and representatives of the private and academic sectors in an initiative totally unrelated to any area or topic politically conflictive.

By promoting international good-will towards the solution of international political problems generated by the scientific community, IGY deserved to be regarded as "humanity's most significant pacific enterprise since Renaissance up until present days". On a smaller scale, the DP also wishes to generate an attitude of greater understanding and reciprocal respect among the participant countries.

In summary, and with the already-mentioned limiting factors, the DP aspires to continue IGY's work by constituting a supranational scientific enterprise where men of science, entrepreneurs with foresight, academicians and public officials unite in the task of generating a greater understanding among participant nations and create the possibility to design ideal methods and instruments for the solution of regional problems.

18/ Science, Technology, and American Diplomacy, Vol. I, Chapter 5, p. 348. The lessons left by IGY in matters of international scientific cooperation are well shown in the following paragraph of the quoted book: "The spirit de corps engendered by IGY seems to have replaced man's natural conservationism, and expressions of optimism floated freely immediately after that spectacular scientific activity... It was observed, for example, that IGY united many men under the conditions which favored appreciation and harmony among them and it demonstrated that men of science could play a fructiferous role in international organizations such as ICSU and its parent, UNESCO..." (Ibid. 347).
In particular, the DP will be limited to the study of "Darwinian sceneries" which are preferentially located—excepting certain Spanish and Portuguese archipelagos—in the Southern Hemisphere. Conceptually, the objective is to examine the state of the evolution theory from the viewpoint of contemporary knowledge and to promote an integral study of man's physical and biological environment in the mentioned territories.

Some Problems Involved in the DP

We believe our purpose shall be clearer if we examine—even though briefly—the complexities which the DP will face. In the first place, it will be inevitably focused from an interdisciplinary perspective, both because of the varieties of problems we have defined, and because the interdisciplinary method is much more efficacious and allows a dynamic study of the subjects to be dealt with. The figure and work of Charles Darwin occupy a prominent space within this context. Most probably, the existent bibliography on the English savant and his theory on natural selection is very profuse and unique in merit. Nevertheless, there exist some topics related to both subject matters which deserve the investigators' interest. As an example, we refer to the study of the impact of Darwinian theory in the culture of peripheral countries, mainly, in Spanish-American nations. We have seen some of this in Chile, where Darwin's ideas provoked a controversy in the educational and political field, which turned out to be enormously beneficial for the intellectual and social development of the nation. Another topic of interest is the impulse which the author of The Origin of Species gave to the institutionalization of science as a
socially acknowledged activity, and to the professionalization of the men of science. In this sense, we believe that Darwinism, by joining a Baconian research methodology with the capacity to formulate hypotheses of an elevated degree of abstraction, permitted science of that time—and specially the life science—to surpass the limits of a rigid positivism and break the traditional barrier which limited the area of a scientist to what was licit for him and his professional activity. This point takes us directly to a problem area we believe vital in our project. Its objective is no other than to examine the development of science and mainly, of disciplines which integrate modern biology ever since Charles Darwin disembarked in England at the end of the voyage of the "Beagle" until the present. In this frame of preponderantly historical analysis, we are concerned both with the internal development of biology (primordially, the theory of evolution and genetics) as well as for the social frame within which science has been acting during this period, that is, the development of relationship between science and society. Indeed, there exist many volumes dealing with the relationship between science and society; some of them examine the problem in certain historical periods and in determinate societies. Others—may be the majority—deal with the sociology of present-day contemporary science. 19/

19/ The following may be quoted among the first ones:
The current sociology of science has an extended bibliography; just to mention two:
Nevertheless, there still exist notorious gaps in this field, bearing in mind the enormous change provoked by the appearance of the theory of natural selection and its impact in the scientific, political, economic and social thought of the nineteenth century. Therefore, we believe indispensable to realize a serious historic study of the behavior of scientific community and its interaction with the social milieu which made possible its past activities during the last 150 years.

Ever since Charles Babbage wrote in 1830 the Decline of Science in England up until today, the scientific environment and the reasons which made science possible have undergone a deep change. After the historic discussion between Huxley and Bishop Wilberforce in June 1860, it seemed that there would never exist limitations to scientific innovation. Today, the latest genetic experiments cause social alarm, and voices are raised even in societies which value freedom of expression and thought above all things -thus pretending to limit the freedom to choose research topics and methods, as has been so far 20/.

20/ According to Thomas Huxley and many other British men of science, after the publication of the Origin of Species, "Humanity could await with optimism not only the unlimited growth of scientific knowledge, but also could foresee an unlimited biological progress". (Quoted by William Irvine, in the book Apes, Angels and Victorians (New York, Meridian Books, 6th Printing, 1968) p. 136. Presently, the outstanding results of genetic investigation (just to name the field of biology) has caused worry in wide sectors of public opinion, both in the United States and in Europe. Cfr. from Harvey Wheeler, "La Ciencia bajo la Ley" in Facetas, Vol. 4, No 1, 1971) and the recent number of Daedalus, entitled Limits of Scientific Inquiry (Vol. 107, No 2, Spring 1978).
In Latin America, historical accomplishments in science are a little known phenomena; yet, they deserve to be considered. Again, we believe that the influence of Darwin's work was basic in the birth of our scientific spirit. Therefore, we have included this topic in our program of investigations.

