

## INSECTS — MEN AND ENVIRONMENT IN CHILE

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We Chileans have boasted for much too long that our country, in the Southern tip and Western slopes of South America, is a biological and ecological island, isolated to the North by a dry desert 800 miles long; by the tallest range of mountains, the Andes, to the East; by the largest Ocean to the West; and by the wind swept freezing encounter of two vast seas in the Strait of Magellan and the Beagle Channel to the South.

This notion of geographical isolation of Chile was first noted by a distinguished French naturalist during the ten years he lived in the country, and published in 1845 (\*\*).

This man was Claudio Gay, who came to Chile in 1829 and was commissioned in 1830 by the Chilean Government to prepare and edit a full research of the Natural History of our country (Fauna, Flora, and mineral resources), and on the Civil History, Agriculture and other natural resources as well.

So thoroughly did he accomplish this

huge pioneer enterprise that from 1844 up to 1871, two years before his death in France, he released under his authorship, printed in Paris and in Spanish, his monumental "Historia Física y Política de Chile", in 28 volumes and two large Atlases, covering some 15.000 printed pages, and the description of about 2.500 plants, animals and Insects from the country he strenuously surveyed for years, preferably on the back of a horse!

We will have to mention again this outstanding "Chilean citizen", as he proudly referred to himself, who found in Chile, a just born-to-freedom disorganized nation, an unexpected thorough meaning and a full sense of purpose for the 43 remaining years of his long life.

As I was saying, it was Gay who first expressed this apt observation about the geographical isolation of Chile, and his concept has been repeated and elaborated rather at large for the past 120 years.

The notion of isolation between mighty natural barriers which characterizes Chile, would indeed mean little if we don't consider it from angles other than mere Geography, such, as in our case, Biology and Ecology. For undoubtedly isolation generates typical and exclusive forms and biocenosis of Flora and Fauna, of Insects and Men.

Let me start anew to point out that Chile has a territory larger than the Republic of Texas; with about the same crops and geographical exposure than California: a long and narrow strip running North to South; and with about the population of New York City.

It spreads for 38 amazing degrees of Latitude South, from 18 to 56 degrees, and it runs for some 3.000 miles of length, being her widest section though hardly 150 miles, from the Pacific to the Andes.

Her two northern provinces form a dry desert where never rains, and from where

**NOTA:** Este trabajo en inglés del Dr. Campos representa una conferencia sobre Chile y sus Insectos, que fue solicitada al Presidente de la Sociedad por las autoridades de la Entomological Society of America, para ser presentada y leída en la reunión anual de la ESA, de Dallas, Texas, noviembre de 1973. Diversas circunstancias impidieron al Dr. Campos concurrir a esta reunión anual, y al Dr. R. I. Sailer, Miembro Honorario de nuestra Sociedad, leerla en su reemplazo. Por estos motivos la incluimos como Editorial de este volumen dedicado a Claudio Gay, sin modificar la versión original de la conferencia del Dr. Campos.

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(\*\*) C. Gay, Botánica 1, Prólogo, pág. 4, París, 1845.

come most of our exports of copper and nitrate. The adjoining provinces to the South, down to Santiago, represent our arid zone, with 10 to 50 inches of rain, where mineral resources (iron, manganese, gold and silver) combine with hard-driving agriculture and meager live stock to make the living of the people.

From our capital city of Santiago down to Puerto Montt, and for some 650 miles, develops a rich farm and cattle land, where wheat and other small grains are grown; temperate fruit trees and vineyards flourish; alfalfa, clover and grasses support million of cattle and sheep; while native and planted forests provide us and our foreign markets with cellulose and wood. This is the Central Valley, and the most populated and industrialized section of the country.

Chiloé, Aysén and Magallanes, our last three southern-most provinces, are the realm of cold, rain and wind, with forests and snow, ocean and fish, glaciers and fiords, sheep raising and poor grasses. In the Strait of Magellan, Punta Arenas with 100,000 people, is the southern-most city of the world.

The joke goes in Chile, that God the Creator, after seven days of hard labor, setting of the world out of chaos, was indeed tired and weary, when Angels approached Him with concern to tell that there still were huge assortment of deserts, oceans, mountains, lakes, forests, volcanoes, rocks, glaciers, islands and the rest, that they didn't know where to place. The sensible answer from the Almighty was: well, throw it away in any remote corner still available! And this, gentlemen, was the way in which Chile was supposedly built.

This brief colloquial description should be completed adding that Chile also has petroleum in the Strait of Magellan, plus coal in the Ocean bottom; abundant electricity from our many torrents, rivers and water falls; steel and cement plants; and sulphur and iodine among our rare productions.

