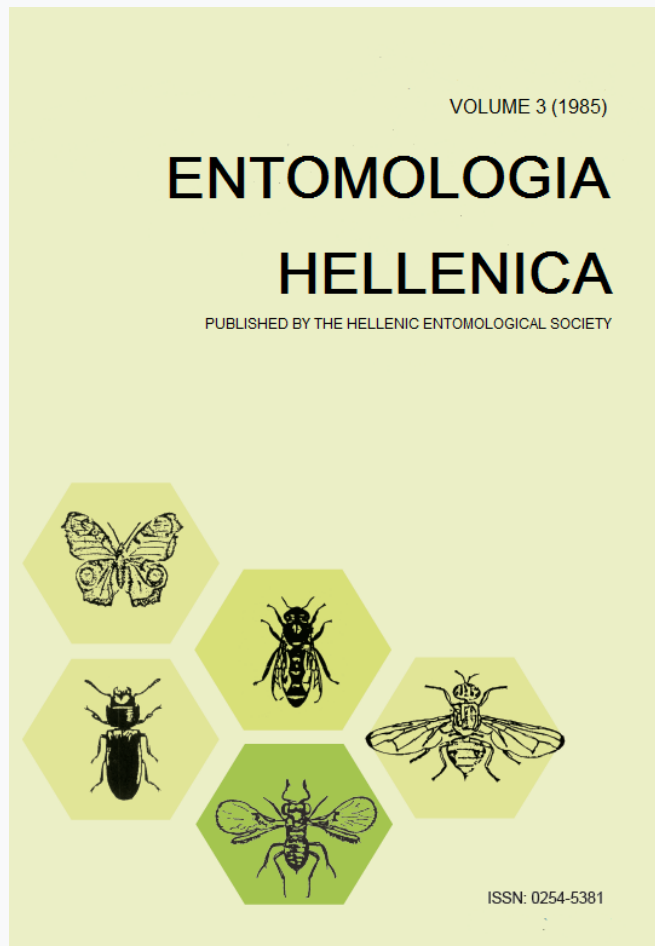


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## Entomological Research in Greece - A Brief Account

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### ABSTRACT

After mentioning the first research work by foreign scientists on the collection, identification and recording of insects and related arthropods of Greece during the last century, the first attempts and legislature for the foundation of the institutes where entomological research started in Greece are given. The fields covered by that research before and after World War II are given, as well as the financing agencies, the periodicals where research papers have been published and, finally, the research and university institutions where entomological research is being done today, with the names and main fields of activity of Greek entomologists.

### Preface

The present paper contains a brief account of early research activities concerning insects in Greece, of early legislation which allowed the organization of institutions and the carrying out of applied entomological research and of institutions and scientists involved in entomological research today. It is not a history of entomology in Greece. It does not cover the development of particular institutions or the contributions of individual scientists in the last forty years, when most of the present research institutions started or expanded their activity. Several scientists in an administrative or research capacity contributed substantially to the construction, expansion, equipping, staff recruiting and guiding or carrying out research during this forty-year period. For obvious reasons, an evaluation of their work was avoided, especially since a number of them are still in active service and it should be the task of subsequent generations to make such an evaluation. Furthermore, part of their contribution is reflected in the publications of each institution, which have appeared in journals of wide international circulation and in the Greek journals listed in this paper.

Following a brief introduction to each institution or group of institutions is a directory of

research scientists, so that the reader may learn their specialties and main fields of current activity. This directory is based on information supplied by heads of laboratories or individual scientists, and may be incomplete for institutions which did not respond to the respective questionnaire, unless the author happened to have a good knowledge of their current research activities. Most information concerning Acarina was omitted, as there is a recent paper by Emmanuel (1982) on the history of acarology in Greece, which includes research with this group of arthropods.

### The 19th and early 20th century

Modern Greece became an independent country in 1830. According to available literature, early entomological research consisted of the collection and identification of insects of the Greek fauna. This early work was carried out by foreign scientists from various European countries, and most specimens are kept abroad. In the bibliography of the Greek fauna compiled by Kanellis and Hatzissarantos (1951) and Kanellis and Legakis (1979), we find that one of the earliest extensive papers on the arthropod fauna of southern Greece (Peloponnesus) is the one by Brullé (1832). More activity

in collecting and identifying insects of the Greek mainland and the islands is noticed in the middle of the 19th century. Among the lists of Coleoptera are those by Schaum (1857), Kraatz (1858a, b), von Kiesenwetter (1858, 1859a, b), Schaufuss (1882), Brenske (1884), Reitter (1884) and von Oertzen (1886), of Hemiptera by Chicote del Riego (1882), and of ants by Forel (1886). At that time appear the first records and descriptions of Greek insects by Gennadius (1881, 1883), one of the first Greek agronomists, who also studied and published on rodents and related mammals of Greece. Lists of Greek insects collected and/or identified by Greek scientists appear much later, in the 1930s, and concern mostly Diptera of medical importance (Pantazis 1932, Caminopetros 1934, Papadakis 1935), Coccoidea (Koronéos 1934), Coleoptera (Paliatseas 1937), and species destructive and beneficial to agriculture (Isaakidis 1935, 1936a, 1939a).

Early legislature concerning the control of destructive insects can be found in such acts as ΒΠΞ of 13/17 February 1893 "About chasing field rodents and grasshoppers" and Act 214 of 31 March 1914 "About protection measures against the grape phylloxera". Those acts provided for the application of known methods of control, under the supervision and often at the expense of state services, but failed to include entomological research per se. At the beginning of the 20th century, in fact in 1914, we have the establishment of governmental services and institutions for the formulation and implementation of plant protection in general. The establishment of those services was made at the recommendation of C. A. Isaakidis, who was the leading figure in plant protection of that period. He was a biologist who went to Belgium, France and Italy for special studies, and worked there with entomologists of high reputation such as P. Marchal and A. Berlese. Thus, Isaakidis became the first scientist in Greece with a sound entomological background. The Plant Protection Service of the Ministry of Agriculture was organized and directed by him from 1914 through 1929. He also called the attention of E. Benakis who generously offered the land and funds for the establishment of the Benaki Phytopathological Institute in 1929, which was organized and directed by Isaakidis through 1948. Isaakidis was also the first professor of agricultural and forest zoology and entomology at the College of Forestry (1918).