The spectacular development of genetics, starting from the work of Pauling, Watson, Crick, Korana and Shapiro, among others, will undoubtedly permit original and productive viewpoints in the examination of modern evolution theory. In 1955, a group of eminent scientists were called by the American Association for the Advancement of Science (AAAS) to meet in Atlanta, U.S.A., to study the problem of species. Are the results of that symposium still valid, from the viewpoint of actual scientific knowledge? This is one of the many questions we believe must be answered by the present generation of biologists. Meanwhile, it is even more beneficial to study the possibility of a synthesis, or at least to establish the most expedite channels of communication between molecular biology and environmental and population biology. An outstanding contemporary biologist has criticized the opinion of certain molecular biologists who believe that live organisms obey physical and chemical laws which govern the universe and that the properties of such organisms are completely understandable in chemical terms. According to this biologist, even if the first premise is true, the second one is not. The comprehension of a live organism requires the understanding of evolutive mechanisms which allow it to adapt to the everchanging environment it lives in. "It could be thought that this would allow biology to enter definitely in the frame
of naturalist world together with physical science. Almost all of the evolutive biologists arrived to that conclusion; nevertheless, it is quite odd and tragic that the incipient breach between those we now call molecular biologists and evolutive biologists, tends to widen instead of closing. Evolutive biology and biology of integral organisms requires an enlargement of the philosophy of science, so as to include its special characters 21/. The breach referred by Simpson keeps widening, and this phenomenon seems to be much more visible in the scientific milieu of underdeveloped countries than in American and European centers of excellence, where the importance given to ecology has contributed to increase the value of the biology of live organisms. "When young and brilliant biologists talk about genetics genes, and wise, old biologists talk about life without organisms, it is evident that something peculiar is going on in biology; peculiar enough so that the word "crisis" is not too harsh". The very inclusion of this quote is enough to establish our belief in the opportunity for a serious dialogue in the matter.

The voyage of the "Beagle" in the Southern Hemisphere sees the new South American republics and the vast territories of Australia, New Zealand and South Africa in a very particular moment of their history. It could be said that Darwin and his companions witnessed the awakening of national consciousness in these regions, after merely fifty years had elapsed since the declaration of Independence of

21/ Cfr. Gaylord Simpson, La Biología y el Hombre (Buenos Aires, Ed. Pleamar, 1974), Chapter II "Perspectivas y Límites de la Biología".
the United States of America. As far as we know, no attempt has ever been made for a comparative history of nations located in the Southern Hemisphere, which have become only an entity of relative political force and lesser cohesion in the so-called "North-South dialogue". This may be a good opportunity to face this task in such an interesting period as in the first half of the nineteenth century. At least, The Voyage of the "Beagle" and its zealous observations on certain aspects of South American societies seems to be a good starting point. Finally, and referring precisely to historical research, the DP shall have to deal primarily with those aspects related to navigation and scientific expeditions undertaken mostly by the Spaniards, French and English in the South Pacific Seas during the eighteenth and nineteenth century. There is little Spanish bibliography on the subject and the one that is available is outdated, excepting some volumes published by the Institute of Hispanic Culture and the work of the Chilean historian Sergio Villalobos titled La Aventura Chilena de Darwin (Santiago, Ed. Andrés Bello, 1974). The theme -so near to our history and so dear to our best naval traditions shall be the object of interdisciplinary research where specialists in naval history and historians of science shall unite to rescue nautical and scientific achievements joined to such names as the very Robert Fitz Roy, La Perouse, Azara, Ulloa and Jorge Juan, Cook, La Condamine, Ruiz and Pavón, and so many other. Today more than ever, the Pacific Ocean is a factor of mutual knowledge and unity among people of different cultures; to enter their history and reconstruct their past must be, undoubtedly, a task which will increase our ties with our neighbours near the sea.
We are convinced that the cultural heritage of a nation does not end in its great architectural monuments, nor its artistic, literary or scientific contributions. The relationship structured through history between man and his physical environment is also part of a cultural property. Therefore, to help reconstruct the autoctonous landscape seen by Spanish discoverers, or to collaborate in all initiatives which tend to obstruct the extinction of native flora and fauna, is a cultural task, because it contributes to the rescue of something which is traditionally ours and which has helped to forge our idiosyncracy as a nation. The drama of our times is that there remains very little to admire, at least in what concerns natural beauties. For this reason, national parks (continental or marine) and natural history museums are considered keepers of the most fragile and unstable part of cultural heritage. Thus, the DP will concern primarily in contributing to the creation and conservation of "natural sanctuaries", museums, specialized libraries and national parks—particularly in those places we have called "Darwinian sceneries". To achieve that, we shall promote the dictation of special decrees and laws, and the start of a large international technical assistance operation. We shall also sponsor the organization of seminars and symposia on the subject as a means of taking advantage of the experience achieved on these subjects in other latitudes. Our aim is to represent man's new approximation to nature through the museum and national parks.

The emphasis on our quests now shifts to a field which is more propitious for the naturalist than for the social scientist, even if we insist that the multidisciplinary
characteristic of the DP is constant throughout all or most of the state problems. We have expressed before that the nucleus of the DP — almost since its origin — has been the analysis of the deterioration of our landscape for the past 150 years. We wish to broaden the term landscape so it may cover the vast Darwinian scenery. Its objective is to verify all the changes in the environment of many territories of the Southern Hemisphere, starting from the careful study of the descriptions left by Darwin and other naturalists and compare them with the natural and human landscape of present times. As we know, Charles Darwin took good advantage of the French and Spanish scientific voyages of the eighteenth century, and in addition, became acquainted with the works of certain Spanish American naturalists. Names such as Azara and Juan Ignacio Molina are repeatedly quoted in his textbooks and his library's catalog; the books of these and other authors appear carefully written down and underlined by Darwin who was a conscientious reader. Moreover, the detailed descriptions left by the English naturalist have a greater intrinsic value because he incorporated the testimony of many other travellers and connoisseurs of the little-explored and

