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CONTRIBUTIONS TO OUR KNOWLEDGE OF THE HEMIPTEROUS
GENERA DIEUCHES DOHRN (LYGAEIDAE : RHYPAROCHROMINAE),
RHYPODES STÅL (LYGAEIDAE : ORSILLINAE), AND
CHINAMIRIS WOODWARD (MIRIDAE : MIRINAE),
with supporting papers on
OTHER RHYPAROCHROMINAE, ORSILLINAE AND MIRIDAE,
OTHER HEMIPTERA, AND INSECTS IN OTHER ORDERS

APPLICATION FOR THE DEGREE OF
DOCTOR OF SCIENCE

from

MASSEY UNIVERSITY
PALMERSTON NORTH, NEW ZEALAND

by

Alan Charles EYLES

September, 1992

INTRODUCTION

When the applicant was awarded a Sir Walter Mulholland Fellowship in 1966, the opportunity arose for a post-doctoral fellowship at the University of British Columbia, Vancouver, Canada, where Professor G. G. E. Scudder was, and still is, working on the Lygaeid subfamily Rhyparochrominae of the World. Here was the chance to work on a large, difficult genus containing species from many different parts of the world, and thus make a major contribution in this area. The choice was between Dieuches Dohrn and Pachybrachius Mahr because no other genus in the Rhyparochrominae contains anything like the number of species contained by these two genera. The complex genus Dieuches was selected. On account of his teaching and other duties, Professor Scudder's available time for research was not unlimited, and as he put it, it would be a great help to him to have that genus thoroughly revised.

My training has been on Hemiptera, family Lygaeidae, with an M.Agr.Sc. thesis (Massey 1958) on Nysius huttoni (White) - subfamily Orsillinae, and a Ph.D. thesis (University of London, 1962) on some Rhyparochrominae with special reference to their feeding habits.

Before, during and since my time at Vancouver there have been other original contributions by the applicant on Rhyparochrominae (New Zealand and overseas species). Since then I have also published original

contributions on New Zealand Orsillinae and on Miridae.

Thus there are three themes - Lygaeidae : Rhyparochrominae, Lygaeidae : Orsillinae (New Zealand), and Miridae (mainly New Zealand). The three major contributions in this application for the Degree of Doctor of Science (Massey University) are the monograph of Dieuches, the revision of Rhyppodes Stål, and the revision of Chinamiris Woodward (a major work on each theme). There follow supporting papers on each of these themes, plus some supporting papers on other Hemiptera and some on insects in other Orders.

The introduction of each of the three major contributions sets out the aim and importance of the work. Assistance received is listed in acknowledgements. This has also been done in the supporting papers.

Lygaeidae : Rhyparochrominae Theme

Monograph of Dieuches

The monograph of Dieuches is a major contribution to our knowledge of these insects. It describes and keys 131 species, 71 of them new to science. The genus had not been revised as an entity for a complete century. Many early descriptions were inadequate, and there was no key to all the described species in the genus.

The aim of the study was to set limits of the genus, and carefully distinguish Dieuches from closely related genera, as well as to provide accurate drawings, good descriptions and a key to species to facilitate identification. All of the drawings, including habitus draw-

ings (except the frontispiece) were done by the applicant.

Perhaps one of the features of the monograph of Dieuches (and the Rhyodes revision) is the numerical taxonomic analysis. This technique was only beginning to be seriously applied about the time the monograph of Dieuches was published, 1973 (and about a handful of years before).¹

There were some "knotty" problems to solve because of misidentifications and erroneous synonymy in the past - for example, determining what true Dieuches armatipes (Walker) was. All that remains of the holotype is the head, prothorax, first antennal segment and one foreleg (see pages 102-103 and 106-107). For other problems and their solutions (where there was previously confusion with other species) see comments under D.armipes (F.) and its complex, D.patruelis (Stål), D.longicollis (Dallas), D.alternatus Horvath (other records), D.femoralis Dohrn, D.herero Breddin and D.oceanicus (Distant).

The monograph of Dieuches was well received, as indicated in excerpts from some book reviews cited below.

