

Australian Government

Department of Agriculture, Fisheries and Forestry

Arthropod collections

in the Philippines

Tom Weir and Jacquie Recsei



Australian Government

Department of Agriculture, Fisheries and Forestry



Tom Weir and Jacquie Recsei

Australian National Insect Collection, Commonwealth Scientific and Industrial Research Organisation

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Preface This publication is a result of an AusAID-funded Philippines-Australia Public Sector Linkages Program activity entitled 'Building National Pest Lists to

Sector Linkages Program activity entitled 'Building National Pest Lists to Underpin Agricultural Exports'. The activity is one of a series of projects undertaken jointly by the Office of the Chief Plant Protection Officer (OCPPO) within the Australian Government Department of Agriculture, Fisheries and Forestry, the Bureau of Plant Industry (BPI) of the Philippines Department of Agriculture and the University of the Philippines, Los Baños.

As part of the activity, OCPPO commissioned CSIRO Entomology, Canberra, to survey the arthropod collections of the Philippines to determine the extent, condition and management of these collections. The survey was undertaken between May and July 2006 by Mr Tom Weir, Senior Curator, Australian National Insect Collection (ANIC), CSIRO, Canberra, and Ms Jacquie Recsei, Collection Manager, ANIC. A further goal of the survey was to identify the priorities for assistance necessary to bring these collections up to international standards.

There is renewed interest in these collections (and in collections of plant disease specimens) because durable collections provide a scientific basis for establishing plant health status. The International Plant Protection Commission, which sets global plant health standards on behalf of its members and the World Trade Organisation, recognises that specimen-based pest lists are one of the most reliable indicators of plant health status. Voucher specimens—accurately identified and preserved in reference collections—underpin national pest and disease lists are vital to all countries, including the Philippines, that seek to gain access for agricultural commodities to international markets. They are also essential for developing national quarantine policies and standards. Currently, it is impossible for the Philippines to make efficient use of the plant health data that is scattered across the various collections throughout the country.

The survey of Philippines arthropod collections has highlighted the need to establish a 'national' pest collection, the value of identifying significant reference material for inclusion in such a collection and that priority should be given to developing a national, plant pest database.

The survey reveals that the Philippines collections are potentially rich in plant health information. Furthermore, existing activities such as agricultural extension work, teaching and scientific research provide opportunities for gathering much more information with minimal added cost. Unfortunately, many of these opportunities are being allowed to slip away as specimens and data collected as part of everyday extension work, university teaching and research are discarded.

A number of general observations are possible regarding the arthropod collections described in this publication.

- 1. Recurrent resourcing for consumables, entomological supplies and even necessities such as electricity is minimal or non-existent. Many collections survive only through the extraordinary efforts and financial contributions of dedicated curators and carers.
- 2. Access to the specialist literature that would enable more reliable identification of specimens is generally inadequate.
- 3. Frequently, equipment needed for the processing and identification of specimens is inadequate.
- 4. Few senior administrators of institutions responsible for collections seem to be aware of the relevance of the collections to plant health and trade in agricultural commodities.
- 5. The physical security of most collections is poor. Even some well-known collections, with an important role in documenting the biodiversity of the Philippines, are in danger of being destroyed by the combined effects of humidity, fluctuating temperature, museum pests and neglect.
- 6. Entry of records is in its infancy.
- 7. There is much scope for improvement in the skills necessary for preparing, maintaining and utilising specimens.
- 8. There is little 'networking' among the collections.
- 9. There are few specialist taxonomists.

These observations indicate that very significant challenges lie ahead.

I. D. Naumann Office of the Chief Plant Protection Officer Australian Government Department of Agriculture Fisheries & Forestry Canberra, Australia June 2009

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Corrections and suggested additions

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Introduction

This survey of selected arthropod collections in the Philippines was completed in 2006 and builds on an earlier survey of all of the arthropod collections in South East Asia (Naumann and Jusoh, 2002; Naumann et al., 2003).

