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Spanish Entomology: Past and Present

M.G. de Viedma
University of Madrid, Spain

SPANISH ENTOMOLOGY: PAST AND PRESENT[1,2]

M. G. de Viedma
Department of Entomology, College of Forestry, University of Madrid, Spain

The history of pure entomology in Spain begins during the Eighteenth Century and continues until today with emphasis upon systematics. The reasons for this are several, but chief among them must be mentioned the extraordinary richness and diversity of the Iberian entomological fauna. This peninsula was a landbridge that in earlier geological times linked Europe and Africa. It is highly zoned and stratified, and supports a variety of faunal elements including European, Mediterranean, African, Atlantic and indigenous. This rich fauna, together with a paucity of skilled entomologists, has resulted in insufficient study of Iberian insects. Except for the Orthoptera, and possibly one or two other groups, our insect fauna is still in the *alpha* taxonomic status, with the consequence that it is generally not feasible to carry out the comparative anatomical, ecological, physiological, or behavioral studies that can be accomplished in countries with either a better-known fauna or with a poorer one.

As early as the Nineteenth Century, there were some distinguished entomologists in Spain. Notable among them was Mariano de la Paz Graells (1809-1898), who was Professor of Zoology at the University of Madrid. In 1847 he was one of the founders of the Royal Academy of Sciences of Spain. He described numerous species of beetles, and studied with skill and profundity the larvae of some species of Cerambycidae. His papers on the plant louse *Phylloxera vastatrix* remain to this day a masterpiece.

Other Nineteenth Century names to be remembered are those of Laureano Pérez Arcas (1824-1894) and Francisco de Paula Martínez Sáez (1835-1908). Arcas was Professor of Zoology at the University of Madrid. By interest and training he was a coleopterist, and he collected his beetles throughout all of Spain. Many European scientists were, even then, interested in the Iberian fauna, and came to Spain to study and collect. Almost invariably they turned to the well-known Pérez Arcas, who proved to be a perfect guide and host as they undertook their investigations through the country. Martínez Sáez was the founder of the Spanish Society of Natural Sciences in 1871. He took part in the famous Spanish expedition to South America, which in 1862-1865, traversed the South American continent and collected numerous specimens of many zoological groups. Martínez Sáez alone collected more than 30,000 specimens, mainly in the region of Río Napo. Unfortunately, most of these hard-gained insects were lost in transport to Spain, and because of lack of support by the disinterested Spanish government of that time.

The first part of the Twentieth Century was a period of notable entomological activity in Spain. Here the name of Ignacio Bolívar (1850-1944) deserves especial attention. Bolívar, who can be considered the father of modern Spanish entomology, occupied the Chair of Entomology in the Department of Biology of the University of Madrid, founded the Laboratory of Entomology of the Natural History Museum of Madrid, and was a member of the Royal Academy of Sciences of Spain. He was a man of warm, engaging personality and of exceptional learning and culture. His mastery of languages, for example, included a thorough command of Latin, Greek, French and English. He studied and cataloged the orthopterous fauna of the Iberian Peninsula (1900) and North Africa, and in his innumerable writings left an indelible impression on the records of Spanish and European entomology. Although he was most widely known for his scholarly activities, he was also a great teacher, and occupied his chair in the University until retirement enabled him to undertake full-time research on the Orthoptera.