²"This is a model revision of this difficult genus. I find little to fault it. Closely related genera are carefully distinguished from Dieuches. There is a

1 Sokal, R.R.; Sneath, P.A. 1963: Principles of Numerical Taxonomy. Freeman & Co., San Francisco.

2 Pacific Insects 16(2-3): 244, 1974. Book review by the late Dr W.C. Gagné, Hemipterist, Bishop Museum.

checklist of species, synonyms and species formerly included in Dieuches. The work is copiously illustrated ... to help determine the species in question. There are photos of a number of types. Hemipterists having to make accurate determinations in this genus, or to delineate related genera, will find this work indispensable."

¹"... representatives of the genus Dieuches, but attempts at further identification were likely to prove frustrating. This is now no longer true, the present monograph covers the 131 known species (71 newly described) and provides a practical key, careful descriptions, lists of material seen and notes on biology. The whole work exudes a remarkable thoroughness and includes sections on morphological characters, on the numerical analysis of phenetic relationships and zoogeography."

²"This revision of one of the largest and taxonomically most difficult genera of rhyparochromine Lygaeidae will no doubt find its place in most entomological libraries. It is an essential working tool for all who may be called on to identify species of Dieuches, and all those who come to work on them in any areas of their biology, development, cytogenetics, distribution or economics."

 1 Ent. mon. mag. 1974 April-June. Book review by Dr T. R.E. Southwood, Professor of Zoology, Oxford University.

2 J. Australian Ent. Soc. 1975: 14(1): 22. Book review by the late Dr T.E. Woodward, Senior Lecturer in Entomology, University of Queensland.

A major revision such as the monograph of Dieuches will, understandably, not generate further taxonomic publications on Dieuches for a long time, but I believe that it helped generate Malipatil's splendid paper¹ revising the section of the complex genus Pachybrachius, and of necessity of some closely related genera, from the Australian region.

However, the monograph has generated at least the following papers (known to the applicant) on biology and immature stages² (two species), and effect of population density on development, etc., and reproduction,³ in Dieuches. Finally, the male genitalia of two species of Dieuches (and some species in other genera) are described and figured, with a discussion on taxonomically important characters, a key to those species and genera based on male genitalia, and the description of a denticulate area on the parameres believed to facilitate holding during copulation.⁴

 1 Malipatil, M.B. 1978: Revision of the Myodochini (Hemiptera : Lygaeidae : Rhyparochrominae) of the Australian Region. Australian Journal of Zoology supplementary series No. 56: 1-178.

2 Malipatil, M.B.; Kumar, R. 1975: Biology and immature stages of some Queensland Pentatomomorpha (Hemiptera : Heteroptera). Journal of the Australian Entomological Society 14(2): 113-128.

3 Biney, S.H. 1984: A study of the nymphal aggregation of Dieuches femoralis (Heteroptera : Lygaeidae). Insect Science and its applications 5(2): 131-136.

4 Piper, R.G. 1985: The male genitalia of some Australian Rhyparochromini (Hemiptera : Heteroptera : Lygaeidae). J. Australian Ent. Soc. 24(1): 45-56.

The Dieuches study itself also generated the four closely supporting papers, A1 to A4, by the applicant.

Some Further Work Generated by Supporting Papers on other Rhyparochrominae

The paper on the rhyparochromine tribe Targaremini (no. A11), which included a key to the genera of Targaremini of the world and a section on zoogeography, has generated further research publications by another scientist. Malipatil¹ described a further new species of Metagerra White and revalidated M. helmsi (Reuter) which had been synonymised with obscura White by Bergroth in 1916. Much additional material from more recent collecting was available to him enabling discussion on distribution, wing polymorphism, habitat and host plant data. Morphological and distributional evidence revealed that M. distincta Eyles 1967 is only a long-membrane form of M. obscura, and is synonymised with it. Interestingly, Malipatil states in his description of the long-membrane form of obscura "The original description of distincta applies entirely to this form of obscura." This includes prominent punctation on pronotum, scutellum considerably longer than wide, and a tapering apical process on the aedeagus, all of which distinguish it from the short-membrane form (which has on the aedeagus a stout apical process, hooked or strongly flared).