College of Agriculture of Athens (1920 - 1937), and the University of Thessaloniki (1937 - 1943). His entomological work was mainly to apply and spread the use of known methods of chemical control of olive and citrus pests, with emphasis on the control of the olive fruit fly with bait sprays. He also dealt with the chemical control of the house fly and stored food insects, and with biological control. In 1926 he imported from southern France the predatory beetle *Rodolia cardinalis* (Muslant) to successfully control the citrus cottony cushion scale *Icerya purchasi* Maskell, and a few years later, from California and Spain, the beetle *Cryptolaemus montruzieri* (Muslant) against the citrus mealybug *Planococcus citri* (Risso) (Isaakidis 1941). Isaakidis also set the legal frame for financing and encouraging entomological research in Greece. Decree - law of the 26 May 1923 provided, among other things, that the Plant Protection Service has among its duties "the study of the diseases and damages of the cultivated plants, the identification of their causes, and the search (or research) of every method to prevent and control them, the recommendation, spread and application of the various measures to control harmful insects and other animals or parasites of plants and of weeds,... the checking up of imported plants". The Plant Protection Service had two sections: Research and Applications. Although research was not done by staff of that Service, the decree - law in question made it possible for funds to be allocated to institutions supervised by the Service to carry out research on insects harmful to agriculture.

At about that time the first few scientists were sent by the government for a year or two to central and western Europe for special studies or training in crop protection, including entomology. Upon returning to Greece, they were put in charge of the newly founded regional plant protection institutes. Those scientists were loaded with administrative and advisory work on insect and disease control. Thus, little research was carried out prior to 1940, except little by Isaakidis (1936b, 1939b) and more so by P. T. Anagnostopoulos, professor of horticulture, who was very active in studying the biology and control of fruit pests and diseases. Anagnostopoulos had no entomological background and misnamed many species of insects he studied. However, his drawings, photographs and observations cover

a great number of fruit pests and are a valuable source of information on life history and symptoms of damage. Most of his work appeared in "Dendrokomiki Erevna" (Arboricultural Research) a journal he edited, and was later compiled in a 648 page book (Anagnostopoulos 1939).

Three regional plant protection stations (recently named institutes) were founded with Act 1877 of 1922. Their purpose was "the study of the causes of ailments of plants and of the means of prevention and control of them, as well as the dissemination of such means". Subsequent acts or ministerial decisions specified the locations of the three regional stations in Volos, Patra and Heraklion Crete. Their activities of the 1925 - 1940 period involved control and recommendations but not research per se (Thanassouloupoulos 1979).

The beginning of research on plant pests in Greece is connected with the founding of the Benaki Phytopathological Institute. Till 1965, this institute employed most of the trained entomologists of the country. The founding act of this institute included among its objectives the following:

1. Research concerning the diseases and damage to cultivated plants in general, and the measures to prevent the appearance of and to control harmful insects and other animals or parasites of plants and weeds and to prevent or cure the diseases and damages of plants.

2. Providing advice to growers and the public.

3. Introduction, acclimatization and distribution of parasitic insects and other natural enemies of insects harmful to agriculture in general.

4. Popularizing plant protection knowledge.

The first experiments on insect pests of agricultural crops were carried out between 1932 and 1940. In World War II, Greece fought against the invaders for about six months and subsequently was occupied by foreign forces till the autumn of 1944. Famine and struggle for the essentials of life made it impossible for research to be done during those years.

### After World War II

Soon after the end of the war, the country suffered from the ills of another four-year civil war. Thus, the recovery of the country was

slow and it is only in the late forties to early fifties that entomological research was given the proper attention and started to expand and intensify. During the 1945 - 1960 period, much of the work in the research institutes continued to be on the diagnosis of damage and identification of the causative pest arthropods, but serious consideration was also given to experiments on the biology of pest insects and on developing or improving methods for their control. Such work was also done at universities, in addition to basic research. Several of the presently active research entomologists specialized abroad during that period, thanks to financial help by the Greek State Scholarship Foundation, foreign governments and universities, and international organizations. Effective control measures were recommended, and applied research spread to more pest species and crops, depending on the seriousness of each pest problem, as evaluated by the Plant Protection Service, and requests by growers.

After 1960, research with insects and mites expanded as a result of more and better qualified entomologists appointed in the research institutes and the universities, more frequent co-operation of certain research groups with foreign experts, and more financial support by the Greek governments and research grants by foreign and international organizations. Under the Joint Program Government of Greece/UNDP/FAO GRE 69/525 for the control of olive pests and diseases, a number of experts from various countries was sent to Greece to help develop new and improve conventional methods of controlling olive pests. In addition to work aiming at developing or improving the chemical and classical biological control of main pests of the olive, citrus, and a few other crops, much fundamental work was carried out necessary for the testing of such methods as microbial control and the sterile insect release, for the identification and effective use of sex pheromones to monitor populations or to control certain pests, for the development of more effective visual traps and chemical attractants, and various ecological, ethological, physiological, pathological, and toxicological work to better control plant pests. Some of the internationally co-ordinated work aimed at developing satisfactory integrated control methods for major crops such as the olive and greenhouse tomatoes and cucumbers.

The Joint Government of Greece/UNDP/

FAO Project GRE 69/525 for the Control of Olive Pests and Diseases, in co-operation with the Ministry of Agriculture, offered great help in the development of methods of biological and integrated control of olive pests, for over ten years.