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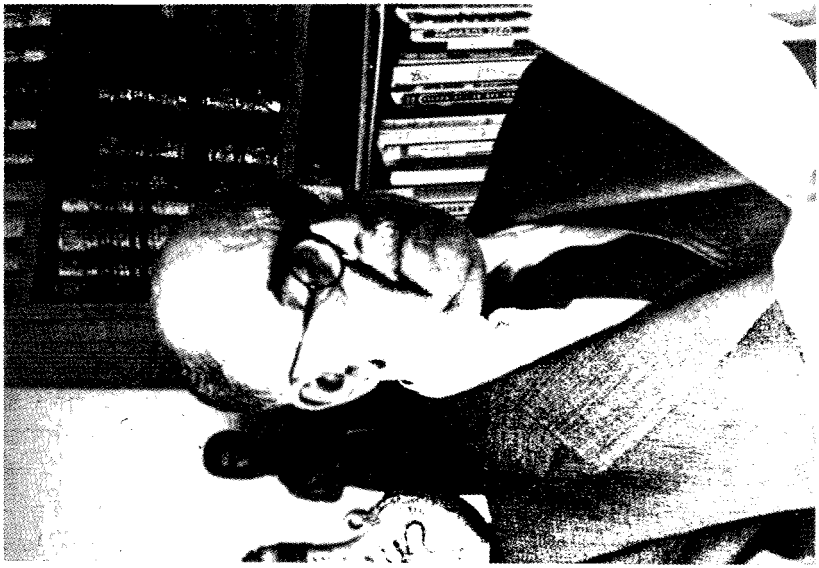
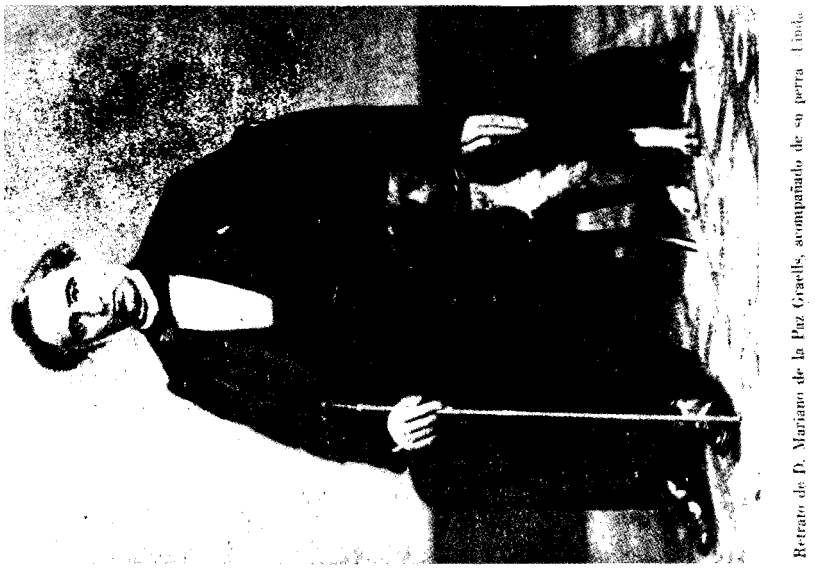
[2]From an address presented May 16, 1969 in De Roy Auditorium, Wayne State University.



Ganzalo Ceballos



Retrato de D. Mariano de la Paz Graells, acompañado de su perra Linda.

Mariano de la Paz Graells

Cándido Bolívar

Ignacio Bolívar

Ignacio Bolívar's son, Cándido Bolívar, is an internationally recognized authority on the Orthoptera. C. Bolívar was also Professor of Entomology at Madrid, succeeding his father to that high post. His most famous publication deals with the group Eumastacidae (1930), and is still a basic reference in that field. Though primarily an orthopterist, Cándido also has done considerable work on beetles. Unfortunately, he was forced to leave Spain after the Spanish Revolutionary War. He is presently in Mexico, where he is still professionally active.

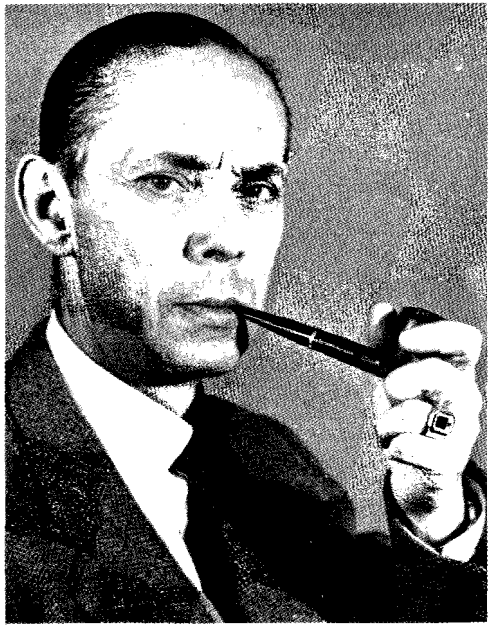
F. Bonet, the collembolist, is also an internationally known authority. He, too, was forced to quit Spain at the end of the Civil War.

The fourth name that must be mentioned, that of Father L. Navás (1858-1938), represents a different kind of entomologist than the preceding. Father Navás was a Jesuit who taught natural sciences in a high school of that Order. He specialized in dragonflies, mayflies, and caddisflies, and described large numbers of species from South America, based mostly on collections made by other Jesuits assigned to missions in that part of the world. The Navás collection presently is located in the Zoological Museum of Barcelona and in the high school in Zaragoza where he formerly taught. It is very rich in types, and is still frequently visited by specialists working with these orders of insects. Father Navás, as a man, was a person of peculiar character. He kept cordial relations with many entomologists of his time, but was, to say the least, somewhat less friendly with others.