 1 Malipatil, M.B. 1976: Metagerra White (Heteroptera: Lygaeidae); a review. New Zealand Journal of Zoology 3: 303-312.

Malipatil's next paper¹ revises the whole of the New Zealand Targaremini (and, as shown in my paper A11, most of the species and genera of Targaremini occur in New Zealand). He keys genera and species, and describes new genera and species including Geratarma eylesi Malipatil. Millerocoris ductus Eyles had been described on a single incomplete female, and Eminocoris conus Eyles on a single male. As more material of both sexes had since become available enabling the study of genitalia, Malipatil was able to finalise the generic placement of conus. He states that the keel is present in Millerocoris Eyles, but is inconspicuous, and interestingly uses my keel character to key out the two species (keel conspicuous in Millerocoris conus (Eyles) and inconspicuous in Millerocoris ductus). His paper was also partly generated by the earlier work of the late Dr T. E. Woodward describing genera and species of Targaremini. With careful work on the greater number of specimens available, Malipatil has synonymised two of Woodward's subspecies of Regatarma forsteri with the species forsteri, raised three of them to specific status but transferred them to a new genus, and transferred two other species to new genera. Malipatil has published a further paper² on wing polymorphism, spec-

 1 Malipatil, M.B. 1977: The Targaremini of New Zealand (Hemiptera : Lygaeidae); a revision. New Zealand Journal of Zoology 4: 333-367.

2 Malipatil, M.B. 1977: Distribution, origin and speciation, wing development, and host plant relationships of New Zealand Targaremini (Hemiptera : Lygaeidae). New Zealand Journal of Zoology 4: 369-381.

iation and host plants in New Zealand Targaremini.

My papers A11, A13 and A14 began recording and extending the tribes of Rhyparochrominae represented in New Zealand, with descriptions of new endemic species and sometimes genera. These have generated the paper¹ further extending this recording with the finding of the two Australian species Paradrymus exilirostris Bergroth and Grossander major (Gross) in New Zealand.

The paper A13 describing Stizocephalus Eyles, "An endemic genus of Rhyparochromini from New Zealand", helped Professor Scudder to solve a problem. He had a specimen from Barber's collection with a data label "Victoria" and a determination label "Acompus rufipes (Wolff)". It was not that species, but coming from a North American collection it was assumed to be from Victoria on Vancouver Island. This was puzzling because it did not belong in any known genus represented in North America. When Professor Scudder saw the drawings in the applicant's paper he noted the similarity to the problem specimen (which confirmed his suspicion about the Vancouver Island locality), and realized at that point that it may have come from Victoria, Australia. He borrowed the holotype from New Zealand and specimens resembling it from Australian collections. The result was his paper describing six new species

¹ Malipatil, M.B. 1977: Additions to the Drymini of New Zealand (Heteroptera : Lygaeidae). New Zealand Journal of Zoology 4(2): 177-182.

of Stizocephalus from Australia, recording S. brevirostris Eyles 1970 from Australia, and providing a key to the species of Stizocephalus.¹

In paper A14 I publish the first record of the tribe Udeocorini from New Zealand and add to the generic description of Udeocoris Bergroth, particularly as the genitalia had not previously been figured or described. I add a new species, figuring male and female genitalia and describe the brachypterous form as all my specimens were brachypterous. This generated the paper² which describes and figures the fifth instar larva of Udeocoris levis Eyles 1971 and extends the description of the adult in particular by including the macropterous form.

Lygaeidae : Orsillinae Theme

The publications from my Massey thesis on Nysius huttoni have generated further research publications on Orsillinae by the applicant. These are paper number A18 on damage to cultivated Cruciferae, paper A20 on the genus Nysius Dallas in New Zealand, part of the work in paper A21, and the revision and review of Rhy-podes which is the second of the three major contributions to this application.

Paper A20 describes a new species of Nysius, the

1 Scudder, G.G.E. 1975: The genus Stizocephalus Eyles (Hemiptera : Lygaeidae) in Australia. Journal of the Australian Entomological Society 14: 89-95.