22/ Cfr. Historical and Descriptive Catalogue of the Darwin Memorial at Down House, Down, Kent., and Handlist of Darwin Papers at the University Library, Cambridge (Cambridge, Cambridge University Press, 1960). I have been able to see personally some of the numerous volumes of the Spanish and Latin American authors in Cambridge University's Library, thanks to the kindness of Mr. Peter J. Gautrey, Curator of the Manuscripts Department.
uncontaminated landscape of the Southern Hemisphere. Thus, we want to take advantage of a historical document of the greatest value in a rigorously scientific study which will permit us to analyze the geological, climatic, biological and anthropological changes occurred in a convenient period of time. Undoubtedly, we shall manage this experiment cautiously and shall verify at every moment the validity of the historical sources in a research of this nature. In order to do so—and following faithfully Darwinian texts— we shall, in the first place, define what we have named "Darwinian sceneries"; they are those territories visited by Darwin and of which he left detailed descriptions. Here, we shall face geomorphological and linguistic problems of certain importance because the toponymy of these places has evolved according to its usage by different cultures. In any case, the correct use of historical documents in the evaluation of present landscapes will be quite an intellectual adventure whose results will be used beneficially in similar projects. Once the "Darwinian sceneries" shall be marked, different specialists will have to analyze the different changes, their cause and magnitude. There are reasons to believe that we shall find exponential curves in all those changes implying man's usage of his geographical medium. Furthermore, we can suppose that the inventory of current zoological and botanical species will vary considerably from the panorama of live organisms described by Darwin; we also know that we shall necessarily have to include the disappearance of ethnic groups known by the author of The Origin of Species. All in all, it must be pointed out that aside from postulating the extinction of certain species—whose causes are not yet wellknown or
studied— we know that since Darwin's visit until today, numerous foreign species have been integrated into the biological landscape of our countries, making almost unrecognizable the scenery observed by this naturalist. For example, the present rural landscape of Chile is not autochthonous at all at least in the Central part of the country. Pines, willows, poplars, fruit trees and interminable bramble bush fences make up a biogeographical scenery absolutely unknown to Spanish conquerors, and partly unknown even in the first half of the nineteenth century. 23/ On the other hand, we believe that we shall find decidedly positive changes—at least from the human point of view— which undoubtedly allows for a certain amount of optimism regarding future perspectives arising from our project.

Surely, it shall be most interesting to compare for the first time the description of eighteenth and nineteenth century textbooks with the results of scientific measurements carried out during the investigation. We are

23/ In the second half of 1977 the British Broadcasting Corporation (BBC) filmed a documentary in Chile on the voyage of the "Beagle". One of the greatest difficulties during the filming was to find an inlet where the sailboat—which had been specially conditioned to resemble the "Beagle"—could dock. In all the appropriate docking spots there were pines and eucalyptus trees which arrived to this country years after Charles Darwin's visit. It is sensible to point out that regarding the introduction of foreign species, the economic criterion has outpowered scientific criterion. This fact has provoked real ecological catastrophes which have caused the disappearance of many native species.
convinced that the techniques and methods proper to history and experimental science shall be favored with this mutual exchange of data and compared observations. This is the only manner we can adequately certify the validity of a historical document as a faithful testimony of the past.

During the past years, studies of great scientific value have been done in the geographical area and space we are marking for our task. Indeed, research has been carried out covering practically all specters of environment analysis. Nevertheless, it must be pointed out that the immense majority of such research has been limited to the study of the present landscape, that is, just a dot in a change curve in time, which would evidently limit the capacity to extrapolate the results of investigations and employ them in long range forecasts.

In the first place, the DP aspires to carry out a multidisciplinary historical study of change which would permit adequate conclusions for future formulations of national-level environment policies. In the second place, the DP will make good use of the existent information and will offer to coordinate and/or cooperate in those investigations which are being executed or will be carried out during our project's seven-year period.

In Chile, there have been original and interesting investigations in areas where the DP also wishes to delve into: in 1977, a grant of the World Wild Life Fund permitted Chilean and Northamerican scientists to determine the ecological impact of exotic species in native fauna. On the other hand, different academic centers in the country have done a giant effort to know better our national resources. One of them is the Institute of Biology of the University of Concepción,
which has the country's most important herbarium (about 50,000 samples) made up by species collected by different Chilean and foreign botanists, and fototypes acquired from the Chicago Natural History Museum. It is interesting to underline the method used by this institute in the search of species. It is done according to the same itinerary covered by classic botanists who travelled throughout Chile during the last three centuries. In this sense, the research is historical, since it relies on the very notebooks of naturalists such as Ruiz and Pavón, J. D. Hooker, Rodulfo and Federico Philippi, etc.

Recently, the initiative of a geographer, Dr. Víctor G. Quintanilla, has brought forth the publication of the Diccionario de Biogeografía para América Latina (Biogeographic Dictionary for Latin America) (Valparaíso, Ediciones Universitarias is the "most adequate" tool to understand completely natural sciences and the auxiliaries to the biological sciences, especially to appreciate change -usually deterioration- of natural habitat" 24/. Thus, the DP, whose purpose is to conduct research on the change of natural habitat, congratulates of the existence of such studies which certainly have also been carried out in other nations, and which will be invited to take part in the project. We must not forget that scientific knowledge is constructed by a permanent conjunction of individual and collective efforts,