Almost all other entomologists of the first third of the Twentieth Century were amateurs. This situation was quite common in Europe at that time, and is still common in Spain today. Most of these amateurs were well-to-do people, or else they were persons who, because of the nature of their career, had time to spare. Not surprisingly, numbered among them are many military men and priests. We shall note first R. G. Mercet (1860-1933), a soldier, whose interest in entomology arose late in life, when he was approximately 50 years of age. Mercet was an indefatigable worker and an exceptional collector. Among his many works is his profound monograph on the encyrtid chalcidoids (1921), which, even today, is a standard reference used by all hymenopterists of the world. There was also M. M. de la Escalera (1871-1949), an extraordinary collector and traveler who described hundreds of species of beetles from Spain and North Africa and cataloged the beetles of Morocco. He was particularly known for his collecting trips through North Africa and the Middle East, especially Iran. These trips, patronized by the Oberthür brothers, brought to European museums thousands of species of those faunae, which at that time were very imperfectly known. Finally, in the first third of the century, there was Father J. M. de la Fuente (1855-1932), a priest who collected intensively in a small area of the province of Ciudad Real and described from there numerous new species of beetles. His catalog of Spanish Coleoptera, unfortunately unfinished, is still of great value.

The Civil War of 1936-1939 has already been alluded to with respect to its impact on entomological activities in Spain. It is deserving of more direct mention. Undoubtedly it caused the loss of many museum specimens, and forced the cancellation or postponement of much needed research, but, more important, it posed a distinct threat to the very lives of the entomologists themselves. Most biologists of that time tended to be politically liberal and sometimes left-winged, and were sympathetic to the Republican side; they were forced to quit Spain when the war was over. Among them were C. Bolívar, F. Bonet, D. Peláez, and others, all of whom established themselves in Mexico, where they are still active. (Peláez was a competent hemipterist and an outstanding illustrator of insects.) Other entomologists were with the opposing forces, or were not directly involved in the war, and were able to resume their research in Spain when hostilities ceased. All, however, were deeply affected by the conflict, with the result that virtually all scientific activity stopped for a time.

During the second third of the Twentieth Century, there arose a figure who made possible the renaissance of Spanish entomological systematics from the ruins of the disastrous war. That person was Gonzalo Ceballos (1895-1967), Professor of Entomology of the College of Forestry of the University of Madrid, a member of the Academy of Sciences of Spain, and a prestigious hymenopterist. His entomological activities actually



Eugenio Morales Agacino

began in 1921, but all of his important contributions date after the Civil War. His most significant treatise is his monumental "Tribes of Hymenoptera of Spain" (1943), but much of his research was more specialized, being concentrated on the ichneumonflies, on which he was a world authority.

Ceballos' extensive teaching program and ambitious research, though so important to Spanish entomology, were perhaps dwarfed by the contribution he made to the *Instituto Español de Entomología,* an organization which, to recent times, remains the single most important force in pure entomology in Spain. Once the war was over, Ceballos grouped the few entomologists left in the country, and he personally founded the Instituto, and became its first director. This organization was, at first, dedicated exclusively to systematics. It soon became a powerful international force by virtue of its extensive collections, excellent library, competent staff, and because of the numerous publications they produced. The Instituto is now a necessary stop for study and consultation for every foreign entomologist with an interest in the Palearctic Fauna. However, the Instituto's future, once so bright, has recently become clouded. In the last few years since the death of Ceballos in March, 1967, it has undergone a complete change of leadership, has lost several key staff members through resignation, and now faces an unpredictable future.

Perhaps a brief digression is in order to enable a few words about the Instituto and its collections. Its collections are very well curated and of great richness and diversity. In the case of some groups they are of the very first order. The collection of Orthoptera (*sens. lat.*), for example, is composed of over 150,000 specimens representative of the western Palearctic Region, and is indispensible to anyone studying this order in the Iberian Peninsula, North Africa, or the Canary Islands. It is also rich in Central American, South American, and Malagasian forms.

The Instituto's library has a rather complete collection of entomological journals, especially those dealing with systematics. It possesses most of the journals edited in Europe and a considerable number from the other continents. A recent estimate indicates that there are in excess of 10,000 volumes in the library.