An outlook of present - day research activity and major interests of Greek entomologists and other scientists can be obtained in the institutions chapter of this paper, where their fields of major activity are given.

#### The financing of entomological research

The largest part of the funds for entomological research, whether they concern the salaries of permanent and temporary personnel, equipment, or expendable items, is covered by the budgets of the particular research institutions. Greek, foreign, or international organizations have at times financed research of a basic and, more often, of an applied or target - oriented nature. Such financing agencies have been: the Ministry of Agriculture, the Ministry of Research and Technology, the National Research Foundation, the Commission of the European Communities, FAO, IAEA, IOBC (OILB), NATO, UNDP, USDA, and WHO. Most research grants from Greek agencies covered wages and expendable items, while those from abroad covered also the exchange of scientists, expert assistance and the training of young Greek scientists in universities and research institutions of western countries.

#### Foreign missions

During the past fifteen years, a number of foreign entomologists worked in Greece on behalf of such agencies as the Commonwealth Institute of Biological Control, the University of California Division of Biological Control and the U.S. Department of Agriculture. They spent in the country from a few days to more than a year, to collect and study natural enemies of weeds of Mediterranean origin, with the purpose to shipping them to North America or Australia for the biological control of such weeds as *Chondrilla juncea*, *Convolvulus arvensis*, *Centaurea solstitialis*, *C. diffusa*, *Abutilon theophrasti* and *Euphorbia* spp. In some cases host specificity tests were run in Greece before the phytophagous insects or mites were shipped to the other continents.

Natural enemies of such pest insects as pear psyllas and *Heliothis* spp. were also collected and shipped to North America. The results of this work have appeared in various journals and in reports.

#### Research degrees

Greek universities and equivalent educational institutions are authorized to confer the doctor's degree, after the completion of original research. Some departments require, in addition, the completion and examination in a number of undergraduate and/or graduate courses, while other departments do not. Most doctorates involving research with insects have been conferred by faculties of agriculture, sciences and veterinary science. Education in entomology has been offered in the former Schools of Agriculture, Forestry, and Veterinary Science (now incorporated into the School of Geotechnical Sciences) of the University of Thessaloniki, and in the College of Agriculture of Athens. The respective undergraduate courses cover the general aspects of applied entomology and the life history and control of insects and mites of agricultural, silvicultural, and veterinary importance, respectively. Courses on apiculture and sericulture have also been offered in the above two schools of agriculture. Specific aspects of medical entomology for physicians are taught in the Athens School of Hygiene.

#### Publication outlets

A number of Greek entomologists publish in well known entomological periodicals of wide international circulation, such as the *Annals of the Entomological Society of America*, *Annales de la Société Entomologique de France*, *Entomologia Experimentalis & Applicata*, *Ecological Entomology*, *Environmental Entomology*, *Journal of Economic Entomology*, *Journal of Insect Physiology*, *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, and *Zeitschrift für Angewandte Entomologie*. Other entomologists publish mainly in journals published in Greece, in Greek, English, or French. Such journals where research papers have been published in the past ten years are:

*Annales de l'Institut Phytopathologique Benaki*. It started in 1935 and appears in two issues per year. There is a Greek and a foreign

edition, the latter with the papers translated in English or French. The papers are mostly by staff of the Institute.

*Annales Musei Goulandris*. It started in 1973 and appears annually or every two years. It covers botany, zoology, geology and paleontology, and contains annotated lists and taxonomic papers of insects, in English, French or German.

*Biologia Gallo - Hellenica*. It is published by the Franco - Hellenic group of Biological Research. First published in 1967, it appears at irregular intervals and contains papers, in English and French, on a variety of biological subjects, including insects.

*Dasiki Erevna* (Forest Research). It is published by the Forest Service of the Ministry of Agriculture, and contains mostly research papers by scientists of the Ministry, in Greek, with summaries in English, French, or German. It started in 1980, and appears at irregular intervals in 2 or 3 issues per year. Before 1980, such papers were usually published in *Dasika Chronica* (Forest Annals).

*Entomologia Hellenica*. It is published by the Hellenic Entomological Society. It was first published in 1983 and appears twice a year. It is the only purely entomological journal published in Greece, and contains regular research articles and short research notes, in English or French, by society and non-society members from any country, on Insecta and Acarina. It has an international reviewing system, is characterized by ISSN and is covered by the Rev. Appl. Entomol., Entomol. Abstracts, Biol. Abstracts and the Zool. Record.

*Georgiki Erevna* (Agricultural Research). It is published by the Research Service of the Ministry of Agriculture, and contains mostly research papers, in Greek, by scientists of the institutes and services of the Ministry. It was first published in 1977, and appears at irregular intervals, in 2 - 4 issues per year.

*Scientific Annals of the School of Agriculture and Forestry of the University of Thessaloniki*. It publishes mostly research papers, including doctoral dissertations of university scientists, mostly in Greek, with summaries in English, French, or German. A few papers appeared in English with a summary in Greek and French.

*Scientific Annals of the School of Physical and Mathematical Sciences, University of Thessaloniki*. It contains research papers on *Drosophila* spp., by scientists of the School.

*Scientific Annals of the School of Veterinary Science, University of Thessaloniki*. It contains research papers on insects and related arthropods of veterinary importance.

*Other periodicals*. A number of non - research periodicals publish research papers concerning insects of agricultural importance. The papers are in Greek, with often a summary in one of the main European languages. Such journals are *Agrotiki* (formerly *Deltion Agrotikis Trapezis*), *Geoponica*, *Geotechnica*, and *Nea Agrotiki Epitheorissis* (New Agricultural Review). A small number of issues of "bulletins" of the regional plant protection institutes of Thessaloniki, Volos and Patra contain regular research papers and short notes on insects of agricultural importance, and annotated lists of crop pests. They are in Greek, with often a summary in English or French. Those bulletins have either been discontinued, or appear at irregular intervals.

