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THE INSECT COMPLEX OF SOWN PASTURES IN THE NORTH ISLAND

II. THE HEMIPTERA AS REVEALED BY SUMMER SWEEP-SAMPLING

By R. A. CUMBER, Entomology Division, Department of Scientific
and Industrial Research, Palmerston North.

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Summary

A sweep-sampling survey during the summer of 1957 revealed 49 species of Hemiptera in the 9 main pasture types found in the North Island. The identity, distribution, abundance, and possible economic importance of each species are discussed.

INTRODUCTION

During the summer of 1957, a survey of insects associated with pastures in the North Island was carried out. In an earlier paper (Cumber 1958) techniques, coverage, and relevant sample-station details are given, and the insect complex generally as shown by sweep-sampling is analysed and discussed.

The present account gives information in respect of the species of Hemiptera taken during sweep-sampling. The identity of the species, their distribution, and the numbers encountered are shown, and their possible importance in the light of systematic position and known habits is discussed.

The survey involves 113 paddock and 108 adjacent roadside samples each comprising a single sweep from an area of approximately 8 square yards.

Distribution maps for 16 species are presented, the presence of a species being indicated by a solid black circle in contrast to an open ring where sampling failed to reveal its presence.

RESULTS

HEMIPTERA — HOMOPTERA

Fam. JASSIDAE

He. 5. *Erythroneura zealandica* Myers

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Distribution

Myers (1923), in describing this as a new species, states: "This is the common grass-frequenting species, found in large numbers from any grassy places, whether the grass be introduced pasturage or native tussock. It is also common on . . . tauhinu (*Cassinia leptophylla*), taken on mangrove at Whangarei . . . from manuka (*Leptospermum scoparium*) . . . Tararua Range 4,000-5,000 ft." Cottier (1931) records it from many localities in the southern portions of the South Island.

The distribution encountered in the North Island is shown in Fig. 1. It coincides with Myer's distribution of Whangarei to Wellington, and it is seen that the species is more consistently present in the southern portions. Its presence at high altitudes in the Tararua Range indicates its ability to cope with pasture conditions in southern cooler areas.

Habits

Myers reports the species as having been taken after mid-winter, indicating "it is possible that many of our species (Typhlocybinae) are carried over the winter as imagines." Cottier however records "a few adults and plenty of eggs during the winter".

This is certainly one of the more commonly encountered pasture insects in the North Island. It occurred in 52 paddock (984 specimens) and 35 roadside (234 specimens) samples. The maximum population encountered was in a paddock sample from Marton on 27.3.57 which contained 162 adults and 4 nymphs. Adults and nymphs were taken in January, February, and March.

Economic Significance

This species could be of very great importance in pastures, but considerable work would be necessary to prove it. Damage could be caused through mechanical means, toxin injection, or transmission of virus diseases.

The insect is present in considerable numbers. Chlorotic spotting of leaves has been noted by the writer. It is possible that some of the viruses affecting our grasses and clovers are transmitted by this species.

He. 11. *Xestocephalus* sp.

Distribution

The genus is world-wide. Wolcott (1937) records high populations in northern New York State. Tillyard (1926) records it as being common to Australia and New Zealand. The distribution of this species is shown in Fig. 2, where it is seen to occur from the Bay of Plenty southwards.

Habits

These are unknown, as is the identity of the species. It was taken in 6 paddock (37 specimens) and 7 roadside (12 specimens) samples, the maximum catch being 28 adults in the case of a paddock sample



Fig. 1.—Distribution map for the jassid *Erythroneura zealandica*. He. 5.

Fig. 2.—Distribution map for the jassid *Xestocephalus* sp. He. 11.

from Taueru on 25.3.57. Adults were taken in January, February, and March. No nymphs were taken.

Economic Significance

No very high populations were encountered, so at present it would appear that any economic importance is likely to be related to its capacity to transmit virus diseases. It may be shown eventually however, that it is associated with a relatively sparse weed.

He 13. *Thamnotettix* sp.

Distribution

The genus is of world-wide distribution. Quinton (1956) records it from forage crops in Connecticut. Osborn (1939) also refers to pasture- and cereal-damaging species in North America. The distribution of this species is shown in Fig. 3, where it is seen to occur widely in the North Island although it was not taken north of Auckland.

Habits

The species occurred in 19 paddock (249 specimens) and 6 roadside (26 specimens) samples, the maximum number taken being in the case of a paddock sample from Waitoa on 5.3.57 which yielded 23 adults and 88 nymphs. Nymphs are recorded for February and March, and adults for January, February, and March, indicating that the species probably overwinters as adults.



Fig. 3.—Distribution map for the jassid *Thamnotettix* sp. He. 13.

Fig. 4.—Distribution map for the jassid *Thamnotettix* sp. He. 14.

Economic Significance

There is no detailed information on host plants, habits, etc., so that the species is only under suspicion. Populations are considerable, however, and its systematic position makes it a possible virus vector and a species which could cause considerable mechanical or toxic damage under build-up conditions.

He. 14. *Thamnotettix* sp.

Distribution

The same general remarks apply as in species He. 13. The distribution of this species is shown in Fig. 4, which indicates that it occurs throughout the North Island.

