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BIOLOGICAL SCIENCES DIVISION

DIRECTIONS OF SYSTEMATIC ENTOMOLOGY IN THE PHILIPPINES

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ABSTRACT

A brief history of the development of systematic entomology in the Philippines is presented. Early collections, descriptions and nomenclature of Philippine insects were done by foreigners, mostly from Great Britain, Germany and the United States of America. Japanese workers on Philippine materials came much later starting in the 1960s.

It was only after World War II (1950s) that Filipino taxonomists/systematists began to study groups of economically important insects and mites. Twelve to fifteen systematists in the entire country have their respective specializations but these experts could not study all of the 20,000 or more species of insects and mites existing in the country.

The orders of insects are tabulated together with the number of species and subspecies under each order. Priorities in future studies should be in orders Coleoptera, (beetles and weevils) and Lepidoptera (moths). Other recommendations and are enumerated.

The most critical problem is how to attract, train and nurture promising scientists who will be the future insect systematists.

INTRODUCTION

A review of taxonomic works on Philippine insects reveals that Europeans were the first to collect and preserve, then name and describe new species based on materials collected by adventurous voyagers and resident collectors during the 18th and 19th centuries. They were mostly British and Germans, also Spanish,

Italian, Swedish, French and other nationalities. Now many museums in Europe have a wealth of Philippine materials recently collected from various islands in various habitats.

During the American regime (1898-1946), two workers pioneered in the collection and study of certain groups of insects. The first was W. Schultze who was a coleopterist and curator of insects of the old Bureau of Science in Manila. In 1915, he published a Catalogue of the Coleoptera of the Philippine Islands. In 1928, he estimated that about 10,000 species of insects were known and that the total number would probably be around 25,000. The other was Charles F. Baker who was based in the University of the Philippines in Los Baños. He was the second dean of the College of Agriculture (1917-1927) and although an agronomist by training, he did extensive collecting of all groups of insects in nearby Mt. Makiling and Mt. Banahaw, also in many islands, with the help of a Cuban collector. He published on braconid wasps an certian groups of hoppers (Homoptera). Baker accumulated a huge collection of insects not only from the Philippines but also in neighboring islands such as Borneo, Java, Sumatra and Singapore. In 1927 when Baker died, his collection was bequeathed to the U.S. National Museum of Natural History in Washington, D.C. Researchrs on Philippine insects should examine this pre-war collection because all museums in the Philippines were destroyed in the last world war. The two specialists, Schultze and Baker, described many new species and were responsible for sending out materials to various specialists in Europe and the United States.

The only extant pre-war collection of insects is that of the late Julian Jumalon. He was a fine arts graduate of U. P. and butterfly collecting was his hobby. His butterfly collection is well cared for by his son, Osman.

Taxonomic contributions of Filipinos began in the 20th century around 1930, but mostly on Diptera of medical importance, such as C. Manalang on Phlebotomidae (1930-1931), F. del Rosario on Psychodidae (1936), F. Baisas (1931-1947, 1974) and J. Mendoza (1941-1954) on Culicidae.

Dr. Leopoldo B. Uichanco, regarded as the father of entomology in the Philippines, majored in agronomy as an undergraduate. He did a master's thesis on plant galls and he found out that these abnormal growths were caused by insects such as thrips (Thysanoptera) and psyllids or jumping plant lice (Homoptera). This work was published in the Philippine Journal of Science in 1919. His taxonomic interest was on aphids, cicadas and butterflies.

In 1949, Uichnaco offered for the first time the course in insect taxonomy when I decided to major in this subject. Later on, around the 70's, insect taxonomy became a required course for all entomology majors. Other taxonomic courses offered in the Department of Entomology at U.P. Los Baños are advanced insect taxonomy, taxonomy of immature iosects and special problems for those interested in certain orders or specific groups of insects.

To date (2001) after 93 years of existence, the Department of Entomology at U.P. Los Baños has had only 700 Entomology graduates. Out of these, only 24 or

3.3% majored in taxonomy/systematics. Those who did a thesis in taxonomy were 2 B.S.A. graduates, 15 M.S. and 6 Ph.D. graduates. Nine Filipino taxonomists obtained the M.S. and Ph.D. degrees abroad, but two did not return.

Systematic entomology has never been a popular subject among biology and agriculture students. In fact, after having been introduced to the basic course in taxonomy, the students have to collect, mount, label, and preserve specimens that vary in size from large to small or microscopic. Then comes the difficult task of sorting and classifying into the different orders and getting acquainted with the common families. This can be achieved only after consulting many books, manuals, and field guides on how to recognize the different kinds of insects and arthropods. Going through these field and laboratory experiences and working with many small specimens and so many scientific names to remember - all these can be very discouraging and tedious to a neophyte entomologist.