The present survey encompasses institutions visited by the 2002 survey along with others identified then or subsequently as holding specimens worthy of inclusion in a 'national pest collection'. Unfortunately, security concerns at the time of the survey in 2006 prevented travel to Mindanao and so a number of potentially important institutions there have not been seen by the authors. These included (after Naumann et al., 2003): Ateneo Davao, Philippines Banana Growers Association, Davao City; University of Southern Mindanao, North Cotabato; Notre Dame University, South Cotabato; Paper Industry Corporation of the Philippines, Surigao, and Central Mindanao University Bukidon. Consideration should be given to including these collections in a future survey to obtain a more complete picture of the overall situation in the Philippines.

Before the collection visits in 2006, the criteria for assessment and a questionnaire were prepared to determine what information would be collected for the collection assessments. As well as distributing the questionnaire in hard copy, it was decided to conduct interviews with staff at the various institutions. This approach proved successful except where the people in charge of the collections were not present. In these cases, hard copy and/or electronic copies of the questionnaire were provided to be completed at a later date. To date, some of these questionnaires have still not been returned.

Institutional contacts and information

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The teaching collection of Benguet State University is located in the buildings of the Institute of Highland Farming Systems and Agroforestry (IHFSA) on the university campus. The collection of 11 000 specimens was started in 1989 and is sourced mainly from student collections. Specimens are mostly taken from crops and their number increases by an estimated 8000 per year. The curator also adds to the collection from time to time. The student collections are used to add new material to the teaching collection and to replace damaged specimens. It is estimated that less than 5 per cent of the specimens would be useful as permanent pest records. Here it must be noted that with adequate training and resources the student collections could easily provide many voucher specimens of vegetable and highland rice crops to a pest species reference collection and database.

The collection is housed in two open-front cabinets containing 21 very large, wooden, glass-topped drawers and two newer cabinets with 15 wooden, glass-topped drawers. There are 90 storage boxes and 30 cardboard and polystyrene boxes, all filled with insects, in addition to these cabinets. The wet collection consists of a carton of miscellaneous glass vials with labelling on the outside and identified no further than to family level. The state of the vials varies and the alcohol level in some is low. The collection is taxonomically arranged.

The collection is in a small room with no space for expansion and there is neither air-conditioning nor pest control. In general, the collection is not in good condition.

Institutional contacts and information

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The Crop Protection Division, previously called the Crop Protection Division of the Department of Agriculture, has broad national responsibilities for the management of insect pests, plant diseases, rodents and weeds. Among other duties, the insect pest management section acts as the central repository of regional, pest data and information, and collects and collates field data to provide national and regional pest profiles. It is well placed to be a central repository for pest collections.

The collection of the Crop Protection Division commenced in 1947 and now comprises about 60 000 pinned specimens of which 75 per cent are of agricultural relevance. Specimens have been acquired from crops throughout the Philippines. It is estimated that about 50 specimens are added to the collection each year and currently there are no regular surveys of crops. The collection includes some quarantine interceptions from an earlier era. It is estimated that only 3000–5000 specimens meet the International Standards for Phytosanitary Measures (IPSM).

Although the collection is not widely known it provides identifications, without charge, for regional staff and quarantine officers. Difficult identifications are sent to UPLB (see below) and may attract an identification fee of 1000 Philippines pesos per specimen. In recent times, few taxonomic specialists have visited the collection of the Crop Protection Division, and currently specimens are not lent out.

Three staff, including one entomologist and two technical staff are associated with the collection, all on a part-time basis.

Publication of pest records is regarded as important but difficult because of budgetary limitations. The division collates pest records received from regional centres. In the past the Division has maintained a card catalogue of this information, and more recently it has progressed to databases of Philippines pests firstly in Microsoft Excel format and now in MS Access. Digitising of pest records is far from complete. The curators recognise the need to receive voucher specimens in order to record new pests and areas of pest activity, and put pests of each crop together in separate, mini-collections.

The collection is housed in 15 large wooden cabinets which are old and do not provide secure storage. There has been some damage by museum pests and mould. The cabinets contain a mixture of drawers and wooden boxes and this, combined with the absence of a unit tray system, renders the collection difficult to manage. Temperature and humidity control is not possible. Air conditioning is run if students or visitors are in the collection area. Fans are run to remove moisture after heavy rains. The collection resides in a large, timber-panelled room, which affords adequate expansion space for the near future.