24/ On the work of the Institute of Biology of the University of Concepción, cfr. "Chile se llama CONC", in Ercilla N° 2174, March 30-April 5, 1977, pp. 61-63.
The information on Diccionario de Biogeografía is in "Brújula para un Nuevo Idioma", Ercilla N° 2244, August 2-8, 1978, p. 57.
and that each investigator adds only a quanta of knowledge to the constant flow of science. As said before, those in charge of the DP's good functioning wish to contribute and serve in the best possible way to greater international understanding. On the other hand, our project is decidedly conservationist, in the sense that the Darwin National Committee -or later the regional committee- will do all that is possible to promote the best use of our resources and the conservation of environment. Both purposes fit into an adequate frame in the proposition of criteria and priorities for the formulation of national and regional level policies destined to keep ecological equilibrium. It is here precisely, where the Darwin National Committee and any organism created by the Darwin Project, must keep at all costs its right to constructive criticism and express its ideas freely -an alienable right which characterizes all academic activities. It is necessary to point out the struggle fought at all levels to combat contamination in all its forms and to create a conscience of the evident danger implied in the indiscriminate and measureless use of the resources of the biosphere. This preoccupation has been very well supported by the large and extended bibliography published, and the increasing interest of different public and private organizations concerned with this problem. However, in our countries, the studies on environment and natural resources' administration are recent, and public opinion tends to consider the increasing contamination problems as something which concerns only highly industrialized countries. Recently, some controversial topics and certain unfortunate happenings -such as the exploitation of autochthonous forests, and the last oil tanker disasters- have started
some discussion on development and conservation. Nevertheless, no adequate bill or legislature have resulted from those events. We firmly believe that all academic contribution to the adequate formulation of an environmental policy must take into account two facts: a) the undeniable need of our countries to maintain an economic growth of certain magnitude; b) the irrefutable fact that actual technology, made possible by an erroneous economic policy, is terminating our options to survive as a species. Undoubtedly, any proposition to detain the weak Latin American development and arrive at a "zero growth" rate (proposed by some conservationists of developed countries) will be rejected unanimously by our nations who are at the "grow or die" stage. On the other side, some radical conservationists have defended their honest and deeply human position in such absolute terms, that if their ideas were to be carried out, it would signify a hibernization of the present situation. In other words, nature's actual dynamism manifested in the cyclic appearance and disappearance of species and in the environmental changes which make this cycle possible, would originate a static process which is completely antinatural 25/. The opposite viewpoint, which is to take

25/ During the past years there has been an insistence in detaining world economic growth, and leaning instead of a "zero growth" rate. In its Fall 1973 edition, Daedalus compiled articles of outstanding specialists on these problems. (Published as Vol. No 102, No 4, Proceedings of the American Academy of Arts and Science).

Eugene Rabinowitch, on the other hand, has criticized the insufficiency rational and passionate arguments of some groups of conservationists; "It is a fact, that without any interference from man, the history of life on Earth includes the elimination of innumerable species which were unable to adapt to changes, and were replaced by more adaptable ones". "Conservation, for
benefit of natural resources without thinking about the future, is a desecapitalization process which will end not only these riches but all our life possibilities; it is much more irrational, but it is overwhelmingly imposing its criteria.

The economy of almost all Latin American countries has shifted from a phase which was exclusively concentrated on exports of raw materials, to another superior phase based on an indiscriminate opening to foreign investment and the stimulation of non-traditional exports. Both factors have accelerated the destruction of our environment, since the lack of protective legislature and the investors' desire to achieve a quick return of their investment combine in an exploitation of resources which leads to the contamination of air and water, erosion, and the extinction of our native flora and fauna.

Analogically, the export of non-traditional products has

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The extreme case of halting the construction of a dam valued at US$ 16,000,000 happened recently (in Tennessee, U.S.A.) due to a U.S.A. Supreme Court resolution favoring a small variety of perch called "snail darter", whose life was endangered because of the dam. The "snail darter" is one of the many species protected by the Federal Act of Endangered Species of 1975. (Time, June 26, 1978, p. 21). We advocate for a middle point between both positions. It is true that the scientific argument for the "zero growth" cause is very strong and highly rational. B.G. Murray compares two types of growth: Biological and economical. The first one is natural and according to natural laws since it rests on a permanent regime where organisms set themselves at a level of equilibrium. On the contrary, economic growth is an increasing one and ends up by weakening the quality of life in the same way as cancerous cells attempt against the host organism. ("Lo que los Ecólogos pueden enseñar a los Economistas", in Facetas, Vol. 6, No 1, 1973, p. 47).
stimulated the intense use of soil, the cutting down of autochthonous forests, and the extinction (because of over-exploitation) of commercially high-valued species. The fact is that our continent seems to be a good place for establishing "pollution sanctuaries". (Zones where highly contaminating industries can operate freely without any restrictions or legal control). In January 1975, the Department of Commerce of the Government of the United States expressed the convenience of investing in certain Latin American countries because of the unexistence or inoperance of antipollution laws 26/. In an excellent article published in Portada, 1976, Crescente Donoso has criticized this tendency in asserting that "while some countries sacrifice nature for industrial development, others are making a comeback to nature, the

26/ Curry-Lindahl says in his quoted book: "Development, in its modern sense, does not always mean progress. Many developing countries do not have the capital nor the market means necessary to exploit its reserves. For the same reason, development is left in the hands of foreign investors who are steered more by profit than by conservation principles. Unfortunately, this viewpoint often coincides with short-term political viewpoints held by governments". (Conservar para Sobrevivir, op. cit. p. 343). Unfortunately, the majority of the great multinationals are investing a great deal of money in establishing highly polluting industries in some countries of this region because the pollution control laws in developed countries obstruct its expansion. The "pollution sanctuaries" have proliferated lately, and we may observe the phenomenon where many of our cities show pollution rates higher than the ones of Europe or North America. On this topic, Cfr. J. Barnet and R. E. Müller, Global Reach: The Power of Multinational Corporations. (New York, Simon and Schuster 1974, especially Part II, Ch. 12: "The Ecology of Corporations and the Quality of Growth").
difference being that they destroyed theirs, and must buy a new one among the poor." 27/ However, the most common criterion is not precisely the proclaimed one. It could be said that the most generalized opinion—which in many occasions is expressed confusedly in some government policies—is a "blind generational belief in supposed benefits of industrial development", 28/ above all another consideration towards ecology.