*Non - periodical outlets*. A relatively small percentage of the research papers appeared, in full, in the proceedings of national meetings, such as the First Symposium of Geotechnical Research of 1977, the Panhellenic Congress of Geotechnical Research of 1981 and the First Symposium of the Hellenic Entomological Society of 1985. The proceedings of the last symposium will appear in a special issue of *Geotechnica* (see above). They are in Greek, with a summary in English and/or French. A few research papers have been published in a printed or mimeographed form as separata of university laboratories or of research stations, or even printed by the scientists themselves. Most of them are in Greek, with a summary in English, French, or German. The Hellenic Zoological Society recently published F. Willemse's Catalogue of the Orthoptera of Greece (1984). Results of applied research have also been included in internal "reports" of the plant quarantine stations.

## Institutions of entomological research

### Institutes of plant protection

#### 1. The Benaki Phytopathological Institute

Founded in 1929 and inaugurated in 1931, this institute has been the central plant protection institute of Greece. Located in Kifissia, a northern suburb of Athens, the Institute is governed by a council composed of descendants of

its founder E. Benakis, of the director of the Institute, and of a representative of the Plant Protection Service of the Ministry of Agriculture. Thus, it is under the indirect control of the above Ministry. The Benaki Institute has the most complete entomological and phytopathological library in the country, and more trained entomologists than any other institute in the country.

Current research includes biology and control of various plant pests, biological control, including microbial control, reproductive physiology, insect pathology, insect rearing, collection and identification of Hemiptera, Lepidoptera, Coleoptera, stored products and food pests, and other insects, insecticide residue analysis, and laboratory and field screening of insecticides and other pesticides. The results of the work are published mostly in the Annals of the institute and in proceedings of national and international meetings, and some in journals of wide international circulation. Staff members are:

Mourikis P. A., director of the institute, Dr. Agr. Sc., Univ. of Thessaloniki (agricultural entomology; the corn borer *Sesamia nonagrioides*; insect identification).

Anagnou - Veroniki M.<sup>1</sup> (insect pathology, microbial control).

Argyriou L., Dr. Agr. Sc., College of Agriculture of Athens (biology, ecology and biological control of pests; predatory and parasitic insect fauna of Greece).

Betzios B. Ch. (biology and control of insects of public health and screening of insecticides against them).

Broumas Th., Dr. Ingr., Univ. of Marseille (integrated control of olive pests; effects of pesticides on beneficial insects; biology and ecology of the grape berry moth and pear psylla).

Buchelos C. T., Dr. Ingr., Univ. of Montpellier (population studies and control of stored product insects, using pheromones and biotechnological methods; Curculionidae of Greece; insects infesting weeds).

Drosopoulos A. S., Dr. Agr., Agricultural Univ. of Wageningen (zoogeography, sys-

tematics and ecology of Hemiptera of Greece; biology of some pest species and biosystematics of some species - complexes).

Fytiza R. E., Dr., Univ. of Paris (effects of air sprays on the fauna; toxicity of pesticides to mammals).

Fytizas E., Dr., Univ. of Lyon (insect physiology; rearing methods for *Sesamia* spp.). Currently in Senegal, as an FAO expert on integrated pest control methodology.

Kalmoukos P. E. (chemosterilization of Diptera; attractants, repellents and bait sprays against the olive fruit fly; efficacy, resistance and phytotoxicity of insecticides).

Kapetanakis E. G., Ph.D., Imperial College, London (efficacy and resistance of insecticides and acaricides; use of resistance of beneficials in integrated control; toxicity to bees).

Katsoyannos P. I., Dr. d'État, Univ. of Toulouse (biological control of scale insects). Currently in Cape Verde, as an FAO expert on integrated pest control methodology.

Mpakagiannis G., Dr., Univ. of Göttingen (biological control of insect pests).

Papaioannou - Souliotis P. (biology and control of phytophagous mites, including biological control; Phytoseiidae and Stigmoidae of Greece).

Patsakos P. G., Ph.D., Imperial College, London (pesticide residue determination and factors affecting residue levels; efficacy of soil insecticides; food attractants and chemosterilants for insect control).

Souliotis C. (biological control of the olive kernel borer *Prays oleae*; biology, ecology and parasitism of the grape berry moth and the pear psylla).

Soultanopoulos C. D., Dr. Agr., Univ. of Bonn (chemical control and trapping of the olive fruit fly; bioassays and mode of action of insecticides).

Soultanopoulou - Mantaka A. (physiology and histology of pest insects; biology and control of the Colorado potato beetle).

Stavraki H., Dr., Univ. of Paris (biological control of the olive kernel borer; biology, ecology and parasitism of the grape berry moth and the pear psylla).

Tomazou T. D. (chemical control of the olive fruit fly; efficacy of insecticides against soil and stored product pests).

<sup>1</sup> Scientists whose post-graduate degree is not given, hold a B.Sc. or equivalent university diploma in agriculture or biology, and have worked in research with insects, in Greece or abroad, for a number of years to justify their inclusion in the directory.

Vassilaina - Alexopoulou P. (rearing and biology of lepidopterous pests).

Vatos A. J. (efficacy of insecticides, attractants and repellents against the olive fruit fly and other plant pests).

Yamvrias C., Dr., Univ. of Paris (insect pathology, microbial control of insects).

## 2. The Lykovryssi Insectary

Located in Lykovryssi, a northern suburb of Athens, this laboratory of the Ministry of Agriculture was built to mass rear entomophagous insects and their hosts, as well as fruit flies for sterilization and release. Staff members are:

Manikas G. P., director of the lab., Dr. Agr. Sc., College of Agriculture of Athens (mass rearing of parasitic insects, olive insect pest management).