For more advanced students and researchers who intend to specialize in certain groups of insects, review of literature starts with the year 1758. Our libraries in the Philippines do not have the necessary books or monographs and journals needed by the specialists so that the practice is to acquire your own set of literature depending on the group you work on. The advancement of systematic entomology in this country has been very slow because of this deterrent. But now, with advances in information technology, retrieval of references and storage of data especially with the project on the biodiversity of insects and other arthropods could be enhanced.

Inventory of Philippine Insects

It took ten years (1953-1963) to prepare my Catalogue of Philippine Hymenoptera with no government support whatsoever. Its completion and publication were made possible with a one-year fellowship grant and a publication subsidy from John Simon Guggenheim Foundation, New York, U.S.A. It was published in the Pacific Insects Monograph Series No. 8; 446 pp. (1966). A bibliography from 1758 to 1963 was included.

In 1976, Dr. Victor Gapud and I envisioned to do an Inventory of Philippine Insects. The National Research Council of the Philippines (NRCP) did not hesitate to support the project and funding was extended to five years. Dr. Gapud was assigned to work on apterygotes (or primitively wingless insects), the exopterygotes (meaning insects that have three life stages, namely: egg, nymph or naiad, and adult) and the big order of Coleoptera. Dr. Venus Calilung and her associate Mr. Ireneo Lit Jr. were requested to compile the superfamilies Aphidoidea and Coccoidea in the suborder Homoptera, order Hemiptera. So much data have been accumulated but no portion of the inventory in the above-mentioned group has been published except for the order Thysanoptera (thrips) which was catalogued by Dr. Cecilia P. Reyes in 1997 based on her Ph. D. thesis done in the University of Alberta, Canada and published in 1994. My assignment in this enormous

undertaking is to tackle the endopterygote orders except Coleoptera (those that undergo four stages, namely: egg, larva, pupa and adult). Completion and publication of two volumes of the Inventory was made possible by the joint support of the University of the Philippines Los Baños (UPLB) and the National Academy of Science and Technology (NAST) in Bicutan, Metro Manila. Volume I contained five orders: Neuroptera, Strepsiptera, Siphonaptera, Trichoptera and Diptera. Volume II is about Lepidoptera (butterflies and skippers). Volume III will update the order Hymenoptera. Hopefully, this will be published soon. The last portion of my commitment is Volume IV, Order Lepidoptera (moths).

Table 1 entitled "Species inventory of Philippine insects" presented here had its beginning with the 1976 NRCP project. As of the year 2000, this table gives a total of 20,940 species of insects with 14,625 endemics or an overall endemicity of 69.8%. Out of the 27 insect orders known in this country, 17 orders have endemism above 50% with three orders having endemicity above 90% (Trichoptera or caddisflies, 96%; Plecoptera or stoneflies, 93%; Strepsiptera or twisted-winged flies, 91%); followed by Phasmatodea or stick insects, 86.5% and Coleoptera or beetles, 79%, etc.

Insect Collections and Museums

Insect collection in universities or colleges, institutes, museums or private collection are repositories of specimens collected from different biogeographic zones of the Philippines. These collections are indispensable for biodiversity information needed by personnel or educators involved in the conservation of flora and fauna.

A museum of natural history should also function as a research institution and not merely to house specimens accumulated through the years or to display exhibits of preserved or live specimens.

All insect collections and museums were burned during World War II except for the Jumalon butterfly collection in Cebu. The earliest specimens available are probably those collected by Dr. Uichanco in 1946 or 1947 when classes resumed in U.P. Los Baños.

Researchers, educators and students will find the following list of insect collections and museums in the Philippines useful.

LUZON

1. National Museum
   Zoology Division, Entomology Section
   Manila
2. Bureau of Plant Industry (BPI)
   Research Division, Entomology Section
   San Andres, Manila

Table 1. Species Inventory of Philippine Insects

Order	Family	Genera	Species	Endemics	&Endemicity
DIPLURA	1	1	1	1	100.00
COLLEMBOLA	6	28	44	20	45.45
ARCHAEOGNATHA	1	2	2	0	0
THYSANURA	2	6	6	1	16.70
EPHEMEROPTERA	7	15	23	13	56.30
ODONATA	15	87	291	198	68.00
BLATTODEA	14	43	99	54	54.50
ISOPTERA	3	17	54	44	81.50
MANTODEA	5	19	42	26	61.90
ZORAPTERA	1	1	1	1	100.00
DERMAPTERA	8	39	127	73	57.50
PLECOPTERA	3	5	14	13	92.90
ORTHOPTERA	12	195	451	341	75.60
PHASMATODEA	5	50	207	179	86.50
EMBIOPTERA	1	1	2	1	50.00
PSOCOPTERA	16	31	84	58	69.00
PHTHIRAPTERA	11	62	136	50	36.80
THYSANOPTERA	2	89	187	73	39.00
HEMIPTERA	77	1000	2566	1557	60.10
COLEOPTERA	87	1567	7375	5840	79.20
STREPSIPTERA	5	11	23	21	91.30
NEUROPTERA	8	41	88	59	76.00
SIPHONAPTERA	5	17	24	12	50.00
DIPTERA	78	747	2884	1639	56.80
TRICHOPTERA	16	55	319	306	95.90
LEPIDOPTERA	52	1185	2901	1808	62.30
HYMENOPTERA	58	871	2989	2237	71.50
TOTAL	**499**	**6,185**	**20,940**	**14,625**	**69.80**