A critic of Donoso's work thinks that his position is the one of "a beggar suffering poverty sitting on top of his money chest ... Rather than satisfying a bucolic desire that our descendants may stroll under shadowy trees to the musical sound of wind, we must see that today's children may have the necessary food, shelter, education and health, and that their parents may have an income compatible with human dignity". The same thought has been supported recently by one of our most important communications media, when it stated in its editorial, "It is evident that the fight against extreme poverty and the effort to remove certain zones of the country from underdevelopment is more important than the conservation of certain natural species, no matter how valuable they are" 29/

    How can we arrive at a consensus with such extreme

27/ "Si los Dólares no Dejarán Ver el Bosque". Portada, No 50, April 1976, pp. 11-17.
28/ Ibid. Ibid. p. 16.
standpoints? Indeed, this task has been set by numerous international organisms and diverse private groups. Among the first-mentioned there exists the United Nations Environment Programme (UNEP) which has been defined as the "environmental conscience of the United Nations system". This program's objective is to help governments and other organisms assure that environment circumstances be taken fully into account in the development process. In its annual report for 1975, the UNEP regards obsolete the position which considers development as "inevitably destructive for environment" as well as the position which supports the idea that environment protection "is often an obstacle to the economic expansion in developed countries and its development process". On the contrary, the UNEP is based on the belief that "environmental considerations demanding a rational order of Earth's resources are the best guarantee that development can be carried through on a supportable base". 30/.

Developing countries wish to reach the degree of industrialization and life standard of developed countries. Actually, we believe that we can reach a quality of life level much more superior if we are able to formulate a policy of development (not only of "growth") which would prevent necessary damage to renewable resources, maintaining at any cost the quality of environment as the proper basis of a development process. Indeed, it is legitimate to doubt economic indexes as the GNP, because if it would consider such factors as

30/ Programa de las Naciones Unidas para el Medio Ambiente (PNUMA), Annual Report, 1975.
environmental deterioration, growth would practically be zero. This would happen, for example, if the cost of environmental protection be transmitted totally to the prices of consumer goods and capital. Therefore, we must think of a new concept of economic growth which expresses a harmony between development and conservation. As affirmed by Gerald Eldein, "economic growth means reducing scarcity of goods and services, or reducing the fear of future scarcity. The world's assets shall be increased and so will human satisfaction if the scarcity of goods such as pure air, uncontaminated water, or the natural beauty of the environment would be reduced. This implies contributing to economic growth in a greater sense than the one of a mere expansion of production, which in itself, is no else than a means to increase individual and communitary satisfaction" 31/. On the other hand, it is not probable that production (in the traditional sense) should be underestimated by the environment control measures, since a healthy policy of environmental regulation would be a stimulus for technological research and for the fast development of antipollution industries without forgetting the great multiplying factor of the high governmental inversion in this item.

The DP accepts the proposition of Richard L. Clinton in the sense of resurrecting the original meaning of the term "development" so as to give it an empirically determinable base

and being ethically (or ideologically) neutral. This base would consist in a supportable relationship between a population and the ecosystem it forms part of. This type of development has been named after Maurice Strong, ecodevelopment. The acceptance of an ecodevelopment policy implies, nevertheless, a careful study of the different ecosystems on which rest Latin American populations, and the rejection of the "demonstration effect" of consumer patterns in industrialized countries.

According to Clinton, "since man in the most valuable resource, ecodevelopment must contribute to his development" 32/

How can the DP contribute to the formulation of such policy? Above all, through the mentioned research tasks, which not only will contribute a profound knowledge of our environment, but will also have the supreme objective of forming a generation of young researchers, impregnated with new values. In this sense, we believe that history will make a significant contribution to the better knowledge of the man-environment relationship in Latin America from a temporal perspective. Even though it is possible to accept that political history is still the backbone of historiographical structure, we have always thought that important subjects of our past have remained in shadows. One such subject is the reconstruction of relationship between a dynamic population

32/ "Hacia una Teoría del Ecodesarrollo; Concepto Clave para Ubicar el Papel de las Políticas de la Población en el Proceso de Desarrollo", in Comercio Exterior, Vol. 26, Nº 1, January 1976, pp. 64-71.
as in Latin America, and the continent's splendid geography. In this historic frame, research on land tenure, urban property, agrarian policy and the territory's colonization attempts will contribute to clarify some questions which so far have not even been stated.

The formation of a regional conscience on the matter shall also be restated from the point of view of the DP. As expressed by the UNEP research, "the changes in the relationship between man and his physical environment depend greatly on the changes in the organization and ends of society .... (the) purpose (of man) must be to construct a society intrinsically compatible with its environment". Curry-Lindahl underlines the tremendous importance of international cooperation in the re-education of our society by saying that "all people must be educated so that they may understand why, in the long range, a strategy with ecological fundamentals will restore our world's environment. Without education we cannot understand, or stimulate the understanding of the appropriate use of natural resources at a national or global scale 33/. The DP aspires to design pedagogical models which may be understood quickly and easily by the new generations. One of the most serious inconveniences of current education on


Nevertheless, it must be understood that educational process is slow and must compete disadvantageously with the "demonstration effect" of consumer societies and with pseudo - values incorporated by the economic policies followed by most of our countries. Recently, a high regional officer said that "in 1977 24 million aballos were extracted from the III Region which seems excessive (sic.). Nevertheless the produced incomred and the employment resulting from it, make it a very important resource for the Region" (La Tercera, July 11, 1978)
environment is the pedagogic process itself: it is much slower than the destruction of ecosystems.