The journals published by the Instituto are two, *Eos* and *Graellsia*. *Eos* accepts original articles dealing with any aspect of entomology but specialized in systematics. It publishes in English, French, German, Italian, Portuguese, and, of course, Spanish, and is open to those entomologists throughout the world who wish to publish in it. *Graellsia*, named after the renowned entomologist, is concerned with the Iberian insectan fauna, and is published only in Spanish and Portuguese.

Now let us return to the entomologists of the mid-Twentieth Century. Among others must be mentioned Eugenio Morales Agacino, a student of I. Bolívar and a close associate and collaborator of Ceballos. In his capacity as Executive-Secretary of the Instituto Español de Entomología, Morales organized the institution, ran it skillfully, and was one of its pillars of prestige abroad. Like the two Bolívars, Morales is an orthopterist of international reputation. He served for many years as an entomological expert of the F. A. O. (Food and Agricultural Organization of the United Nations) in places as different as Central America and Iran. He is today the recognized expert on the Iberian orthopterous fauna, and is also known for his important researches on the fauna of North Africa, especially that of the Sahara Desert.

Apart from Ceballos and Morales, I will record among the names of the prominent modern entomologists of Spain only Francisco Español, who specialized on beetles, especially the Tenebrionidae of the Mediterranean Region and the Anobiidae of the world; Joaquín Mateu, Carabidae of the Palearctic region; Luis Báguena, Aderidae of the world and Scarabaeidae of Spain; Jose María Dusmet (1869-1960), aphids of Spain; Ignacio Docavo, Braconidae of Spain; F. J. Suárez, mutillid wasps of the world; J. Gómez Menor, Iberian Homoptera; J. Gil Collado and S. V. Peris, Spanish Diptera; D. Selga, Collembola of Spain; and myself. My principal interest lies in the systematics of certain lignicolous beetle larvae, especially those of the families Curculionidae, Melandryidae, and Anobiidae.

The aforementioned modern entomologists of Spain are all professional scientists. However, there are also some noted Spanish entomologists who, without having undergone any special training in biology, have become recognized authorities in their respective fields. They include A. Cobos, who works with the Buprestidae of the world; R. Agenjo, Lepidoptera of Spain; J. Junco, pompilids of Spain; and C. G. de Aizpurúa, biological cycles of certain butterflies and moths in northern Spain.

Even a cursory review of the preceding pages indicates that systematic research in Spain, though far from complete, has been considerable, and has resulted in important contributions. However, for reasons mentioned earlier, the results in non-systematic research are very different. Unfortunately, I can record here only the name of J. Templado, the author of some papers dealing with the distribution and ecology of certain species of beetles and moths of economic importance.

THE TEACHING OF ENTOMOLOGY

Even a few years ago all entomology in Spain was taught in the Departments of Biology of the Universities of Madrid and Barcelona and in the Agricultural and Forestry Colleges of the University of Madrid. Today there are formal courses in entomology taught at the following universities: Barcelona, La Laguna, Madrid, Oviedo, Pamplona, Salamanca, and Sevilla. Moreover, the number of colleges listed above has grown by one, the Agricultural College of Valencia. This would indicate that the field is growing rapidly, which is true. However, staffing of the new programs is lagging badly. Many of the professorships are still vacant, so recently have they been instituted, and so scarce the supply of trained personnel (mostly because it does not pay to be an entomologist in Spain). Thus, it may be some time before certain of the above programs exist in more than name only. Allow me to cite an example, a personal one. The Biology Department of the University of Navarre (Pamplona) experienced such difficulty finding a Chairman

for their program in entomology that they enlisted my services on a part-time basis. The result was that last year I traveled week-ends from Madrid (in whose College of Forestry I hold the Chairmanship of Entomology) to Pamplona, a distance of 800 km. round trip, to help organize and implement their course until they can find a suitable replacement. Unfortunately, this kind of arrangement is not uncommon.

Information relative to the teaching of biological sciences, entomology, and the general Spanish university system is to be found in Gangwere, 1967 (*Grad. Comment* 10:102-111), and in Viedma (*Grad. Comment*, in press). The reader may turn there for whatever additional detail he wishes.

APPLIED ENTOMOLOGY

In Spain, there are two large centers of applied entomology, both dependent on the Ministry of Agriculture. They are the Phytopathology Section of the Instituto de Investigaciones Agronómicas and the Servicio de Plagas Forestales, both located in Madrid, though the former also operates several field stations elsewhere in the country.

