

ENTOMOLOGICAL RESEARCH TOPICS

The idea for this list of research topics was first put forward by Graeme Ramsay at our annual dinner in 1981. Somehow or other the compilation task fell to me; on reflection a seemingly poor choice. Apart from anything else I am amazed at how fast time passes. A large part of the delay in the final appearance of the list was due to my attempts to compile a comprehensive index system. However, I finally realised that most entomologists are a fairly clued-up lot and most can read so I confined myself to a list of the insect and mite species in the topics and supplemented this with an index of hosts, localities, sites and predators.

From time to time it will become apparent that there are some duplications of research topics, a number being found under more than one major subject heading. This was done because of a slightly different emphasis in the titles and they could be categorised in more than one way.

There is every likelihood that some of the topics are already being worked on or that some of the questions have been answered. It would be helpful if anyone is aware of changes of this nature if they could perhaps write to the editor of the WETA and the appropriate correction can be made.

The topics provide subjects for research for a wide range of interests and abilities, from the primary school child to the professional entomologist, and it is hoped that the list will be added to as members of this society find there are gaps that need filling or previously untouched fields that require exploration. In either case could members please let the editor of the WETA know.

Information on most groups and other invertebrates can be obtained from the identification consultants listed in the 'Guide to New Zealand Entomology' Bulletin No. 7 of the Entomological Society of New Zealand.

Finally, my thanks to all those industrious souls who, whilst in varying stages of sobriety, interrupted their annual dinner to provide this extremely useful nucleus of research topics. I feel that no better atmosphere could be found for great minds to be put to work - good food and wines and old friends - what price the sober halls of academe?

Allen Heath
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BIOLOGY AND ECOLOGY

1. General study of Avondale spider needed - particularly development and mating behaviour.
2. General study of Polistes wasp at Whangaparoa needed.
3. Study on the establishment of the American cockroach.
4. Ecology of native cockroaches, especially Celatoblatta commonly found in houses.
5. Ecology of Gisborne cockroach in NZ.
6. Ecology of the Mutillid wasp when the female is found.
7. Maturation times of spiders and the seasonal separation of species - requires trapping in different habitats.
8. Rear out blowfly adults from any carcass from which maggots are taken. Identify carcass and adult flies.
9. Life histories of NZ mosquitoes require study.
10. Study the life cycle in NZ of the domestic tinea moth Tinea, Tineola and Monopis.
11. The life history and biology of the black stink roach, Platyzosteria.
12. Studies on the cytology of NZ wetas e.g. Hemideina crassidens in the North Island has 2 different chromosome numbers.
13. Why are individual island insects larger than individual mainland insects?
14. Study the defoliation ability of the Gum Emperor moth (Antheraea eucalypti).
15. Period of activity of the white butterfly throughout the year.
16. Seasonal activity of ladybirds.
17. Investigate the hosts and population dynamics of the tomato fruitworm, Heliothis (syn. Heliocoverpa) armigera conferta.
18. Study the interactions of mite populations on oaks.
19. Competition of monarch butterfly larvae on swan plant.
20. Ecology and life history of Carposina adreptella on raspberries.
21. Ecology and life history of Eutorna phaulacoma on brambles.
22. Ecology and life history of scale insects on Feijoas and citrus.
23. General biological studies of Protura and Collembola.
24. General biology and life history of Locusta migratoria.
25. Life cycle of giraffe weevil.
26. Food and seasonality of tydaeid mites on shrubs and fruit trees.
27. Biology of tydaeid mites on Pittosporum sp.
28. Biology of Coynocephalus spp. (Orthoptera) on Poroporo.
29. Nesting habits, colony habits and flowers visited by native bees.
30. Biology of Strathmopoda skilloni on native hosts.
31. Phytophagous activity of insects in general.
32. Studies on the seasonal changes in the fauna of compost heaps and the succession of the fauna.
33. Determine the geographic ranges of insects in NZ.
34. Evaluate the place of insects in the diet of birds, fish etc.
35. Preferred hosts and parts of hosts of insects require investigation in relation to time of year and developmental stage.
36. Determine the food components that stimulate or deter development.
37. Study food chains in different habitats in relation to population dynamics.
38. Use light-trapping to identify egg-laying flights of endemic insects in relation to weather fronts.
39. Investigate whatever 'triggers' population changes.
40. Study the habitats of Carabidae larvae.