In this rather unique strip of land, facing the Ocean and backed up by mighty mountains, strive 12 million Chileans along with plants, animals and Insects of course, that isolation has turned out into precise and defined races or relics which hardly find links or parentage anywhere in South America or the Neotropics, except perhaps partly in South Argentina.

As a matter of fact, we Chileans claim to be a distinct well defined Indo-american race, which resulted from the inevitable cross of the Spanish Conquistador and the native Araucanian woman, blended and mellowed, as a rare antique Scotch, by more than 400 years of isolation with immigration nihil. It may be worth to note that Spanish ladies did not come to Chile until well advanced the conquest, while adult native men were devastated by a cruel war against the invaders which lasted 400 years!

Our southern native forests, the Valdivian that is, is mostly composed of seven or eight species of tall *Nothofagus* (Fagaceae), about 50 species of *Myrtaceae*, which add fragrance to the environment, plus many *Lauraceae*, and only six genera of native Conifers, notably, *Araucaria*, *Fitzroya*, *Libocedrus*, *Podocarpus*, etc. Bamboo-like big *Gramineae*, such as our several species of "quillas" (*Chusquea* spp.) fill the forest and make it sometimes insurmountable. Mosses like *Dendrologotrichum dendroides*, biggest moss in the world, and globiform species of the genus *Rigodium*, with numerous native Solanaceae and wild-strawberries (*Fragaria chilensis*) cover the floor of these characteristic forest (\*). Our beautiful Chilean palm (*Jubaea spectabilis*) does not reach the Valdivian latitude though.

This Austral forest is a silent forest, because singing birds are rather scarce in its chilling grandeur. Only noisy swarms of our common green parouquet break down this majestic silence. Mammals and rodents too are sparing all through the country.

As for our Insects, they are the central theme of my talk and the reason we are here. This endless realm of marvels, which provide a living for us all, is perhaps the group of animals that better characterizes our secluded environment. We have not much striking to mention about our mammals, our birds or our fishes, but our Insects do show relations and forms which are unique and sometimes indeed extraordinary.

It was a Jesuit priest, Abbot Juan Ignacio Molina, who first referred to Chilean Insects (\*\*) in a pioneer paper

(\*) C. Reiche, Geografía Botánica de Chile, 423 págs., Santiago 1934.

(\*\*) R. Cortés, A glance at Chilean Entomology, Proc. Ent. Soc. Washington, 45 (9): 226-232, 1943.

published in Bologna, Italy, in 1782, called "Essay on the Natural History of Chile", which makes him the first South American born naturalist. This volume, originally written in Italian but soon translated into most known languages including Latin, deals with quite a good number of our plants and animals. Yet, striking enough, he only describes seven species of Chilean Insects.

Three are at least the outstanding merits in Molina's early work: first, he wrote it by heart and using fragmentary uncomplete notes, because he was exiled from his country and the rest of South America with the Jesuit community by King Carlos III in 1767 when he was only 27 years old. He could never return to Chile and died in Bologna in 1829. Secondly, as he mastered the language of the Araucanians, he faithfully preserved the vernacular names the natives applied to our plants and animals. Thus, he saved for good original - euphonic - aboriginal names which otherwise would likely have been lost or forgotten.

Yet, the most striking merit of Molina's work was his use in 1782 of the system, order and way to classify living organisms that the "gentleman Carolus Lineo (*sic*)" had proposed a few years earlier. Had Molina followed in his book any other odd system of classification available in the 18th. Century, or not used the binomial way to describe, or just ignored Linné's *Systema* his pioneer work would have unfortunately been dismissed by modern science! Written by heart and sticking to Linné make Molina's pioneer paper a lasting contribution to the knowledge of Nature in Chile.

By 1865 we had published the eight volumes of Zoology of Claudio Gay's comprehensive *Historia Física y Política de Chile*, in which Insects are dealt with in volumes 5, 6, 7 and 8. Actually, Gay's huge work, financed mostly by advanced subscriptions plus a bonus from the Chilean Government, is a descriptive Catalogue of our species of Plants, animals and Insects that pushed Chile to a foremost leading position in the Hemisphere, in 1865, in the knowledge of its organisms, plant and animal alike.

Gay strenuously surveyed for ten years our territory, from Copiapó down to Chiloé and the Archipelago of Robinson Crusoe, out of the coast in Valparaíso. He collected everything and persuaded children to bring him examples of insects.

birds and rocks, thus hugely enlarging his crop. He normally travelled in the back of a horse, carefully carrying in his own hands a Torricelli column of mercury to check up pressures and altitudes. Several mules followed the party with the rest of the luggage.