Liaropoulos C. N., Dr. Ingr., Univ. of Toulouse (insect pest management in olive groves and glasshouses).

Tsiroyannis V. Th. (mass rearing of entomophagous insects for biological control of olive and greenhouse pests).

## 3. The regional plant protection institutes

There are four regional "institutes" of plant protection, under the Research Service of the Ministry of Agriculture. They are located in or near the major cities of four regions of the country, and they serve mainly the needs of the particular regions. Their research work includes life history and control of major pests of their area of responsibility, including insect surveys and pesticide screening in the field, aiming at advising extension plant protectionists and farmers. They are from north to south:

### a. Thessaloniki Plant Protection Institute

Atzemis A. T., director (biology and chemical control of olive insects).

Evangelopoulos I. Z. (insects of cereal crops, control of white fly and spider mites in greenhouses).

Palukis S. S., Dr. Ingr., Univ. of Paris VI (scale insects).

Papanicolaou P. E. (biology and control of leaf miners and psyllas on pomaceous trees).

Sathopoulos D. G. (soil insects, biology and control of cotton insects).

### b. Volos Plant Protection Institute

Ioannidis J. D., director of the institute

(biology and control of phytophagous insects).

Bakoyannis A. E. (biology and control of phytophagous insects and mites).

Koutroumbas A. G., Dr. Ingr., Univ. of Paris VI (biology, physiology and control of phytophagous insects).

### c. Patra Plant Protection Institute

No trained entomologist at present.

### d. Heraklion Plant Protection Institute

Roditakis N. (pests of grapevine and horticultural crops).

## 4. The plant quarantine stations

There are five such stations. Four are located in the same cities as the plant protection institutes and the fifth in Piraeus, largest port of the country. In addition to regular plant health inspection and quarantine duties, some of their scientists are charged with agricultural forecasting for insect pest and disease control. They operate a network of traps, usually pheromone traps, for such pests as the codling moth of apples and pears, leaf miners of pomaceous trees, the olive kernel borer (also known as the olive moth), the grape berry moth and the potato tuber moth. Although those scientists are not research entomologists, their data of trap captures and seasonal development of immature stages of pest species constitute applied research, often original for a particular region. Among those scientists with several years experience are E. Angelakis of the Heraklion Station (grape berry moth), L. Tzeiranakis of the same station (olive kernel borer and black scale), A. Papadopoulou of the Patra Station (Lepidoptera of stone fruits, olive kernel borer, potato tuber moth) and D. S. Kyparissoudas of the Thessaloniki Station (Lepidoptera of pome and stone fruits, olive kernel borer, grape berry moth). The results are contained in internal annual reports. Charged with similar agricultural forecasting duties are a few plant protection specialists of the regional services of the Ministry of Agriculture. Among them is A. Gliatis of the Larisa Service (codling moth and lepidopterous corn borers).

## Institutes of plant research

There are a number of such institutes that are



under the Ministry of Agriculture, the Ministry of National Economy and state - owned or state-supervised organizations. They generally deal with specific crops and their protection. Some of them have well - organized entomology laboratories, carrying out applied entomological research for years and issuing insect control recommendations for the growers. Their scientists often co - operate with entomologists of the plant protection institutes. Some do not have separate entomology laboratories, but employ one to a few entomologists or acarologists.

#### 1. Center of Agricultural Research of Athens

Located in Amaroussion, a suburb of Athens, this plant research center has an acarology laboratory. Staff member is:

Hatzinikolis E.N., in charge of the lab. (systematics, biology and ecology of Eriophyoidea, Tetranychoida and other plant-inhabiting mites; chemical control of plant-feeding mites).

#### 2. Center of Agricultural Research of Central Greece

Located in Larisa and dealing mainly with field and forage crops, this institute has recently employed an entomologist:

Zoaki-Malissiova D., Dr. Agr., Univ. of Gies-sen (pests of corn, aphids of alfalfa and cereal crops).

#### 3. Institute of Subtropical Plants and Olive, Hania

Located a few kilometers from the city of Hania, Crete, this rather large regional institute includes an entomology laboratory, the scientists of which have been active in fundamental and applied research on pests of citrus and olive, and recently also on greenhouse pests. Staff members are:

Michelakis S.E., director of the lab., Dr. Ingr., Univ. of Marseille (ecology and integrated control of the olive fruit fly; pests of protected crops).

Alexandrakis B. Z., Dr. Ingr., Univ. of Bordeaux (olive and citrus scale insects).

Paraskakis M. I. (black olive scale, olive kernel borer).

#### 4. Olive Institute, Corfu

Located in the outskirts of the city of Kerkyra

(Corfu), capital of the homonymous island, this institute has an entomology laboratory active on olive pests. Staff members are:

Kapatos E., Ph.D., Imperial College London (population dynamics, ecophysiology, and developing pest management systems for the olive fruit fly).

Macropodi M. (rearing of parasites of olive pests).

Stratopoulou E. (bioecology and population dynamics of the olive black scale).

Tzorras A. (seasonal development of the olive kernel borer).

#### 5. Tobacco Institute of Greece

Situated in the city of Drama in northern Greece, this institute is under the jurisdiction of the Ministry of National Economy. It has a long tradition in the study and control of the main pests of tobacco and in the dissemination of control recommendations to tobacco growers. The results can be found in the annual reports of the institute (in Greek) and in proceedings of congresses, symposia and group meetings of the CORESTA. Staff members working with insects are:

Chrysochoou A.P. (control of tobacco pests in the warehouse, seedbed and field).

Mandelis S. (control of tobacco pests in the warehouse, seedbed and field).

Tsakiridis I.P., M. Sc., North Carolina State Univ. (transmission of tomato spotted wilt virus by the onion thrips).