2 Malipatil, M.B. 1975: Immature stages of some New Zealand Rhyparochrominae (Heteroptera : Lygaeidae). New Zealand Journal of Zoology 2: 381-388.

smallest in the world collected by me at Franz Josef in the South Island. From the same locality I also collected 35 specimens of Brachynysius convexus Usinger 1942, and later found a fine series of it, including a macropterous male, from nearby Waiho Gorge in the National Museum collection. This confirmed my earlier decision (in paper A15) to synonymise Brachynysius Usinger with Nysius, but revealed characters enabling the revalidation of the species convexus (which I had synonymised with huttoni). In the earlier work only a single paratype female of convexus had been available for study. The three New Zealand species are keyed in paper A20 using the good, simple characters revealed in this study. The late Professor P. D. Ashlock who at that time had recently published his Ph.D. thesis work on a generic classification of the Crsillinae of the world offered to draw the genitalia of the three species, and to provide comments on characters distinguishing Nysius from Rhyppodes and on characters peculiar to New Zealand species of Nysius, so I offered him a coauthorship.

Development of the Rhyppodes Revision Project

From collecting trips it soon became apparent that there were many remarkable new species of Rhyppodes. I collected many of them over some 12 to 14 years, mainly from 1962 to 1973 inclusive, from remote alpine areas with my colleague Mr J. I. Townsend. Twenty-two new species are described and added to the five previously known members. Hudsona anceps (White) is added

by the new synonymy of Hudsona Evans with Rhypodes. A range of characters occurs within the genus, some quite bizzare, making Rhypodes the most remarkable genus in the Orsillinae. Until this study, insufficient species were known for earlier workers to adequately describe the genus Rhypodes or to define its limits.

Each species is figured with a habitus photograph or drawing, line drawings of male and female genitalia (except where only one or two specimens were available), and often of other parts. The 28 known species are keyed. There is an illustrated section on general morphology, which also lists the most useful diagnostic characters. There are further sections on limits of the genus, comments on tribal classification, numerical analysis of phenetic relationships and biology.

One problem involving confusion of three species was solved. R.clavicornis (F.) and R.cognatus Eyles are unusual in that males are narrow and parallel sided. When Usinger¹ stated that pronotal triangles may not be a specific character (for clavicornis) he no doubt intended the form with narrower males (= cognatus). It is unfortunate that until the applicant's review and revision of Rhypodes, through lack of knowledge of the group, Usinger's statement led to some confusion and a tendency to lump everything lacking

 1 Usinger, R.L. 1942: The Orsillini of New Zealand (Hemiptera, Lygaeidae). Transactions of the Royal Society of New Zealand 72: 41-52.

triangles in with clavicornis. The material which Usinger included in clavicornis contained more than one species (see remarks under clavicornis p. 376, cognatus p. 377 and koebelei Eyles p. 388).

Development of the Contributions on the Miridae Theme

The studies on Miridae began when the applicant collected a species of Megaloceroea Fieber in New Zealand which differed from the New Zealand species M. reuteriana White and proved to be M. recticornis (Geoffroy) of Palaearctic and Nearctic distribution. All five species then remaining in Megaloceroea needed to be examined. What started out as a study of New Zealand Stenodemini had to be widened to the Australian region and still further to include two species from the Oriental region.

The resulting paper A23 generated further papers by the applicant on Stenodemini - paper A22 on the male genitalia and tribal placement of the Tasmanian and Australian Protomiris Poppius, and paper A24 a revision of the now near cosmopolitan genus Dolichomiris Reuter, with a revised key to the genera of Stenodemini.

When the applicant was well into this work, Professor J. C. M. Carvalho, from Rio de Janeiro, Brazil visited New Zealand and we worked together for several weeks, deciding from that point to work as a team. In the Dolichomiris paper Professor Carvalho helped with the generic redescription, genitalia drawings of D. linearis Reuter and offered inclusion of a revised key to

the genera of Stenodemini, so that we could publish it as a joint author paper.

Another result of his New Zealand visit was our joint paper (presented by Byles) to the 14th International Congress of Entomology in Canberra in 1972 in which we announced that there are "many more species of Miridae in New Zealand than the 20 at present recorded". Some are in the Deraeocorinae, but a large number are in the genus Chinamiris Woodward (Mirinae).