41. Life table studies of insects on different crops in the home garden.
42. Study the mating, oviposition and overwintering of pests.
43. Examine the effects of sound waves on insect behaviour.
44. Assess the variability of response of individuals to bites of stable fly, sandflies (blackflies) mosquitoes and fleas. Does it hurt at all? Do the bites bleed? Do the bites get itchy? Do the bites come up in big lumps?
45. Studies on the life history, rearing and biology of the mole cricket.
46. Studies on the life history and biology of the katydid.
47. Investigate the life history of Thrips obscuratus.
48. Studies on the absence (or presence?) of native fauna on cultivated indigenous plants.
49. Study the ovarian development of grasshoppers, crickets, various Hemiptera, Homoptera e.g. stink bugs, flatids, the dictyopharid and some mirid bugs.
50. Observations on the copulation, habitats and biology of some common robber flies.
51. Evaluate the relationships between flowering cycle, number and species of insect visitors, performance in seed setting and evaluation of effectiveness of dominant pollinators for alpine plants, native flowers, certain vegetables, crops, fruits and ornamental flowers.
52. General observations on the bionomics and behaviour of parasitic hymenoptera as well as sphecids and phytophagous species.
53. Observations on the behaviour of sphecoid hunting wasps; their prey range and selection; nest construction, seasonal activity and other insect associates.
54. Observations on the behaviour of native bees, together with flower visitation and nesting, etc.
55. Investigate the association of other insects with ants, e.g. commensals, inquilines, parasites, etc.
56. Studies on the distribution and ecology of Mecodema in the Kaimai, Tauranga and Coromandel areas.
57. The life histories, overwintering, rate of survival and predators, etc. of Australian spiders in Auckland.
58. Attempt to rear pasture insects, e.g. Porina, grassgrub, black-beetle, sod webworm complex.
59. Attempt to rear predators and parasites on artificial diets.
60. Studies on the biology and life histories of native and endangered species of arthropods, e.g. wetas, stagbeetles, mites, stick insects, mantids, common grasshopper.
61. Attempt to rear leafroller complex.
62. Study the biology of the earthworm Octolasion cyareum and determine why it is supplanted by other topsoil-mixing species.
63. Study the biology of the subtropical earthworms Amyntas diffringens and A. hupiensis (both can be the dominant topsoil-mixing species in pastures).
64. Compare the growth rates of the earthworm Eisenia foetida with other common species. Does it really grow faster than the others or does it just tolerate muckier food?
65. Make observations on the annual cycle and biology of the earthworm Allolobophora longa.
66. Attempt to develop cell cultures of economically important insect species in NZ.
67. What do sandflies (blackflies) feed on when humans are absent?

68. Make observations on the habitat of larvae of Chaerodes on the seashore.
69. Study the food of insects by examining gut contents.
70. Study protected species of insects, obtaining any information possible.
71. Studies on the stridulation of the large field cricket and its relation to temperature.
72. Studies on the overwintering behaviour of the Monarch butterfly.
73. What is the common earwig feeding on?
74. Make observations on the behaviour of various species of spiders, e.g. Steatoda, Chiracanthum, etc., etc.
75. Make comparative studies on the sounds produced by NZ Orthoptera other than wetas.
76. Investigate rates of development at different temperatures and humidities of NZ Calliphoridae and Muscidae.
77. Studies of spiders in a variety of habitats (e.g. grassland, bush floor) using pitfall traps will give information on the seasonal separation of species, maturation times, etc.
78. Studies on the life history of the Cecidomyidae (? fungal feeders).
79. Make observations on the tick/host associations of seabirds by examining birds 'wrecked' on beaches following storms or prolonged windy weather.