The previously-exposed matters have increased our interest in contributing with the results of our future research to the planning of a strategy leading to satisfactory regional and international ecological action. We are convinced that our responsibility does not end in the mere contribution to the advancement of the subject matter, but we must also do everything possible so that the conclusions to which we arrive may be well used at the level of government and international organisms.

3. A Synthesis of the Objectives and Purposes of the Darwin Project

Having outlined briefly some of the most important problems and topics covered by the DP, it is necessary to stress the permanency of our initial purposes, which have been clearly exposed throughout the preceding pages. We have defined them unequivocally and this constitutes an excellent opportunity to synthetize and punctuate what has been expressed previously. Thus, the main objective pursued by the DP, and which the Darwin Committee will try to materialize, are the following:

a) The necessity of an international homage to Darwin and his work, on the 150th anniversary of the cruise of the H.M.S. "Beagle". Undoubtedly, the voyage of the "Beagle" is the most famous and important scientific expedition in the history of Humankind, and it constituted the basis of The Origin of Species. A century and a half has elapsed since this great achievement; we believe it duly necessary to halt and analyze the Darwinian work and
evaluate its historical impact.

b) An appeal to the international scientific community to carry on a task of great meaning. Just as it happened with IGY in 1957-58, we believe this shall be a good opportunity for men of science from different countries to contribute their experience and knowledge in a pacific and significative task, whose extent towards international understanding will be of great value. In particular, we steer this invitation to collaborate with our project, towards men of science, and towards whosoever believe in science as an agent for unity, social progress, and human harmony. We also extend this invitation to the "darwinian" countries of the Southern Hemisphere, (Argentina, Brazil, Chile, Ecuador, Peru, and Uruguay in Latin America, in addition to Australia, New Zealand and South Africa) plus the scientists from those nations which, for one reason or another, cannot be left out of the task we have undertaken. We are referring here to the scientific communities of England, Spain, Portugal, France and the United States. Charles Darwin's country obviously must be present as well as the territories of Spain, France and Portugal which were visited by the English naturalist, who studied the books and works of the naturalists of these countries. Finally, the United States has acquired a first rate experience and "know how" in problems such as environmental deterioration and the formulation of equilibrated development policies, which also preoccupy our committee. Private enterprises and North American volunteers cooperate in these tasks, either by financing projects or actively participating in their execution. We
must follow this example.

c) **Support to scientific activities in Latin America**

The development of scientific thought in our countries is plagued with vicissitudes which seem to worsen as times go by. In the scarce opportunities where some academic excellence centers have been formed, different agents have conspired to make its task impossible. As a result, the so called "brain drain" has come about, which is no other than the legitimate desire of the scientist to contribute to the advancement of knowledge in a more propitious environment. Such is the characteristic of all men of science. No doubt the institutionalization of science is indispensable as nucleus of all modernization processes, being this a historical task undertaken by all our countries. For this reason, our primary purpose has been one of creating stimulus and motivations to Latin America science. We believe the DP will be a good opportunity to help to achieve that goal. In the first place, the DP is an original and unexperienced initiative which will undoubtedly impulse research in such areas as the ones which formerly integrated Natural History, and which are not prioritary in our scientific development. In the second place, our research projects are mostly interdisciplinary, which will contribute powerfully to the better knowledge of different methodologies and techniques, and to the fruitful and innovating work in the frontiers of different areas and disciplines. In the third place, the results of our task will be beneficial inasmuch they will be used in the implementation of national and regional development plans. The DP is, in addition, a
project which will easily reach public opinion, serving in this way the social legimitation of scientific activities. Finally, we are aware that one of the greatest problems of regional scientific development has been a scarce and intermittent financement. The Darwin National Committee and the regional committees to be formed in the future will try by all means at its disposal to create alternative channels of financement, utilizing non-traditional sources of research support.

We are certain that at least our initiative will establish the basis for a new dialogue between academicians, men of science, and spokesmen of the public and private sectors of not only the region, but also of many countries of the Southern Hemisphere. In this manner, our desires to enhance cultural integration of our nations will be fulfilled; undoubtedly, it will increase mutual understanding and respect among the involved countries.

d) Effective contribution to the formulation to ecodevelopment policies. Perhaps, the greatest challenge for a modern scientist is to restore social trust in science, by contributing to the progress of society. We know it is difficult -if not impossible- to make that the voice of the scientific community be heard above other pressure groups having greater social prestige, or with more means at their disposal. Nevertheless, our first task shall be the opening of expedite channels of communication between government authorities and men of science. Only in this manner shall we achieve that our development policies proposals be listened. Furthermore, since we manage more variables for the formulation of these policies, we shall
deem which criteria are the most adequate. Thus, it is prioritary to evaluate renewable natural resources, know well their regeneration speed an capacity, and in order to achieve this knowledge, design criteria and priorities for the stable, congruous and pauseless economic growth which will help us to achieve unsuspected goals of development. Secondly, it is essential to create a regional Data Bank on the studies already done and the ones being conducted as for environment knowledge, evaluation of resources and contamination control are concerned. There exists an amazing amount of information which is sub-utilized or disperse, for which reason it will be necessary to create regional coordination mechanisms.