#### 6. Cotton Organization

This state-owned organization is responsible for the co-ordination of cotton production in the country and for pest control recommendations to cotton growers. They have an entomology laboratory in Athens and field research scientists in some of the main cotton growing regions. Staff members are:

Chatzimichail A., of the Larisa office (population fluctuations of the pink bollworm, cotton leafworm, Jassidae and spider mites).

Kalampouka-Fimiani E., of the Thessaloniki office (biology and control of aphids and other sucking insects).

Kalogiros K., head of the Larisa office, M. Sc., Univ. of Reading (population fluctuations of the pink bollworm, cotton leafworm, Jassidae and spider mites).

Panagopoulos G., head of the Veria office

(biology and control of spider mites).

Tolis I., head of the Athens lab., Dr. Agr. Sc., College of Agriculture of Athens (microbial and chemical control of Lepidoptera of cotton).

#### 7. Hellenic Sugar Industry Ltd.

This state-owned organization is responsible for the co-ordination of sugarbeet production and for sugarbeet pest and disease control recommendations to the growers. They have a plant protection laboratory in their plant in Platy Imathias, northern Greece. Staff member is: Ioannidis P. M., M. Sc., Univ. of Reading (biology and control of the leaf beetle *Cassida viridis*; screening of insecticides against sugarbeet Coleoptera).

#### 8. The forest research institutes

There are two such institutes, each having an entomology laboratory. The work has been on the collection, identification, biology and control of forest insects.

##### a. Athens Forest Research Institute

There is no entomologist at present.

##### b. Thessaloniki Forest Research Institute

Avtzis N., in charge of the entomology lab., Dr. Forstw., Univ. of Göttingen (feeding behavior and physiology of forest insects; field-screening of insecticides).

#### 9. Other institutes of plant research

Some of their scientists, mostly agronomists and horticulturists, have carried out applied research on pests of specific crops, often in cooperation with trained entomologists of other institutes, especially of the plant protection institutes. Such institutes are: the Cereals Institute in Thessaloniki, the Cotton Institute at Sindos, the Deciduous Trees Institute in Naousa, the Olive and Horticultural Institute in Kalamata, the Raisin Institute in Pyrgos, and a number of regional "agricultural research stations".

"Democritos" National Research Center of Physical Sciences

This institution, known until recently as the "Democritos" Nuclear Research Center of the

Greek Atomic Energy Commission, is now under the jurisdiction of the Ministry of Industry, Energy and Technology. It is located in Aghia Paraskevi, an eastern suburb of Athens. Within its Biology Division, entomological research started in the Entomology Laboratory sometime in 1962. Originally, the research aimed at testing the sterile insect release method against the olive fruit fly, *Dacus oleae*, therefore, much of the published work of the first 15 years concerned the development of artificial diets and a mass rearing method, sterilization of the insect by gamma radiation or chemosterilants, studies on the reproduction and mating competitiveness, physiological, behavioral and genetic studies concerning the quality of the flies produced, nutrition, chemical analysis of the insect and its natural host (the olive fruit), identification of the fly's sex pheromones, behavior and response to pheromones and to other chemical and visual stimuli, the development of visual and pheromone traps, marking, release and recapture of sterile flies, and control of the insect by mass releases of sterile flies and mass trapping. In addition, the studies included temperature, light and humidity effects on the development and behavior of the insect, pheromone biosynthesis and symbiosis. In the last few years, the work expanded to developing an artificial rearing method for the corn borer *Sesamia nonagrioides*, temperature, light and humidity effects, isolation, identification and field application of its sex pheromone, evaluation of crop losses in corn by this and another two lepidoptera, *Ostrinia nubilalis* and *Scotia* (= *Agrotis*) *segetum*, seasonal occurrence of the three species, screening of single corn hybrids for resistance, the symbiosis of the wood borer *Zeuzera pyrina* and the biology and damage to olive trees by the jasmine moth, *Margaronia unionalis*. The results are published mostly in journals of wide international circulation and in proceedings of national and international meetings. Staff members are:

Tsitsipis J. A., in charge of the lab., Ph.D., Univ. of California, Berkeley (fruit fly rearing and ecology; lepidopterous pests of corn; aphid ecology).

Economopoulos A.P., Ph.D., Univ. of California, Berkeley (fruit fly behavior, color and food-odor attractants, trapping, quality assessment of artificially reared insects). Currently in Vienna, IAEA Seibersdorf Laboratory, leader of Medfly

Group (Mediterranean fruit fly rearing, quality, sexing, control).

Haniotakis G. E., Ph.D., University of California, Davis (pheromones; behavior and trapping fruit flies and lepidopterous wood borers; integrated control of olive pests).

Manoukas A.G., Ph.D., Univ. of New Hampshire (nutrition; nutritional ecology and biochemistry of olive fruit fly).

Mazomenos B. E., Dr. Ingr., Univ. of Ghent (fruit fly pheromones, physiology and biochemistry; pheromones of lepidopterous corn pests).

Tsiropoulos G. J., Ph.D., Univ. of California, Berkeley (fruit fly ecophysiology, nutrition, feeding behavior and symbiosis).

Zervas G. A., Dr. Agr., West Berlin Polytechnic (fruit fly behavior, trapping, food attractants; bioecology of lepidopterous olive pests).

#### National Research Foundation

Located in Athens, this foundation is under the jurisdiction of the Ministry of Industry, Energy and Technology. In its Institute of Biology, basic research on the physiology and biochemistry of insects has been carried out the last eight years. Staff members are:

Sekeris C. E., director of the institute. Dr. Med. Sc., Univ. of Munich (induction of specific proteins by ecdysteroids and juvenile hormones in Diptera; developmental aspects).

Dimitriadis G., Dr. Biol. Sc., Univ. of Patra (developmental appearance of specific proteins in the olive fruit fly).

Patrinou-Georgoula M., Ph.D., Univ. of Edinburgh (developmental appearance of specific proteins in the olive fruit fly).