CONTROL (PARASITES, PREDATORS, CHEMICALS)

1. Study insect predation by rodents and lizards by examining their stomach contents.
2. Study insect predation by moreporks by examining insect remains in faecal pellets.
3. Investigate the pathogens of the native insect fauna.
4. Survey the extent of pesticide usage by urban local bodies.
5. Investigate the possibility of biological control of Australian, American and German cockroaches (an egg parasite is known for the latter).
6. Field studies on the effectiveness of bait preparations for cockroach control.
7. Look for parasites of spiders, earwigs, mantids (especially egg batches), Tineids and gall-forming insects.
8. Investigate the possibility for biological control of the green vegetable bug.
9. Investigate the control of Carposina adreptella on raspberries.
10. Investigate the control of Eutorna phaulacosma on brambles.
11. Investigate the control of scale insects on Feijoas and citrus.
12. Study the predation of Tydaeid mites on shrubs and fruit trees.
13. Investigate the possibility for biological control of Scolypopa.
14. Look for natural enemies of Strathmopoda skilloni.
15. Study the predatory activity of insects.
16. Investigate 'companion planting' as an insect control measure.
17. Investigate native plants as a source of insect repellents.
18. Make benefit/cost analyses for specific crop/pest relationships. When does it pay to control?
19. Study alternative insect control methods e.g. physical in place of chemical.
20. Examine how changes in husbandry techniques can affect and effect control of economically important arthropods.
21. Study the place of predatory mites in glasshouse production.
22. Cage and rear parasites of arthropods.
23. Try to recover fungal, bacterial and viral infectious agents of insects.
24. Look for food components that stimulate or deter development in insects.
25. Use of light trapping to monitor the timing and effectiveness of destructive husbandry techniques.
26. Study the mating, oviposition and overwintering of pests, particularly in relation to control strategies not using residual chemicals.
27. Determine the host range of parasitic insects within NZ.
28. Compile records of host/parasite relationships with information on habitat, distribution and seasonal occurrence.
29. Compile prey and host/parasite records of mantids, damsel bugs (Nabidae), some pentatomids and robber flies (Asilidae) and perhaps some ground beetles (Carabidae) or tiger beetles.
30. Studies on the prevalence and species of parasites in caterpillars and many other hosts. Accurate identification of hosts and parasites would limit the range of possibly suitable subjects.

31. A survey of the pathogens of noctuids is required, together with a study of the host range of noctuids.
32. Studies on the predation on eggs and larvae of Sitona.
33. Predation of insects by wasps and how this relates to competition for food of native birds.
34. Studies on the possibility of biological control of sandflies (black flies).
35. Develop a 'do it yourself' kit for pest control.
36. Investigate the existence of pheromones for wasp and household ant control.
37. Investigate the presence of entomophagous predatory nematodes in native bush.
38. Determine the importance of predatory mites for porina, Sitona and other pests in relation to egg predation.
39. Study the resistance of grass grubs (or isolated instances thereof) to diazinon and fensulfothion.
40. Survey of predation of black field cricket.

TAXONOMY AND DIAGNOSTIC

1. Studies on the cytology of NZ wetas. In the NI and Westland Hemideina crassidens has 2 different chromosome numbers.
 2. Recording and analysis of insect sound for taxonomic purposes.
 3. Development and use of computer techniques for taxonomic purposes.
 4. Study of insect larvae in relation to adults and taxonomic keys.
 5. Study of damage as a diagnostic factor.
 6. Establish association between adults and immatures of numerous species or find missing sexes or stages; e.g.
 - (a) Mutillid wasp-female not known. In Auckland it is probably associated with the nests of solitary wasps.
 - (b) Associate the larvae of numerous moths with the adults.
 - (c) Associate the nymphs and adults of various Pentatomatidae.
 - (d) Rearing of larvae and pupae of families given below and careful preservation of larval exuviae and association with the resulting adults of the following families of Coleoptera (these are the ones with numerous species, but other families also need attention):- Carabidae, Staphylinidae, Pselaphidae, Scarabaeidae, Helodidae, Byrrhidae, Elateridae, Anobiidae, Cleridae, Melyridae, Coccinellidae, Lathridiidae, Colydiidae, Tenebrionidae, Melandryidae, Crysomelidae, Cerambycidae, Curculionidae.
- Notes: No expensive equipment needed. Care is required, and provide adequate suitable food and in some cases drinking water. Control moisture to avoid both desiccation and fungi. A stereomicroscope is useful for rearing small beetles. Check with Mrs B. May with regard to Curculionidae (weevils) to avoid a lot of repetition.
7. Taxonomy is needed among:- Collembola; Protura; click beetle larvae; larvae of aquatic diptera and coleoptera; larvae of Carabidae; Sciaridae; Tydaeid mites; Platyzosteria (distinguish the northern species); mites e.g. Uropodoidea and Trombidoidea.
 8. Taxonomic studies on the generic or small family groups of larger attractive insects such as NZ soldier flies or small groups of ichneumonid wasps.
 9. Taxonomic studies on the genera or subfamilies of Hymenoptera or of the Hymenoptera associated with small groups of related hosts e.g. agromyzids, drosophilids etc.
 10. The larva of Conioscinella bodia (Hutton), (Diptera), a common chloropid occurring in pasture and feeding on the stems of grasses, has never been found.