During the period 1976 to 1985 the applicant was involved with other projects, other than entomology. The joint papers follow on, generated from the New Zealand Stenodemini work (paper A23), describing new species of Miridae from New Zealand. They are a good example of two scientists, who worked together briefly, co-operating at a distance. Paper A25 describes and figures nine new species of Deraeocorinae, with keys to the New Zealand genera and 12 species of Romna Kirkaldy. Paper A26 describes a new genus and species of Mirini from lucerne.

The Chinamiris Revision

The preceding work led finally to the revision of Chinamiris which is the third major contribution of this application. Twenty-nine new species are described, Calocoris laticinctus (Walker) is transferred to Chinamiris and the 31 species now known in the genus are keyed and figured. The wide range of characters, including number and shape of projections (when pres-

ent) on the male genital capsule, now known from the many new species, have enabled limits of this genus to be set. There is an illustrated section on general morphology, a habitus drawing or photograph of each species, figures of the male genitalia of most species, a section on host plants, and maps showing the known distribution of the six most abundant species.

The study showed that the species laticinctus was previously not well known. There had been a handful of attempts to identify it over the years, but there had been some confusion as one or two labels appear on five of the new species of Chinamiris (see top p. 297).

ACKNOWLEDGMENTS

Of the three major contributions, the Dieuches monograph and Rhypodes revision are entirely my own original research work. Acknowledgments of assistance are given in both publications, particularly to Dr J. H. Darwin for running the computer computations for the numerical taxonomic analysis. However, with the Dieuches work, I am indebted to Professor G. G. E. Scudder for valuable groundwork in tracing type specimens and publishing lectotype designations, for use of his photographs of type specimens, and for his encouragement and stimulating discussions throughout the project. Loans of specimens are acknowledged in the book, as are five people who not only loaned specimens (some from personal collecting trips), but provided data on host plants and/or habitats, or other helpful information.

The third major contribution, the Chinamiris revision, is a joint paper with Professor J. C. M. Carvalho (Rio de Janeiro) who is the World authority on the Miridae. I gratefully acknowledge his encouragement and valuable input from his knowledge of all mirid genera. Due to working from a distance his contribution has been about one third of the work.

Supporting papers on Nysius huttoni (Orsillinae) from my M.Agr.Sc. thesis (Massey) and on some Rhyparochrominae from my Ph.D. thesis (University of London) personally thank my supervisors, Mr L. Gurr and Professor T. R. E. Southwood, respectively, for guidance and encouragement; these thanks are reiterated here. Their training set the pattern for the lifetime work on Hemiptera, Lygaeidae and Miridae, presented herein. It was my first supervisor, Mr L. Gurr, who kindled my interest in the Hemiptera. He taught me how to get alongside and observe the animals I was working with, and showed me how to breed and rear these insects. He also taught me how to draw my own illustrations - a feature of most of my papers.

Of the 40 supporting papers, all except 12 are entirely my own original research contributions. In the 12 joint author papers, the applicant played a major role in all stages of the projects, but gratefully acknowledges contributions of coauthors. In the paper on the Cicadellidae and Issidae (Homoptera) of Niue and the Cook Islands, I am indebted to the late Dr R. Linnavuori for his specialist knowledge of these fam-

ilies. I thank Professor R. E. Blackith for his assistance with the statistical work in our paper in Evolution on hybridization in Scolopostethus Fieber (paper no. A10). Finally, in the papers on the fodder crop survey, I thank the late Dr R. A. Cumber for assistance with the planning and field work, and suggestions on presentation, in the first three papers (by Eyles), and also for assistance with sorting, identifications and final preparation of the manuscripts in the fourth to sixth papers (by Cumber and Eyles).

Assistance by colleagues and technical staff of New Zealand Arthropod Collection in collecting and mounting of specimens is acknowledged.

CONTENTS

LIST OF PUBLICATIONS BY A. C. EYLES

The three major works upon which the D.Sc. application is based.

1. Monograph of the genus Dieuches Dohrn (Heteroptera : Lygaeidae). By A. C. Eyles 1973: 465 pp. 337 Figs. Eyles, Christchurch, New Zealand.
2. A revision and review of the genus Rhyodes Stål (Hemiptera : Lygaeidae). By A. C. Eyles 1990. New Zealand Journal of Zoology 17: 347-418.
3. Revision of the genus Chinamiris Woodward (Hemiptera : Miridae). By A. C. Eyles and J. C. M. Carvalho 1991. New Zealand Journal of Zoology 18: 267 - 321. In this joint paper I am the senior author and did two-thirds of the work.