Most of the material collected was then forwarded or taken to France where well known authorities identified and described it. In the case of Insects, Solier took the Coleoptera, Spinola cared of Hymenoptera and Hemiptera, while Emile Blanchard treated the Diptera and a bunch of small Orders. Many Chilean insects collected by Gay though, remained undescribed at the Paris Museum and were later studied and published by authors like Macquart and even Robineau Desvoidy in his large "Diptères des environs de Paris"!

But so big was the amount of duplicates and specimens collected, that Gay suggested to the Government as early as 1840 the foundation in Santiago of a Museum of Natural History where to deposit and exhibit the material and instruments, including the still unbroken Torricelli column, he was willing to bequeath to his adopted country. Thus, gentlemen, our Museums in Río de Janeiro (1818), in Buenos Aires (1823) and in Santiago (1840) were indeed the first one in the Hemisphere earlier than many in North America (\*).

For nearly 50 years, from 1851, on, our Museum was aptly directed and organized by the well known Prussian naturalist Dr. Rodulfo Amando Philippi, the distinguished follower of Molina and Gay. By 1900, the Division of Insects of our National Museum had four or five prominent Entomologists, namely, Philibert Germain, Edwyn C. Reed, Fernand Lataste, and the two Philipps, father and son, the latter much less brilliant than his illustrious progenitor. An accomplishment we were never able to repeat again!

We finish the 19th. Century with extremely good identified collections of Chilean Insects at the Museum, and with important catalogues, lists and monographs on Coleoptera, Diptera, Lepidoptera, Hemiptera, and many other familiar

(\*) R. Cortés, Análisis crítico de la Entomología y la investigación entomológica en países latinoamericanos, Bol. Soc. Ent. Perú, 6 (1): 11-17, 1971.

groups, plus annals, bulletins and periodicals where to publish them. One has to recall with nostalgia those years, nearly a century ago, when Entomology and Insects in Chile had such a pioneer priority and such devoted pure scientific interest!

Because it is fit at this point to mention that insects injurious to men, crops and animals in Chile are far less important than in the United States or Argentina, both in number and type of damage. Again, isolation and a limited import trade of agricultural goods has saved us from the kind of perplexing economic problems caused by insects I dare to say you have here. And surely has also limited in our country the opportunities for Economic Entomologists to find well paid jobs!

It is indeed weird that even injurious insects native from this Hemisphere, which occur naturally in every other country from Mexico and the United States down, have never been found in Chile, such as the whole genus *Anastrepha* (*Tephritidae*), which widely flies in numerous different species in our border line with Argentina, Bolivia and Perú!

We certainly do not have in Chile astounding forms of native insects, as beautiful blue *Morphos*, or large picturesque beetles, weevils, true bugs, *Cicadas*, walking sticks, grasshoppers, or other such forms common in the Tropics.

On the contrary, our insects are rather dull, gray, small, unattractive, not very abundant, yet definitely peculiar and characteristic in their Phylogeny, origin and relations.

Certain groups, common in South Chile and Argentina, such as Thynnids, Nemestrinids, Tabanids, Herialids, Scarabs, many *Isoptera* as well as *Mecoptera* and *Megaloptera*, find their closer relatives only in Australia and New Zealand, sometimes in South Africa, and even in California, as noted by Baron Osten Sacken (\*), who actually never visited Chile but got this impression through his lifelong friendship Dr. R. A. Philippi.

The common origin, or rather common trunk, of some native insects from South Chile and Argentina, Australia and New Zealand, has been discussed and extensi-

vely treated by several authors, attracted by the origin and distribution of some of our species, genera or families, such as P. J. Darlington, E. J. Fittkau *et al.*, G. Kuschel, R. Ringuelet, C. O'Brien, L. E. Peña, G. Mann and a bunch of other authorities.

This startling field of origin and distribution of our Insects, as well many other organisms, plant and animal, certainly offers a most attractive challenge to Biologists and Ecologist in Chile, Argentina, Australia and New Zealand, and ought to make important contributions in the near future to world science.

And if we go to archaic insects, such as our weird "living fossil", *Notiothauma reedi* McLachlan (*Mecoptera*), it surprises to learn that "a disproportionate number of these celebrated insects survive today only in Chile and Australia" (\*).

To understand many of these relations and vinculi of our Insects and animals, one has to associate them with native vegetation, climatic and other physical conditions and with ecological factors which inter-act to determine forms and relics, as well as induce evolution, adaptation and mutations. The subject is much too wide to consider it in this brief description.

As G. Kuschel (\*\*), puts it "it is an incontrovertible fact that a large number of elements of the fauna of Southern Chile show no phylogenetic relationship with the rest of the American fauna, but are related to groups in New Zealand, Tasmania, Australia, New Guinea, South Africa and the subantarctic islands".