Recently, a strategic plan has been developed for the collection and additional space secured in an adjacent building. BPI plans to store newly acquired material in these new premises while maintaining the existing collection in its current quarters.

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The collection was started in 1995 for teaching purposes. It has been supplemented by student collections and is now also used in extension work. It is located in a room in a permanent building open to pests. The room has part-time air-conditioning but power is unreliable. It has been damaged by mould and pests and the 2006 typhoon caused most of the collection to be lost—consequently there are only about 600 specimens. The specimens are stored in 13 metal, glass-topped drawers. There are also two store boxes of Pili nut pests and one store box of general crop pests. The standard of mounting is not good and no specimens have been identified below order level, except for the butterflies. Only two of the store boxes contain specimens with labels.

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The College of Agriculture maintains two separate arthropod collections. The main collection is part of the university's museum and is used for teaching, extension and reference purposes. It has recently been relocated on campus. The second collection is used mainly for teaching but also for some extension work. This teaching collection is in an open classroom situation in a building separate to that housing the main museum collection.

Museum collection

This collection consists of insects, weeds, pest molluscs and vertebrates, and was started from student collections. The earliest record is from 1973. It is 90 per cent dry, with pinned material amounting to approximately 12 000 specimens stored in more than 100 wooden drawers with glass tops. There is a small reference collection of tephritid, drosophilid and agromyzid flies identified to species level, verifications having been done by international experts. About

10 per cent of the collection would fit the ISPM pest record criteria-mainly pests from onions, corn, rice and eggplant. The collection is said to grow by about 3000 specimens per year and about 60 per cent are related to crops.

The building is subject to termite damage and has a leaking roof. A fan is often run to keep mould down but it is at the whim of power outages. The building is open to pest entry and light damage to the specimens. Specimens come almost entirely from the Central Luzon area and many originated in student collections submitted for assessment. The collection also includes some dried plant specimens demonstrating insect damage. The collection is used frequently.

Teaching collection

The teaching collection is not in good condition. It consists of 3500 specimens, mainly of pests, contained in 15 metal and 19 wooden drawers and a small number of wet specimens in xylocaine tubes. Some drawers are arranged by crop and some taxonomically. The standard of mounting is poor but there are some useful pest specimens.

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The teaching collection was started in 1970 from student collections and from the collections of the curators when they were students. Because specimens cannot be preserved they are in regular 'turn-over', leading to frequent loss of data sets.

The collection is located in a room of the Department of Agriculture Building. The roof leaks, there is termite damage and the room is not air-conditioned. However, silica capsules are used to control humidity in the storage containers and consequently mould damage is not apparent. There has been some damage to or loss of specimens by psocids and museum beetles. Naphthalene is not used in the drawers. There are approximately 900 specimens, half of which are in ethanol. The collection is stored in 31 glass-topped metal and wooden cases and arranged semi-taxonomically and identified to order, with some identifications to family. Many identifications are incorrect. Labels are underneath the specimens in the drawers and the pins show signs of decay. The butterflies are identified to species but there are no labels on the specimens themselves. The specimens are 90 per cent relevant to agriculture. Three of the cases are devoted to pests of rice, corn and vegetables and another three boxes derive from research on forest arthropods. At least 500 specimens are collected each year and the collection could grow by many more specimens if the forest ecology specimens collected every year were not routinely discarded. The wet collection is stored in rubber-stoppered vials with perishing tops. There are no labels in the vials and the alcohol levels are low.

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The collection is located in the Umali Laboratory Building-Crop and Environmental Sciences Building in the IRRI campus at Los Baños. Several years ago it was estimated there were about 90 000 specimens in the collection which is mostly arranged taxonomically. There is a large arachnid wet collection. The collection comprises principally arthropods associated with rice and includes material from many (mostly Asian) countries.