#### Universities

Greek universities do not have departments of entomology. Entomological research, including dissertations, has been carried out mainly in laboratories of applied entomology, biology, zoology, animal parasitology, and human parasitology. The fields of this research, whether basic or applied, depend largely on the specialty and preference of the particular scientists and on the interests of outside financing agencies. Teaching staff doing research with insects are:

1. University of Athens

Lab. of Biology

Aleporou - Marinou B., Ph.D., Univ. of Southampton (biochemical analysis of insect nuclear protein).

Margaritis L. H., Dr., Univ. of Athens (structure and physiology of the egg - shell in Drosophilidae and Tephritidae).

Pataryas Th., Dr., Univ. of Athens (analysis of nuclear proteins in insects).

2. University of Crete

Lab. of Biology

Legakis A., Ph.D., Univ. of Southampton (systematics and ecology of ants; ecology of soil insects in Mediterranean ecosystems; fauna of Crete).

3. University of Patra

a. Lab. of Biology

Christodoulou C., director of the lab., Dr. Biol. Sc., Univ. of Athens (genetics of major haemolymph proteins of the Mediterranean fruit fly).

Chrysanthis G., Dr. Biol. Sc., Univ. of Patra (metabolism and secretion of major haemolymph proteins of the Mediterranean fruit fly).

Kaliapas A. D., Dr. Biol. Sc., Univ. of Patra (isolation, identification and cytochemistry of major proteins of the haemolymph; anatomy and hardening of cuticle of the Mediterranean fruit fly).

Katsoris P., Dr. Biol. Sc., Univ. of Patra (enzymic systems in the Mediterranean fruit fly).

Kefaliakou - Gouradopoulou M. (phylogenetics of tephritid fruit flies).

Lambropoulou M., Dr. Biol. Sc., Univ. of Athens (tyrosine metabolism and hardening of cuticle in the Mediterranean fruit fly; effects of amino acid analogs on the synthesis of proteins and nucleic acids in this insect).

Marmaras V. J., Dr. Biol. Sc., Univ. of Athens (tyrosine metabolism, hardening of cuticle, and function of major haemolymph proteins in the Mediterranean fruit fly; effects of amino acid analogs on the synthesis of proteins and nucleic acids in this insect).

Mintzas A. C., Ph.D., New York Univ. (physicochemical characterization and reg-

ulation of biosynthesis of major proteins in larvae of the Mediterranean fruit fly; vitellogenesis in this insect).

Psarianos C., Dr. Biol. Sc., Univ. of Patra (tyrosine metabolism and cuticle hardening in the Mediterranean fruit fly).

Rina M. C. (vitellogenesis in the Mediterranean fruit fly).

#### b. Lab. of Genetics

Alachiotis S.N., Dr. Biol. Sc., Univ. of Patra (biochemical and evolutionary genetics of *Drosophila melanogaster*).

Kilias G., Dr. Biol. Sc., Univ. of Patra (biochemical and evolutionary genetics of *Drosophila melanogaster*).

Stephanou G., Dr. Biol. Sc., Univ. of Patra (genetics and biochemistry of *Drosophila melanogaster* and Mediterranean fruit fly).

Zacharopoulou A., Dr. Biol. Sc., Univ. of Patra (cytogenetics of *Drosophila melanogaster* and Mediterranean fruit fly).

#### c. Lab. of Zoology

Koutsaftikis A., Dr., Univ. of Saarbrücken (systematics, zoogeography and ecology of Lepidoptera of Greece).

### 4. University of Thessaloniki

#### a. Lab. of Animal Physiology

Theophilidis G., Ph.D., Univ. of Glasgow (neuronal control of leg muscles in Orthoptera).

#### b. Lab. of Applied Helminthology and Entomology

Himonas C. A., director of the lab., Dr. Vet. Sc., Univ. of Thessaloniki (arthropod fauna ectoparasitic on animals).

Haralabidis S., Dr. Vet. Sc., Univ. of Thessaloniki (arthropod fauna ectoparasitic on animals).

Liakos V., Dr. Vet. Sc., Univ. of Thessaloniki (arthropod fauna ectoparasitic on animals).

#### c. Lab. of Applied Zoology and Parasitology

Tzanakakis M. E., director of the lab., Ph.D., Univ. of California, Berkeley (olive fruit fly reproduction, rearing, and control with symbiotoxicides; ecology of insect diapause).

Katsoyannos Byron I., Dr. Sc. Techn., Federal Polytechnic of Zürich (fruit fly behavior, biology, ecology and control, esp. of

cherry, olive and Mediterranean fruit flies).

Koveos D. S. (biology and ecology of olive fruit fly and Tetranychid mites, with emphasis on diapause).

Papadopoulou - Mourkidou E., Ph.D., Univ. of California, Riverside (pesticide residue analysis and methods development; pesticide structure - activity relationship).

Prophetou - Athanasiadou D. A., Dr. Agr. Sc., Univ. of Thessaloniki (biology and ecology of olive insects, with emphasis on diapause; control of olive fruit fly with symbiotoxicides).

Savopoulou - Soutani Mathilde, Dr. Agr. Sc., Univ. of Thessaloniki (biology and nutrition of grape berry moth and other Lepidoptera).

Stamopoulos D. C., Dr. Ingr., Univ. of Tours (ecology and biology of insects of stored products; bacteria occurring in insects).

#### d. Lab. of Forest Protection

Kailidis D. S., director of the lab., Ph.D., Michigan State Univ. (ecology, biology and control of forest insects; surveying of insects of coniferous and oak trees; outbreaks of bark insects in natural and planted forests of Greece).

Markalas S., Dr. Forstw., Univ. of Göttingen (ecology, biology and control of forest trees, especially of the pine processionary caterpillar; insects attacking coniferous trees after forest fires).

#### e. Lab. of General Biology

Kastritsis C.D., director of the lab., Ph.D., Univ. of Texas, Austin (cytogenetics, population and developmental genetics of *Drosophila*).