Thus, it is no wonder that as early as 1874 the outstanding group of French, Prussian and English Entomologists working in our Museum, under the inspiration of a young amateur, José Toribio Medina, who was to become our top Historiographer, tried to organize in Santiago a Society of Entomology. Had this initiative become a fact, our Society would be a century old in 1974!

Present day Entomology in Chile is practiced or taught, as everywhere, in five of our eight universities; in three of our

(\*) C. L. Remington, A rare and primitive winged insect from Chile, *Discovery*, 4 (1): 37-44, illus., 1968.

(\*\*) G. Kuschel, Terrestrial Zoology in southern Chile *Proc. Royal Soc.*, B, 152: 540-550, 1960.

(\*) F. R. Cole, *The Flies of Western North America*, University of California Press, Introduction, pág. 3, 1969.

five Museums; at the Ministry of Agriculture; by private commercial firms, with an over-all link, our Society of Entomology, finally founded in June 1922. This makes us 50 years old and indeed the oldest Society of Entomology of Spanish or Portuguese language in the Hemisphere south of Mexico.

Our half-century old Society has a membership of 150; four provincial branches in Arica Valparaíso, Concepción and Valdivia; holds monthly regular meetings in Santiago; an annual Symposium of Entomology; and publishes its prestiged *Revista Chilena de Entomología*, now in its seventh volume, plus a Bulletin of general information.

In the five universities where Entomology is taught in Chile, the main emphasis is placed of course in the teaching of the science of Insects, but with important research programs on Taxonomy, Biology, Ecology and Distribution. Worth to mention is the Department of Entomology at the National University in Santiago, where we have ten trained Entomologists with advanced degrees, and a rather important collection of Chilean Insects, which is particularly valuable in groups such as Tachinidae, Tenebrionidae, Coccoidea, Acarina, and insects of agricultural interest. At the Universidad de Concepción, Dr. Jorge N. Artigas has been able to organize in the past 20 years a very important group of young Entomologists and which probably is the largest collection of Chilean Insects in the country.

The Ministry of Agriculture, through its departments and stations, is entitled mainly with insect control and quarantine problems. We are indeed proud to recall that our Bureau of Pest Control and Plant Quarantine was organized none the less than in 1896, to prevent the entrance of the grape *Phylloxera* to such an important grape and wine producing country as Chile is. This aim has been most efficiently accomplished for almost 80 years, but of course we don't know for how more long!

Also worth to mention are the recent campaigns carried out by the Ministry to eradicate from the city of Santiago the Mediterranean fruit fly, *Ceratitidis capitata* (Wied.); and only last year the Australian fruit fly, *Dacus tryoni* (Frog.) from Easter Island. Both crowned by complete success.

The Ministry of Agriculture furthermore, maintains in La Cruz a National Station of Entomology with five college

Entomologists, organized in 1937 by Professor Raúl Cortés, and where most of our biological, ecological and control research programs are carried on. Most of our Entomologists have got their early training there.

Our Museums, as everywhere, are in charge of collections of Chilean Insects and most of its work is of course on the Taxonomy and identification field. The almost sesqui-centennial Museum in Santiago still keeps the remaining of types and insects of Philippi and Germain, and the more recent accessions of Stuardo (Nemestrinids) and Ureta (Lepidoptera).

We do have too some eight or ten about regular magazines where to publish, and a Government institution where to get financial resources and grants to carry on research projects.

Collections of Chilean Insects must now keep some 500.000 pinned and labelled specimens, in different institutions, being the most important ones that at the Universidad de Chile, National Museum and Universidad de Concepción. There are also sizable collections at the Universidad del Norte in Arica, at the Catholic University in Valparaíso, and at the Station of Entomology in La Cruz.

Outstanding among these collections are the one of Chilean Tachinidae of Professor Raúl Cortés with some 10.000 examples nearly all identified and rich in types; the collection of Chilean Asilidae of Professor Artigas in Concepción; the Tenebrionidae collection of L. E. Peña; the one of Apoidea of Professor H. Toro in Valparaíso; of Coccoidea and Acarina of R. González and R. Charlín; and of Scarabs, Cerambycids, Elaterids, Lepidoptera, Ichneumons, etc., in private hands or different institutions.

Gentlemen. Program Chairman Dr. Vinson invited me months ago to come to Dallas to deliver a talk on "Insects - Men and Environment in Chile". I regret that pressing responsibilities prevented me to attend personally your annual meeting. In my behalf my friend Dr. Reece I. Sailer has kindly accepted to read this paper to you. I thank them both and thank you all for your considered attention.

If I only have awaked or stimulated your interest in a distant land and on its Insects, which happens to be my country, I will be more than gratified and fully satisfied! Thank you!

November 16, 1973.