The collection is well equipped with high quality, entomological cabinets. Some are still unused and are available for expansion. The preparation areas and equipment are of a high standard and specimens are well prepared. The collection has not been visited by taxonomists in recent years. Leyte State University (LSU) Leyte State University Department of Pest Management Biological Museum Visca, Baybay Leyte 6251-A Philippines

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This large collection of plant material, vertebrates and invertebrates was assembled in the large ground floor museum annexe at the Department of Pest Management in 1997–1998 and all arthropod groups are covered. It comprises private collections as well as student and staff collections. Student entomological collections commenced in 1976 when the Department of Plant Protection was established. The collection is mainly used for teaching and reference purposes but is open to everyone for a small cover charge of 5 Philippines pesos—and is said to have 5000 visitors annually. It is estimated that the collection has more than 98 000 specimens including 5000 alcohol specimens and 3500 slides, and grows by about 2,400 specimens a year. Well mounted specimens are generally kept out of the teaching collections.

There is one functioning air-conditioning unit in the reference room. The pinned insect collection shows signs of mould and pest activity. The pins are rusting but it is checked semi-regularly for major pest outbreaks. Naphthalene is used but is often rolling free within the drawer. The standard of labelling is generally quite good in the reference collection.

The display collection is housed in glass-topped display cases with 16 devoted to various crops and pests—fruits, rice, vegetables, stored products and vectors. The displays are covered against light damage when the museum is closed. There are also 19 display cases arranged taxonomically, mostly to family level. In the main reference collection room there are 44 wooden cabinets each with 12 glass-topped drawers and 12 cabinets each with 15 open drawers used to store unmounted material. The teaching collection comprises six cabinets of 12 drawers each and there are 54 store boxes/drawers for teaching and student collections combined. Most of the specimens in the teaching collection are in poor condition.

The wet reference collection contains 3400 vials with crops pests and 600 700 vials of spiders. These are a combination of screw top tubes, rubber-stoppered tubes (some perishing) and rusting screw-top jars, stored in wooden trays. The labelling varies—from inside the tubes to outside the tubes to no labels at all—and the tubes exhibit varying levels of alcohol. The teaching collection has about 1000 tubes with perishing, rubber stoppers and rusting lids, with varying conditions of labelling and alcohol levels.

The collection also has 63 slide boxes of around 3600 acarology slides but there is no longer an acarologist at the university. There is evidence of fungal damage to these slides.

Material is available for loan but is most often used for reference by farmers and students and for technical training purposes in extension work.

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The museum collection is located in the large airy upper hall of the Library of the Batac Campus. The collection of 3200 specimens was started in the mid 1980s and has been supplemented since then by student collections. The collection is derived mainly from the Ilicos Norte region and mostly from vegetable crops as well as rice, cotton and tobacco. The collection grows by approximately 50 specimens per year. There are 12 drawers arranged taxonomically (eight to family and four unsorted) and 17 drawers specific to particular agroecosystems. Eighteen large wall displays, taxonomically arranged, illustrate the insect fauna of Ilicos Norte region. The standard of mounting and labelling is generally good, however the identifications are pinned underneath, rather than on, the specimens themselves. Some pins are rusting. All dry specimens show signs of mould and pest damage but are still generally intact. No naphthalene is present in the drawers. Some specimens are identified to species level but the majority only to family level.

The wet collection consists of screw-top tubes pinned into the drawers. The alcohol is at various levels, labelling is on the outside and specimens are identified no further than to family.

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The National Museum began accumulating its large natural history collections in the early 1900s and today the museum occupies one of three huge, colonialera buildings near Rizal Park in central Manila.

The collection is stored in 14 metal cabinets and five wooden cabinets and consists of a mixture of 104 wooden store boxes, 120 large glass-topped wooden drawers and 404 small glass-topped display cases. Store boxes are either contained in wooden and metal cabinets or stacked about the collection rooms. In some drawers moth balls have been dislodged and roll about freely. Alcohol specimens are stored in heterogeneous domestic jars. There is a fire detector but no sprinkler system.

The collection has been moved from the second floor to the ground floor of this old government building. The two rooms accommodating the collection are very small with one containing the office space. There is inadequate space to curate the collection or prepare specimens. Air-conditioning is available but is switched on only during office hours or when staff are present and humidity levels in the rooms are extremely high.

There is significant damage to specimens (including the labels) and to literature associated with the collection.