Part of status report of the Arthropod Working Group headed by Dr. Victor P. Gapud on the Biodiversity of Philippine Arthropods, December 2000.

3. College of Public Health (formerly Institute of Hygiene)
   Department of Parasitology, U.P. Manila
   Pedro Gil St., Ermita, Manila
4. Justin Nuyda Butterfly Collection
   94 Aguirre Avenue, BF Homes
   Parañaque City, Metro Manila
5. Museum of Natural History (MNH)
   Insect Collection in the Department of Entomology
   3rd Floor BIOSCIENCE Building, U.P. Los Baños
   College, Los Baños, Laguna

6. International Rice Research Institute
   Department of Entomology Insect Collection
   College, Los Baños, Laguna
7. Philippine Rice Research Institute (PhilRice)
   Muñoz, Nueva Ecija

VISAYAS

8. Julian Jumalon Butterfly Collection
   34 Macopa St., Mambaling
   Cebu City, Cebu
9. San Carlos University Museum
   Biology Department Insect Collection
   Cebu City, Cebu
10. Visayas College of Agriculture (VISCA)
    Department of Entomology Collection
    Baybay, Leyte

MINDANAO

11. Central Mindanao University
    Department of Biology Insect Collection
    Musuan, Bukidnon

It is pathetic to say that there are more collections of Philippine insect abroad (Europe, United States and Japan) than we have in our possession.

The Guidelines and Code of Ethics in the Collection of Biological Specimens as proposed by the Biological Division of NAST in cooperation with other government agencies (DENR, DA-Fisheries, U.P. and National Museum) were approved and implemented in 1991.

Some foreigners complied with the requirements but the more cunning ones enter the Philippines as tourists or enter through the backdoor. Others obtained Philippine specimens without coming here. Local collectors are hired by foreigners and collector's compensation depends on the number of specimens sent abroad.

The airports, seaports and post office in the main cities should be alerted to watch smuggling of biological specimens by foreigners who arrive as tourists.

Local Workers on Philippine Insects and Their Expertise

1. Ballentes, Myrna — **Coleoptera:** Chrysomelidae: Hispinae
   Department of Entomology
   Central Mindanao University
   Musuan, Bukidnon, Mindanao

2.	*Baltazar, Clare R. Department of Entomology U.P. Los Baños College, Laguna, Luzon	**Hymenoptera:** (parasitic wasps) Braconidae, Icheneumonidae
3.	Barroga, Grace Department of Entomology U.P. Los Baños College, Laguna, Luzon	**Coleoptera:** Chrysomelidae: Galerucinae
4.	*Calilung, Venus J. Department of Entomology U.P. Los BañosCollege, Laguna, Luzon	**Hemiptera:** Homoptera, Aphididae, Psyllidae
5.	Cayabyab, Bonifacio National Crops Protection Center U.P. Los BañosCollege, Laguna, Luzon	**Lepidoptera:** Rhopalocera (butterflies)
6.	Eusebio, O. L.Technician Museum of Natural History U.P. Los BañosCollege, Laguna, Luzon	**Phasmatodea:** (stick insects) PhasmatidaeA German specialist co-authored Eusebio's 3 new species of stick insects.
7.	Fegelan, Leab R. Department of Crop Protection Central Luzon State University Muñoz, Nueva Ecija	**Diptera:** Drosophilidae
8.	Gapud, Victor P. Department of Entomology U.P. Los BañosCollege, Laguna, Luzon	**Odonata** **Hemiptera:** (water bugs, shield bugs) **Coleoptera:** Coccinellidae (lady beetles)
9.	Lit, Ireneo, Jr. Museum of Natural History U.P. Los BañosCollege, Laguna, Luzon	**Hemiptera:** Homoptera: Coccoidea
10.	Navasero, Mario V. National Crop Protection Center U.P. Los BañosCollege, Laguna, Luzon	**Hemiptera:** Homoptera: Psylloidea (jumping plant lice)
11.	Nuyda, Justin 94 Aguirre Avenue, BF HomesParañaque, Manila, Luzon	**Lepidoptera:** Rhopalocera (butterflies)