Dimitriadis V., Dr. Biol. Sc., Univ. of Thessaloniki (*Drosophila* gut structure, function and development).

Manousis A., Dr. Biol. Sc., Univ. of Thessaloniki (characterization of viruses pathogenic to insects).

Mauragani - Tspidou P., Dr. Biol. Sc., Univ. of Thessaloniki (cytogenetics of *Drosophila*, hormonal regulation of gene action).

Scouras Z. G., Dr. Biol. Sc., Univ. of Thessaloniki (cytogenetics of *Drosophila*, polytene chromosomes, puffing).

Thomopoulos G. N., Dr. Biol. Sc., Univ. of Thessaloniki (*Drosophila* salivary gland structure, function and development).

Triantaphyllidis C. D., Dr. Biol. Sc., Univ. of

- Thessaloniki (population genetics of *Drosophila*).
- f. Lab. of Sericulture and Apiculture
- Ifantidis M. D., director of the lab., Dr. Agr., Univ. of Bonn (apiculture, biology and control of the *Varroa* mite).
- Pappas N. (apiculture, control of the *Varroa* mite).
- Thrasylvoulou A., Ph.D., Pennsylvania State Univ. (apiculture, control of the *Varroa* mite, pesticide residues in hive products, analysis of honey).
5. Athens School of Hygiene
- Lab. of Parasitology, Entomology and Tropical Diseases
- Voyadjoglou-Samanidou A., M.Sc., Washington State Univ. (insects of medical importance; protozoa and fungi in house flies from various locations; head louse surveys in children).
6. College of Agriculture of Athens<sup>2</sup>
- a. Lab. of Agricultural Zoology and Entomology
- Pelekassis C. E. D., director of the lab., Dr. Agr. Sc., Univ. of Thessaloniki (biology, ecology and control of insect and mite pests of olive, citrus and cereal crops). Retired as of 31 Aug. 1985.
- Emmanouel N. G., Ph.D., University College of Dublin (systematics and bioecology of mites of economic importance).
- Lykouressis D. P., Ph.D., Univ. of Reading (aphid population dynamics; natural enemies of aphids).
- b. Lab. of Ecology and Environmental Science
- Karandinos M. G., director of the lab., Ph.D., North Carolina State Univ. (ecology and reproductive isolation of Sesiidae; populations of soil and litter arthropods of pine groves in air - polluted areas; behavioral ecology of the pine processionary caterpillar).
- Flogaitis E., Dr. 3e c., Univ. of Paris (populations of soil and litter arthropods of pine groves in air - polluted areas).
- c. Lab. of Genetics
- Krimbas C. B., director of the lab., Dr. Biol. Sc., Univ. of Athens (population genetics of *Drosophila* spp.).
- Loukas M., Dr. Agr. Sc., College of Agriculture of Athens (population genetics of *Drosophila* spp. and of Tephritid fruit flies).
- Tsacas S., Dr. Agr. Sc., College of Agriculture of Athens (population genetics of *Drosophila* spp.).
- Vergini Y., Dr. Agr. Sc., College of Agriculture of Athens (population genetics of *Drosophila* and of Tephritid fruit flies).
- d. Lab. of Sericulture and Apiculture
- Santas L. A., director of the lab., Dr. Agr. Sc., College of Agriculture of Athens (breeding and diseases of the silkworm; honeydew - producing insects; pests of the honey bee).
- Papadopoulou - Batzaki D. G. (sericulture and apiculture).
- Museums and collections
- The Goulandris Museum of Natural History, located in Kifissia, a northern suburb of Athens, houses important collections of Greek macro - and micro - Lepidoptera, Neuroptera, Trichoptera and Coleoptera. In addition to Greek systematists employed by the Museum, a number of foreign entomologists led collecting expeditions in the Greek mainland and the islands, and /or studied material at the museum. Annotated lists of identified species have been published in the Annals of the Museum.
- Another important collection is housed in the Benaki Phytopathological Institute. It contains approximately 25,000 specimens of various orders and is especially rich in Hemiptera, Lepidoptera, Coleoptera and plant pest species. Annotated lists of identified species have been published in the Annals of the institute and in other journals.
- Collections of forest insects are housed in the Laboratory of Forest Protection of the University of Thessaloniki, and in the Athens Forest Research Institute. Information is scant on smaller collections in other university laboratories and research institutes.

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KEY WORDS: Entomology research in Greece, Research institutes in Greece, Greek entomologists

## Εντομολογική Έρευνα στην Ελλάδα - Μια Σύντομη Αναφορά

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### ΠΕΡΙΛΗΨΗ

Μετά από μνεία των πρώτων ερευνών ξένων επιστημόνων που αφορούσαν τη συλλογή, προσδιορισμό και καταγραφή των εντόμων και συγγενών τους αρθροπόδων της Ελλάδας τον περασμένο αιώνα, αναφέρονται οι πρώτες προσπάθειες και η σχετική νομοθεσία για την ίδρυση των ιδρυμάτων στα οποία ξεκίνησε η εντομολογική έρευνα στην Ελλάδα. Ακολουθούν οι τομείς που κυρίως κάλυψε η έρευνα αυτή πριν και μετά τον 2ο Παγκόσμιο Πόλεμο. οι πηγές χρηματοδότησης της έρευνας αυτής, τα περιοδικά όπου κυρίως δημοσιεύτηκαν και δημοσιεύονται τα αποτελέσματα της έρευνας που αφορά έντομα και, τέλος, τα ερευνητικά και ανώτατα εκπαιδευτικά ιδρύματα όπου γίνεται εντομολογική έρευνα σήμερα, με μνεία των ειδικευμένων σ' αυτά ερευνητών και των κυριότερων τομέων ερευνητικής δραστηριότητας του κάθε ερευνητή.