The insect collection amounts to an estimated 125 000 specimens—120 000 pinned and 5000 slides. Its scope is the biodiversity of the Philippines including natural and managed landscapes. About 25 per cent of the collection could be of agricultural significance. It was earlier estimated by Naumann and Jusoh (2002) that the collection was growing at a rate of more than 800 specimens annually. Apart from a new slide collection of Thysanoptera deposited recently and some additional butterflies there now appear to be little acquisition. Specimens are generally well prepared and well labelled, although many labels are yellowed with age.

The museum does lend material to bona fide researchers. Visiting specialists do come to study the collections, although bench space is almost non-existent. A move to larger quarters anticipated in 2002, has not taken place.

The public insect display in another of the buildings in the Rizal Park area is not always open and the public section of the museum does not support 24-hour environmental control.

Philippine Coconut Authority (PCA) Philippine Coconut Authority Epidemiology-Entomology Albay Research Centre Banao, Guinobatan Alaby Philippines

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The PCA is under the umbrella of the Department of Agriculture. The collection contains approximately 23 500 specimens of insects associated with coconut and 1500 of them are wet specimens. This collection is well curated, well labelled and well mounted.

The dry collection is housed in seven wooden cabinets, each of eight glasstopped drawers and employs a unit tray system. It is held in an air-conditioned room that also serves as a laboratory for other activities. Two cabinets contain the reference collection arranged taxonomically, with strength in Hemiptera and Coleoptera, and with a few orthopteroids. The specimens are identified to morphospecies and many have been given species names. The other five cabinets contain specimens from surveys of various coconut-growing areas, with material mostly sorted into morphospecies.

The wet collection is located in the same room and occupies one large drawer. Vials mostly have cork tops or screw caps but many have dried out, while others are double-stored in larger bottles and are plugged with cotton wool. The labels are inside the vials. Philippine Rice Research Institute (PRRI) Philippine Rice Research Institute Maligaya Science City of Muñoz Nueva Ecija 3119 Philippines

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The Philippines Rice Research Institute is located near the Central Luzon State University. The institute has undertaken diverse research and extension programs relating to the cultivation and protection of rice and a few key vegetable crops grown alternately with rice. Facilities are modern and laboratories are well resourced.

The room is air-conditioned between 9.00 am and 3.00 pm each working day. The collection is clean. Naphthalene has not been replaced. Pest activity is evident despite regular checks. Currently, the collection is in reasonable order except for the alcohol material, but is not in active use.

Dr Victor Gapud started the collection in 1985 and has had extensive input into the arrangement and identifications of the collection. Miss Lina Flor maintained the collection until 2004. The collection consists of around 13 400 specimens—6000 dry specimens, 5000 wet specimens and 2400 slides. Pinned specimens occupy two high-quality, wooden cabinets donated by the Japan International Cooperation Agency and consisting of well sealed glass-topped drawers. There are 24 boxes of slide-mounted material that appear to contain at least some type material. Specimens are well prepared and labelled, and have been identified at least to order. About 20 per cent of the pinned collection is identified to species and arranged taxonomically.

Material is not available for loan but is often used for reference by farmers, students and for technical training purposes in extension work.

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The mainly teaching collection was started in 1986 when the curator was an agricultural extensionist. It is estimated at about 2000–3000 specimens, 90 per cent of which are related to crops. The collection is growing slowly with student collecting, but only a small portion of specimens collected by students appear to have been incorporated into the main collection.

The collection is located in a room of the Research and Development Building. There is adequate work space and the room is air-conditioned once a week to lower the humidity. The mainly pinned insect collection shows signs of mould and other pest activity. Naphthalene usage is very low.

The collection is stored in 18 wooden glass-topped drawers and there are two smaller boxes with crop beneficials. The wet collection is stored in rubber-stoppered vials and xylocaine tubes. There are no labels on the specimens and the pins are not of museum standard. The student collections are identified to order level only.

The curator keeps two small store boxes with a reference collection identified to family level and in some groups to genus level. All are mounted with stainless steel pins and well labelled.

Material is not available for loan but is often used for reference by farmers and students and for technical training purposes in extension work.