e) To protect native flora an fauna. This is the prioritary task of the DP, and it will surely attract easily external financement as well as the decided support of great sectors of public opinion. Furthermore, through this objective we shall manifest our most cordial cooperation with all academic groups or the ones constituted by voluntary citizens which throughout the world are fighting for the cause of conservation. Here, the object is to know comprehensively our zoological and botanical species, examine its habitat and hopefully, establish its degree of stability as a species. Not only must we protect -to the point it is rationally possible- existing species, but also we must examine the possible causes of the extinction of many species Darwin knew and classified. The protection of native flora and fauna requires to know the ecological impact of different foreign species introduced in the country during over 400 years. It is also necessary to
carry out studies controlling the deterioration of the natural environment. No doubt, this will be a beautiful effort, full of surprises, frustrations and re-encounters with the prodigious nature of the Southern Hemisphere.

Addition to the formulation of an ecological conscience and love of nature in our countries. We have expressed our earnest desire to face the pedagogical problems implied in the formation of a greater conscience (awareness) of the danger represented by the destruction of environment. We must face such problems through original techniques and foci, which lead to partial or radical modification of school curriculum, both in natural and social sciences. We point out some ideas which undoubtedly point to this direction: First, the social and historical aspects of the environment's deterioration; second, the promotion of museums, national parks and different extension activities. Through these initiatives, we shall increase the possibility to modify positively the relationship man-environment.

34/ A chilean publication is a very good example of environmental education. It is called Expedición de Chile, and it is written by the Instituto Juan Ignacio Molina, and published by the Editorial Gabriela Mistral. The majority of the Latin American countries have made a great effort towards creating national parks. As strident example of what we just mentioned are Galápagos Islands which actually are struggling desperately for surviving as an unimitable laboratory of the life process. The establishment of the research station named Charles Darwin near Santa Cruz (1962) has helped powerfully the cause of the Islas Encantadas (as named by the Spaniards). See Time, June 26, 1978, p. 50.
These are our principal aims. Undoubtedly, as the project is being carried on, we shall structure step by step a hierarchy of purposes and objectives different from the one we have pointed out. Nevertheless, we trust that we shall not leave behind the aims with which the DP began, and whose attainment as benefice is a constant stimulus to our work.

4. How will the Darwin Project be implemented?

To concrete the DP in all its points and with all its complexities and scopes, would seem an incommensurate ambition, clashing openly with present-day Latin American and world situation. Nevertheless, the fact that a great amount of research projects on similar topics and with similar view points to those of the DP have been carried out, seems to deny such position. The results of those investigations exist and may be used. The same can be said about the current projects which are being carried out in Chile and in other countries of the region, some of which we have mentioned previously. Thus, the object is to use existing information or modify it according to our own view points and perspectives. In this enterprise we shall not start from zero, but shall base the greatest part of our actions on a great mass of data, results and existing material.

There is one more convincing argument: even if it is true that our task is principally academic, and is therefore directed to the advancement of knowledge, it is no less true that it focusses on problems whose solution is urgent for the survival of our society. In other words, such studies must be carried out, otherwise risking to attempt in an irreversible form against our own options and the ones of future generations.
The DP is not only a homage, or another commemoration. Rather, it reiterates its character as an enterprise of international cooperation, vital for the greater understanding of our countries, for the increasing of the quality of life of its populations. However, we need to clarify as well as possible the form in which the DP will be carried out. In order to do so, we shall differentiate between research activities, the formulation of policies and extension activities, to refer then to the possible financement of these actions.

1) Research programs: It refers to the execution of original projects, or the utilization, modification, coordination and/or collaboration with finished projects or at the stage of execution.

2) Formulation of policies: It deals with the use of the results achieved from some of the proposed research topics. Such data will be used when compiling propositions for the formulation of policies (educational, environmental, developmental, etc.) at a national and regional level. This type of action is of open cooperation with the different regional and international governments and organisms. This will need the creation of expedit communications channels.

3) Extension actions: A great part of our effort will be to inform the community and integrate the population into our tasks. That shall be possible in the extent that different extension programs be implemented, such as the filming of documentaries, expositions, text publications, improvement of museums and natural parks, organized tourism, etc. Any educational collaboration will also fall within this frame: courses, programs, lecture cycles, curricula planification, etc.
These programs will generate the following actions:

a. Research Programs
   - Collection of data and elaboration of work hypothesis
   - Field work
   - Seminars and symposia. (The work meetings would take place
     in any country participating in the DP, procuring that
     those meetings be carried out in places visited by Darwin.
     As far as Chile is concerned, we have obtained the
     logistic support from important national organisms to carry
     out all sorts of scientific reunions).
   - Publications. The DP will procure as possible to publish
     the works arising from our investigation. Nevertheless, it
     is important to point out that all the participating
     scientists will have maximum freedom to publish the results
     of their work.

b. Policy formulation programs
   - Collection of research results
   - Formation of Data Bank
   - Compilation of an Index of private and public organizations
     participating in counseling activities, or decision making
     levels in development policies.
   - Compilation and compared analysis of the existing
     bibliography.
   - Seminars on the formulation of environmental and
     development policies which may allow meetings of all
     representatives from all areas.

c. Extension programs
   - Facilitate organized tourism so as to allow the best
     possible acquaintance of Darwinian sceneries.
   - This type of tourism does not require costly investments
nor a solid and permanent infrastructure. The object is to open same trails which could be scouted by foot and which would join Darwinian places. In Chile, as well as in the rest of the countries invited to this program there exist numerous national parks and uncontaminated landscapes which coincide approximately with the Darwinian sceneries. Educational actions destined to create conscience about the problems the DP is concerned with.