GROUP A Papers directly, or more closely supporting one of the three major works.

Papers directly supporting the Monograph of Dieuches as they needed to be published before the monograph.

- A1. Eyles, A. C. 1968: A new Rhyparochromine genus from Madagascar and Seychelles (Heteroptera : Lygaeidae). New Zealand Journal of Science 11:318-327.
- A2. Hidaka, T.; Eyles, A.C. 1968: Dieuches japonicus new name for Dieuches fuscus Hidaka preoccupied (Heteroptera : Lygaeidae). New Zealand Journal of Science 11: 337-341.
- A3. Eyles, A.C.; Scudder, G.G.E. 1968: Cyrtocnemodon, a new genus of Rhyparochrominae (Heteroptera : Lygaeidae). New Zealand Journal of Science 11: 363-370.
- A4. Eyles, A.C. 1969: The validity of Dieuches occidentalis from Arizona. New Zealand Journal of Science 12: 728-731.

Papers closely supporting the Dieuches work:- other published work on Lygaeidae, subfamily Rhyparochrominae.

Publications from my Ph.D. thesis are marked *.

- A5* Eyles, A.C. 1963: Life histories of some Rhyparochrominae (Heteroptera : Lygaeidae). Transactions of the Society for British Entomology 15: 135-166.
- A6* ----- 1963: Some notes on natural enemies of Lygaeidae (Hem.). Entomologist's monthly magazine 98: 226-227.
- A7* -----1963: Descriptions of the immature stages of five Rhyparochrominae (Heteroptera : Lygaeidae). Transactions of the Society for British Entomology 15: 277-294.
- A8. ----- 1964: The identity of specimens of Scopostethus Fieber and Drymus Fieber (Heteroptera, Lygaeidae) in the Zoological Museum, Oslo, with habitat notes, distributions, and a new record of Trapezonotus desertus Seidenstucker from Norway. Norsk Entomologisk Tidsskrift XII: 219-223.
- A9* ----- 1964: Feeding habits of some Rhyparochrominae (Heteroptera : Lygaeidae) with particular reference to the value of natural foods. Tran-

sactions of the Royal Entomological Society of London 116: 89-114.

- A10† Eyles, A.C.; Blackith, R.E. 1965: Studies on hybridization in Scolopostethus Fieber (Heteroptera: Lygaeidae). Evolution 19(4): 465-479.
- A11. Eyles, A.C. 1967: Two new genera and five new species of Targaremini from New Zealand, with a key to the genera of Targaremini (Heteroptera : Lygaeidae). New Zealand Journal of Science 10: 407-423.
- A12. Scudder, G.M.E.; Eyles, A.C. 1968: A new species of Elasmolomus (Heteroptera : Lygaeidae) from Australia. New Zealand Journal of Science 11: 618-622.
- A13. Eyles, A.C. 1970: An endemic genus of Rhyparochromini (Heteroptera : Lygaeidae) from New Zealand. New Zealand Journal of Science 13: 500-504.
- A14. ----- 1971: A new species of Udeocorini (Lygaeidae : Rhyparochrominae) from New Zealand. New Zealand Journal of Science 14: 252-258.

Papers closely supporting the Rhypodus revision:- other published work on Lygaeidae, subfamily Orsillinae of New Zealand.

Publications from my M.Agr.Sc. thesis are marked +.

- A15† Eyles, A.C. 1960: Variation in the adult and immature stages of Nysius huttoni White (Heteroptera: Lygaeidae) with a note on the validity of the genus Brachynysius Usinger. Transactions of the Royal Entomological Society of London 112:53-72.
- A16† ----- 1963: Fecundity and oviposition rhythms in Nysius huttoni White (Heteroptera : Lygaeidae). New Zealand Journal of Science 6: 186-207.
- A17† ----- 1963: Incubation period and nymphal development in Nysius huttoni White (Heteroptera: Lygaeidae : Orsillinae). New Zealand Journal of Science 6: 446-461.