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Museum of Natural History

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National Crop Protection Centre

The National Crop Protection Centre of the Crop Protection Cluster maintains a diagnostic laboratory (formerly known as the Plant Quarantine Support Laboratory) and a collection comprising about 50 wooden store boxes of pinned insects, several dozen vials of alcohol-preserved specimens and two small boxes of slides. Specimens are well prepared and labelled. The laboratory provides identifications across diverse arthropod groups in support of various projects (Naumann et al., 2003).

Department of Entomology

The Department of Entomology provides the most comprehensive, tertiary-level training in entomology in the Philippines, but does not maintain a departmental reference collection as such.

Museum of Natural History

The Museum of Natural History is said to contain about seven separate collections, most of which are housed in various departments scattered over the UPLB campus. The main insect collection is estimated at about 360 000 specimens—150 000 dry, 10 000 wet and 200 000 slides. It contains important

type material. The dry collection is housed in 30 low wooden cabinets, each with 24 glass-topped drawers, and 41 metal cabinets, each with 28 store boxes. Various other store boxes house the student collections, project material and teaching collections. The wet collection consists of tubes of various shapes and sizes of which many are now dry due to perishing rubber stoppers. They are kept in plastic and cardboard dishes in random order and labelling is incomplete. The acarology collection of some 200 000 slides is stored in seven metal cabinets and has recently been moved to the same room as the main collection.

The entire collection is housed in the same building as the Department of Entomology, but departmental staff have no formal appointments as curators of the collection. The collection is showing a build up of dust and substantial damage from psocids, mould and museum beetles. Air-conditioning is sporadic. Naphthalene has not been replaced in the collection.

The library has a large card catalogue listing publications related to entomology regionally, and a large collection of reprints. Approximately 500 mite specimens have been data-based via Notepad and SQRL.

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The Biological Museum was started by Enrique Shoenig and associates in 1952. Some time later, the entomological collection was split equally between the Biological Museum and the private collection of former Professor Julian Jumalon, and the latter is now associated with the butterfly farm at his residence. It is estimated that the collection at the Biological Museum now comprises more than 121 000 specimens, including 120 000 dry specimens and some 1200 wet specimens. The collection at the butterfly farm may be of equal magnitude.

The Biological Museum insect collection is located on the fourth floor of the Department of Biology building on the Talamban Campus of the university. The museum also includes displays of other organisms. By virtue of its elevated location, being air conditioned during daytime working hours and general good airflow, the collection shows little evidence of mould or pests. There are two parts to the entomological collection—a display area and a separate room for the reference collection.

The display area is large and consists of some 72 glass-topped display drawers giving a taxonomic overview of the insect fauna as well as various other themes such as beneficial insects, common pests, mimicry, trade in beetles, insects of medical importance, mosquitoes of Cebu City, insects from various parts of the world, zoogeographic distributions, etc. The labels here are large for display purposes and contain the appropriate data in most cases. Pins are of museum quality and there is naphthalene in all drawers. The identifications are at least to family level, with many to species.

The reference collection, arranged taxonomically, is located in a separate room off the display area. It is housed in 11 large wooden cabinets, each containing 66 glass-topped wooden drawers. The 72 drawers for the display area have come from these cabinets. There are four cabinets of Lepidoptera (mostly butterflies), and one each of Hemiptera, Hymenoptera, Coleoptera, Diptera, Odonata, orthopteroids and mixed exotics. The labelling is good, as are the pins and there are naphthalene balls in each drawer. All of the specimens here are identified to family level, and many to genus or species. Unsorted accessions are stored under each family. The strength appears to be in lepidoptera, Hemiptera and Hymenoptera.

The wet collection is located within the display area in two glass-fronted cabinets, and consists of some 1200 vials sealed with either rubber or plastic push-in or screw tops. Some of the rubber tops are perishing and the alcohol levels are variable. The labels are in the vials and specimens are identified to various levels. More than half of these vials contain spiders.

A database of the specimens has been started with approximately one third of the reference collection and database numbers recorded under the labels of the specimens.

Specimens are not lent out but researchers are welcome to come to the collection and work on the material.

References

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Institutional contacts and information

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