- Filming of documentaries, recording radio and Television programs, etc.
- Publications.

Financement of the DP

No doubt, the greatest difficulty in such sort of a project is its financemment. We have pointed out that the DP is an original initiative in the sense that it transcends the Government area and decidedly searches for the contest and the adhesion of different social groups. We believe that this characteristic of the DP shall be positive because our search of economic resources will not be oriented only towards the traditional sources of financemment but, on the contrary, we will create new options by promoting the interest of groups which, until now, have been absent from great cultural enterprises, and which now may help and cooperate with us.

It is appropriate to point out that our pilot project -aimed at implementing the national program for introducing the Pacific Salmon into the XI and XII Regions- has found resources in an innumerable number of non traditional instances, which certainly stimulates our optimism regarding the project's financing. On the other hand, some of the state agencies we have contacted, in Chile as well as in other Latin American
countries, have shown willingness to support this initiative inasmuch their possibilities will allow.

The actions of international cooperation and technical assistance are just as important as direct financing. We have been working in this sense during the last months, and we can assure that the DP will count on an optimum support from international organisms and scientific societies.

Finally, we are convinced that certain extension actions could autofinance themselves, due to the increasing interest of public opinion for the topics and problems we shall delve into. In the same fashion, the National Darwin Committee shall be that of the elaboration of a tentative program of activities and events between 1973 and 1986. Such program will watch for the execution of different research projects and extension activities which will be carried out in Chilean territory, in which there should work academicians, scientists, or organisms of the same country. It must be understood that the program—even at its national level— not only welcomes foreign individuals and entities, but the Committee will also encourage specialists and institutions from other countries to participate actively in our projects.

The temporary organization of the Program is made up of three stages conceptually well-delineated:

a) National Stage: This stage will be in charge of the Darwin National Committee which will counsel government authorities and CONICYT on the different actions and measures thought to carry out the DP in the Chilean territory. The Committee pretends to create as soon as possible a private non-profit corporation whose aims will be to manage the Committee’s funds and implement the initiatives undertaken by this...
legal organism.

By means of an express resolution of the Supreme Decree which created the Committee, it has the power to communicate with different public and private organizations, in Chile as well as abroad. One of the first initiatives undertaken by the Committee will be to impulse the creation of a regional commission to gather representatives of the Latin American nations visited by Darwin, and which wish to take part in the DP. Notwithstanding regional or international activities programmed by the future organisms which could arise from a spirit of international cooperation, the National Darwin Committee shall plan its activities for a seven year period, starting on September 1978. Such activities will have the same aims and objectives as we have already mentioned in section 3.

b) Regional Stage: It coincides with the national stage as far as time is concerned, even though a little late in starting. The programming of the regional activities will be in charge of a supranational organism created by the unanimous desire of Argentina, Brazil, Chile, Ecuador, Perú and Uruguay to take an active part in the DP at a continental scale. Thus, our first task—which we are already working at—shall be to contact authorities, organisms, and state agencies in charge of scientific and technological development, and universities and men of science of those sister-nations so as to create a common enterprise: the Regional Darwin Committee. In this case, our role will be limited to take the initiative of this call, and propose total or partial acceptance of those purposes, objectives and activities already mentioned.
c) **International Stage:** This stage will embody national and regional activities. The individuals and institutions from Australia, Spain, United States, France, New Zealand, Portugal and South Africa are cordially invited. We have promissory antecedents which allow us to expect an active participation from men of science and from diverse private agencies and entities of these countries in our project. As in the Regional Stage, we shall convocate an enlarged meeting of these nations in Chile (probably through the Cultural Attachés of the Embassies here) aiming at setting the basis of a consultive, coordinating, and executive organism where the participating countries will be represented through their different international organisms, scientific associations, etc. Just as in the previous case, we shall propose our ideas and projects to this organism, so they may be discussed at this level.

**Programming, Coordinating and Executing**

As far as the National Stage is concerned, the programming, coordination and execution of the DP is under the direct responsibility of the National Darwin Committee and CONICYT. Nevertheless, we hope that in a short time a private corporation will be created which will be in charge of the total execution of the project at its national level, which will facilitate enormously the DP's management. The National Committee acts through a Council where different groups, sectors and agencies of the country are represented. One of its first tasks will be to create advisory organisms and subcommittees, which will be in charge of the following areas: History and Social Sciences, Evolutive Biology and Genetics, Earth Sciences, Ecology and Conservation, Extension and Public Relations and
International Affairs.

The Darwin Committee will be able to create new advisory organisms if the work should require it. On the other hand, this committee will name and invite different local personalities to take part in our activities, this way fulfilling our desire to make the DP a national enterprise. Immediately after the opening ceremony, the Executive Secretariat will initiate a series of contacts with diverse university authorities, private enterprise spokesmen, and high public officials, inviting them to participate in our project.

Finally, we want to repeat once more that our character is essentially academic, welcoming any criticism or suggestion, and willing to share the tasks we have set or which will be set for us in the future. Our only desire is to serve; by that we mean serving mankind's common cause, that is to say, peace and international understanding and also to serve science and scientists. As in any academic initiative, we pretend to publish the results of projects and seminars so that they may be accessible to everybody in the least amount of time. Naturally, we shall respect the scholar's absolute freedom to publish the results of his work in the form and by the means which he will freely choose. Our innermost concern, as we face the current crisis of science, will compel us to double our efforts to assure to the man of science his maximum right: the right to express himself freely.