ECONOMIC ENTOMOLOGY

1. Study the defoliation ability of the Gum Emperor moth.
2. Examine Nysius and its relationship to the 'bug wheat' problem.
3. Investigate the damage to clover and germinating seeds caused by the sminthurid collembolan, Bourletiella arvatis.
4. How do true bugs affect lucerne so that conditions are unsuitable for seed set?
5. Carry out pollination studies, e.g. study lucerne and look for alternatives to bees as pollinators.
6. Study and develop breeding aids for economic insects e.g. straws, cages, gorsehedges, to look for alternative pollinators or to provide predators and parasites.
7. Undertake light-trapping to monitor and identify 'invader' species.
8. Undertake light-trapping to study the arrival of possible 'invader' species in relation to weather systems.
9. Undertake pheromone-trapping near ports and airports in order to intercept possible 'invaders'.
10. Monitor dairy, grain and produce stores in order that serious new pests, e.g. Trogoderma variable could be detected or evidence of a breakdown in hygiene requiring treatment could be picked up.
11. Investigate the hosts and population dynamics of Helicoverpa armigera conferta, the tomato fruitworm.

INVENTORIES, SURVEYS, LISTS

Undertake inventories of the insect fauna of various vegetation habitats:-

1. Your own garden.
2. In a nearby reserve (doing plant/host associations or habitat studies).
3. On tree stumps or fallen logs.
4. In regenerating lupin stands.
5. On a marram grass dune.
6. 'Rough' (weedy) patches.
7. Strand plants.
8. Ornamental plants; particularly in regard to what various animals are doing e.g. pollinators, phytophages, predators.
9. Compost heaps.
10. Native plants.
11. Introduced plants.
12. Exotic forests.
13. Estuarine plant communities.
14. Agricultural crops.
15. Horticultural crops.
16. Pittosporum.
17. Astelia; work out food chains.
18. Moss.
19. Lichens.
20. Fungi.
21. Orange peel; insects attracted to it; succession as peel dries out.
22. Leaf axils.
23. Typha stems (overwintering populations of insects).

Make a list of insects found in:-

24. Your house.
25. Dung of various kinds.
26. Bird's nests.
27. Intertidal and strand fauna.
28. Spiders in mason wasp nests.
29. Light traps in relation to seasonal occurrence; types of fauna attracted to different lights; migrant Australian species in coastal areas; time of night species are active.
30. Mosquitoes found in urban and suburban containers.
31. Estimate the number of praying mantis in your garden, backyard or section.
32. Assess the relative abundance of psocids in your house or parts of your house. This is an opportunity to develop a workable enumeration system.
33. List the ticks collected from stranded sea birds.
34. List the blowflies reared out from fly-struck carcasses.
35. List the insects eaten by rodents and lizards by examining the stomach contents.
36. Examine the pellets of moreporks in order to determine the insects eaten.

37. List pollination records for insects.
38. Make lists of insects found on:- different crops in the home garden; different species of related plants e.g. Leptospermum, Nothofagus, Cordyline.
39. Make a list of ground fauna in introduced versus native bush or in agricultural land versus bush, or on lake margins or stream bed versus valley slopes. (Use pitfall traps and transect lines; a number of 'indicator' species could be followed seasonally.)
40. Determine the host range of parasitic insects in NZ.
41. Make surveys of mites in particular areas of habitats.
42. Make a survey of the pathogens of noctuids and a study of their host range.
43. Make a survey of the predators of black field cricket.
44. Make a survey of the food of insects by examining their gut contents.

HISTORY AND SOCIOLOGY

1. A study of entomophobia.
2. Survey of pesticide use by local bodies.
3. History of entomology in NZ.
4. Biographical records of early entomologists; obtain archival material. (Tonnoir's sister-in-law and Mrs Patrick, Tillyard's daughter are still alive in Auckland.)

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This is not an exhaustive list, terms being included only if specifically mentioned in a research topic.

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