The Instituto de Investigaciones Agronómicas is interested in research dealing with both biological and integrated control, and works closely with two international agencies: O. I. L. B. (Organisation International de Lutte Biologique) of the I. U. B. S. (International Union of Biological Sciences) and I. A. E. A. (International Atomic Energy Agency) of the United Nations.

Among the significant works undertaken by the Instituto, we should record the researches of Manuel Arroyo. This prominent scientist and his associates have developed new methods for the laboratory rearing of the fruit fly *Ceratitis capitata*, and are able to use this insect as a host for parasites of the olive fruit fly, *Dacus oleae.* They have published on these rearing methods, as well as on the results of irradiating pupae of the former species as a means of control through release of sterilized males. Their main campaigns have been waged in Tenerife, the Canary Islands, and in Murcia, in the southeast of Spain, both places that are geographically isolated. Results in both instances have been good. These are promising research lines, and Spain has been at the forefront in their continuing development. Indeed, research involving laboratory rearing and irradiation of insects that are pests of the orange tree and other fruit trees, programs patronized by the two previously mentioned international agencies, has recently been centralized in Madrid, with the result that much of the future international work along these lines is destined to bear a strong Spanish imprint.

The Instituto is spearheading a number of other kinds of programs. It is involved in control of the locusts of the Iberian Peninsula, particularly *Dociostaurus maroccanus* and *Calliptamus italicus*, and carries on an active cooperation with F. A. O. and with the agricultural defense organizations of our former colonies in North Africa, now independent countries. Also, the Instituto has recently established a program for the control of wheat pest Heteroptera. The above is perhaps sufficient to indicate in a general way the scope and direction of the organization's researches.

The Servicio de Plagas Forestales, or Forest Pest Service, the second great center of applied entomology in Spain, has an origin that extends back to the beginning of the Twentieth Century. It was founded by Manuel Aulló, then Professor of Entomology in the College of Forestry of the University of Madrid.

The principal lines of research of the Servicio deal, at the present moment, with chemical control of the pests of oaks, especially *Quercus ilex* (chiefly involving the insect pests *Tortrix viridana* and *Lymantria dispar*); of pines (the pests *Thaumethopoea pityocampa* and *Pissodes notatus*); and of *Populus.*

The Servicio has been working (financed in part by Public Law 480 of the United States of America!) on two broad programs especially deserving of comment. The first of them deals with *Lymantria dispar*, the Gypsy Moth, a species imported into the United States from Europe, and today an important pest in the oak forests of your country. It is divided into two parts, both involving biological control of the insect, one through parasitization by other insects and the other by parasitization by viruses and bacteria. The names of Nestor Romanyk and Adolfo Rupérez are noted here as the respective

principal investigators. Under the first part of the first program (that of Romanyk), the biological cycle and mode of action of the parasites were studied, parasites were released for possible control, and extracts were taken from the abdomens of virgin females and used to attract males with the object of reducing the rate of reproduction of the species. This research, carried out in close association with the U. S. Department of Agriculture, has given satisfactory preliminary results. The second part of the first program (that of Rupérez) on *Lymantria dispar* involves the several viruses and bacteria that attack the insect. As the second researches are still in an early stage, the results are not yet available.

The Second Public Law 480-financed program at the Servicio involved *Populus* research recently finished under the direction of Carlos Dafauce and Domingo Cadahia. These investigators were concerned with *Saperda carcharias, S. populnea, Paranthrene tabaniformis, Aegeria apiformis*, and certain other pest species, and with the resistance of the different strains of Populus to attack by these insects.

Finally, I would like to record the program carried out by the Servicio on the complicated, generally misunderstood life cycle of the cone parasites of *Pinus pinae*. This species of pine once grew abundantly in the forests that covered major parts of the central plateau of Spain, particularly in the Provinces of Segovia and Valladolid. The plant's production then declined alarmingly under the attacks of a weevil, *Pissodes validirostris,* and a moth, *Dioryctria mendacella.* However, as a result of extensive researches by Pedro Bachiller and his associates, the pests' biological cycles and behavior became perfectly known, and their chemical control then proved simple and inexpensive. Upon implementation of the recommended control measures, the pests were reduced, and the region again became the top producer in the world of pinion, or pine kernel, with exports in great quantity to the most distant parts of the world where it is used as an item of delicatessens.

ACKNOWLEDGMENTS

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SOME IMPORTANT WORKS DONE BY SPANISH ENTOMOLOGISTS

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