* *Retired*

12.	Raros, Leonila C. Department of Entomology UP Los BañosCollege, Laguna, Luzon	**Acarina:** predatory Phytoseiidae Cunaxidae, Cheyletidae and Raphignathoidea; also suborders Tetranychoidea, Acaroidea Oribatida
13.	** Rimando, Leo Formerly Department of Entomology UP Los Baños College, Laguna, Luzon	**Acarina:** Tetranychidae
14.	Recuenco-Adorada, Jesamin UP Los BañosCollege, Laguna, Luzon	**Coleoptera:** Coccinellidae (lady beetle)
15.	Reyes, Cecilia P. Emilio Aguinaldo College Manila, Luzon	**Thysanoptera:** (thrips)
16.	Reyes, Stephen G. Department of Entomology UP Los BañosCollege, Laguna, Luzon	**Hymenoptera:** (bees)
17.	Sumalde, Augusto Museum of Natural History UP Los BañosCollege, Laguna, Luzon	**Hemiptera:** Homoptera: Aleyrodidae (white flies)
18.	Cagampang-Ramos, Adela Private Consultant Caloocan City, Metro Manila, Luzon	**Diptera:** Culicidae (mosquitoes)
19.	**Delfinado-Baker, Mercedes Alabang HillsMuntinlupa, Metro Manila, Luzon	**Diptera:** Culicidae, Simuliidae (backflies) Ceratopogonidae (biting midges)

** *Retired and no longer active in systematics*

Notes and Recommendations

1. **Regarding collection, preservation and storage of specimen**
   a. Identify areas or location not reached nor sampled by collectors.
   b. Explore funding agencies willing to support collecting expeditions to be organized by a government institution.
   c. Enforce the rules and regulations imposed on visiting entomologist or collectors of biological specimens so that they could share the collections with local counterparts.
   d. For a humid country such as ours, efforts should be exerted to preserve specimens against infestation of museum pests such as insects and molds.

e. Establish a reference collection (meaning specimens are identified to genus and species level) for all 27 orders of insects.
f. Type specimens should be deposited in one museum agreed upon by curators of insects in the Philippines. A list of type specimens of Philippine species scattered in various museums here and abroad should be compiled giving the following data: name and author of species, date published, publication, sex of specimen, locality, year or date collected, collector, and place of depository.

2. **Regarding visualization equipment**
   a. Stereoscopes and microscopes witb higher magnification are needed.
   b. Have enough computers for museum use.
   c. Have a good camera and accessories for photomicrography.

3. **Regarding inventory of unfinished insect orders (20) and mites**
   a. Try to publish the small orders where data are complete.
   b. For the exopterygote orders of insects, the information on species biodiversity may be made available if a checklist be prepared and published soon. This holds true for the mite group now totaling 1,117 species which are known only to our specialist, Dr. Leonila Raros.
   c. Published inventories should be in CD's.

4. **Regarding taxonomic literature**
   a. Establish a taxonomic library with the responsibility of acquiring books and monographs pertaining to Philippine insect fauna; also obtaining reprints or machine copies of articles in journals that published new taxa from the Philippines.
   b. Request authors to donate a copy each of their publications.
   c. Request retiring specialists to donate their private library in order to build up the publications.
   d. Make available translators of foreign written papers for a fee.

5. **Attracting and training specialists**
   a. Scholarships and/or thesis grants should be made available for promising undergraduates and graduate students.
   b. Job opportunities for taxonomy majors should be created. Right now most graduates go into teaching and do research at the same time.
   c. Research priorities should be in the orders Coleoptera, Lepidoptera particularly the moths of economic importance and predatory mites.
   d. The active senior taxonomists should have an understudy to serve as replacement for outgoing or retiring systematists.

CONCLUSION

Although there have been significant accomplishments on Systematic Entomology in the Philippines since the American regime, the challenges outweigh the present prospects. The needs are multifaceted and evidently difficult to attain where,

1. there is dwindling number of experts who are committed to sustain works on systematic entomology;
2. there is unattractive environment for young scientists to pursue a career path in systematic entomology;
3. there is inadequate facilities for both technical and operational to conduct studies;
4. there is meager/no financial assistance for research dissemination in the form of publication of catalogues and monographs;
5. there is dangerous exposure to risk especially during field work ;
6. there is inaccessible or outdated information system;
7. there is ineffective implementation of the Code of Ethics for foreigners to secure from the National Museum in the Manila a permit to collect biological specimens and sign an agreement to share the collection with the government;
8. and on top of it all, the nature of work is tedious and demanding.

The life of Systematic Entomology is at stake, primarily if budding insect taxonomists would not be given appropriate attention and motivation by the Academe and other Institutions responsible for the progress of Systematic Entomology in the country, and eventually the death of Biodiversity study.