- A18. Eyles, A.C. 1965: Damage to cultivated Cruciferae by Nysius huttoni White (Heteroptera : Lygaeidae). New Zealand Journal of Agricultural Research 8: 363-366.
- A19† ----- 1965: Notes on the ecology of Nysius huttoni White (Heteroptera : Lygaeidae). New Zealand Journal of Science 8: 494-502.
- A20. Eyles, A.C.; Ashlock, P.D. 1969: The genus Nysius in New Zealand (Heteroptera : Lygaeidae). New Zealand Journal of Science 12: 713-727.
- A21. Eyles, A.C. 1974: Insects: terrestrial bugs. New Zealand's nature heritage 3(34): 953-956.

Papers closely supporting the Chinamiris revision:- other published work on Miridae, mainly from New Zealand.

- A22. Eyles, A.C. 1973: Protomiris transferred to Orthotylinae (Heteroptera : Miridae). New Zealand Entomologist 5(3 & 4): 313-316.
- A23. ----- 1975: Further new genera and other new combinations for species previously assigned to Megaloceroea (Heteroptera : Miridae : Stenodemini). Journal of natural history 9: 153-167.
- A24. Eyles, A.C.; Carvalho J.C.M. 1975: Revision of the genus Dolichomiris, with a revised key to the genera of Stenodemini (Heteroptera : Miridae). Journal of natural history 9: 257-269.
- A25. ----- 1988: Deraeocorinae of New Zealand (Miridae : Heteroptera). New Zealand Journal of Zoology 15: 63-80.
- A26. ----- 1988: A new genus of Mirini (Heteroptera : Miridae) from lucerne crops in New Zealand. New Zealand Journal of Zoology 15: 339-341.

GROUP B Other Hemiptera papers and other entomology papers.

- B1. Eyles, A.C. 1960: Insects associated with the major fodder crops in the North Island. II. Hemipt-

- era. New Zealand Journal of Agricultural Research 3: 994-1008.
- B2. Eyles, A.C. 1971: The family Membracidae (Homoptera) present in New Zealand. New Zealand Entomologist 5(1): 47-48.
- B3. ----- 1970: Hemiptera. pp. 34-37 In Symposium: The present status of taxonomic entomology in New Zealand. New Zealand Entomologist 4(3): 24-61.
- B4. ----- 1971: List of Isometopidae (Heteroptera : Cimicoidea). New Zealand Journal of Science 14: 940-944.
- B5. ----- 1972: Supplement to list of Isometopidae (Heteroptera : Cimicoidea). New Zealand Journal of Science 15: 463-464.
- B6. Eyles, A.C.; Linnavuori, R. 1974: Cicadellidae and Issidae (Homoptera) of Niue Island, and material from the Cook Islands. New Zealand Journal of Zoology 1: 29-44.
- B7. Eyles, A.C. 1960: Insects associated with the major fodder crops in the North Island. I. The general picture. New Zealand Journal of Agricultural Research 3: 779-791.
- B8. ----- 1961: Insects associated with the major fodder crops in the North Island. III. Coleoptera. New Zealand Journal of Agricultural Research 4: 129-140.
- B9. Cumber, R.A.; Eyles, A.C. 1961: Insects associated with the major fodder crops in the North Island. IV. Hymenoptera. New Zealand Journal of Agricultural Research 4: 390-408.
- B10. ----- 1961: Insects associated with the major fodder crops in the North Island. V. Diptera. New Zealand Journal of Agricultural Research 4: 409-425.
- B11. ----- 1961: Insects associated with the major fodder crops in the North Island. VI. Odonata, Orthoptera, Isoptera, Psocoptera, Thysanoptera, Neuroptera, Lepidoptera. New Zealand

and Journal of Agricultural Research 4: 426-440.

- B12. Eyles, A.C. 1965: Observations on some parasites of two Wiseana species (Lep. : Hepialidae). New Zealand Journal of Agricultural Research 8: 951-958.
- B13. ----- 1966: A predator on Wiseana (Lep. : Hepialidae). New Zealand Journal of Agricultural Research 9: 699-703.
- B14. ----- 1973: Prey of the Staphylinid Thyre-
ocephalus chloropterus (Coleoptera). New Zealand Entomologist 5(3 & 4): 341-342.