Habits

This species was taken in 21 paddock (66 specimens) and 3 roadside (3 specimens) samples, the maximum number being from a paddock sample at Tutira on 11.2.57 which contained 27 adults. Adults were taken in January, February, and March, and nymphs in February and March.

Economic Significance

Host associations are not known, but virus transmission and mechanical and toxin damage are possibilities.

He. 15.

It has not been possible to place this species in a known genus. It was taken from roadside and paddock near Wallingford on 26.3.57 (4 specimens). It is of no economic importance and is probably associated with a pasture weed.

He. 19. *Deltocephalus* sp.*Distribution*

The genus is of world-wide distribution. This species is widely distributed in the North Island as shown by Fig. 5, but did not appear in samples north of Auckland.

Habits

No information on this species is available. It was taken in 20 paddock (197 specimens) and 5 roadside (5 specimens) samples, the maximum catch of 40 adults being in a paddock sample from Greytown on 25.3.57. Nymphs and adults were taken in January, February, and March.

Economic Significance

This genus contains serious pasture pests (Quinton 1956; Osborn 1939), and the high populations met indicate that the species should be regarded with considerable suspicion. There is the possibility of mechanical damage, toxins, or virus transmission.

He. 32. *Edwardsiana australis* (Froggatt) (Australian Apple Leaf-hopper).

Myers (1923) notes this species as occurring in the Auckland, Hawke's Bay, and Nelson orchard areas where it is damaging to the foliage of apple and hawthorn. Atkinson *et al.* (1956) records it as "General throughout apple-growing areas of the country".

A single adult was taken at Wairoa on 12.2.57. The species is not associated with pastures.

Fam. DELPHACIDAE

He. 4. *Delphacodes* sp.*Distribution*

The genus is world-wide occurring in both Australia and New Zealand. This species was taken at Horotiu (23.1.57), Maraekakaho (11.2.57), Napier (11.2.57), Wairoa (12.2.57), Gisborne (13.2.57), Te Matai (4.3.57), and Mangaweka (18.3.57), indicating a general distribution.

Habits

It was taken in 6 paddock (20 specimens) and 4 roadside (10 specimens) samples, the maximum number being 12 adults and 1 nymph in the paddock sample from Te Matai. Adults were taken in



Fig. 5.—Distribution map for the jassid *Deltocephalus* sp. He. 19.

Fig. 6.—Distribution map for the delphacid *Delphacodes tasmani*. He. 7.

January, February, and March, and a single nymph in February. No further information is available.

Economic Significance

Not considered important.

He. 7. *Delphacodes tasmani* Muir

Distribution

This species was described in 1923 from material taken at Waikanae and in the Tararua Range.

The distribution encountered is shown in Fig. 6, which indicates that the species is widespread throughout the North Island.

Habits

Muir gives no information on host plants. In the present survey the species was taken in 15 paddock (29 specimens) and 7 roadside (8 specimens) samples, the maximum population being 9 adults from a paddock sample at Kohinui on 28.3.57. Adults were also taken in January and February.

Economic Significance

This species is not considered to be of importance.

He. 20. *Nilaparvata myersi* Muir*Distribution*

This species was described in 1923 from a single male taken on Mt. Alpha, Tararua Range, at 4,500 ft. In the present survey 2 paddock and 1 roadside samples each yielded a single adult specimen, the localities being Lake Tutira (11.2.57), Gisborne-Tiniroto (12.2.57), and Waikohu (13.2.57).

Habits and Economic Significance

The habits of this species, which is of no economic importance, are not known.

He. 48. *Delphacodes* sp.

A single male was taken in a roadside sample from Wairoa on 5.3.57. No information is available on this species.

He. 49. *Delphacodes* sp.

A single specimen was taken in a paddock sample from Helensville on 23.1.57. No information is available on this species.

Fam. DICTYOPHARIDAE

He. 21. *Thanatodictya tillyardi* Myers*Distribution*

This species was described in 1923 from specimens taken on the Dun Mountain, Nelson, at 3,000 ft. In the present survey it was taken at Whangaroa (17.1.57), Maraekakaho (11.2.57), Rotorua (4.3.57), and Hikateruru (6.3.57), the greatest number taken being 3 in the Whangaroa sample.

Habits

The writer has noticed a close association between this species and bracken fern (*Pteridium esculentum* Hook.) in the far northern areas. This association was also recorded by Myers. However no fern was noted at the above localities with the exception of Whangaroa.

Economic Significance

The species is of no importance in pastures.

Fam. CIXIIDAE

He. 2. *Oliarus oppositus* (Walker)*Distribution*

Myers (1924) indicates that this species is "widespread over both Islands and to an elevation of at least 4,500 ft (Tararua Range)". The writer has collected it from Kaitaia to Wellington (Cumber 1953a) but knows of no records from east of the main ranges running from Wellington to the East Cape. The distribution as indicated by the survey is shown in Fig. 7.

Habits

Myers states that "this species frequents grass and ground herbage". It is probable that the life history closely follows that of the allied species *Oliarus atkinsoni* Myers which has been studied in detail (Cumber 1952a, b). In *O. atkinsoni* there is one generation each year, the adults appearing in spring from nymphs which feed on surface or sub-surface rootlets in small galleries. For this reason, only adults may be taken by sweeping. It appeared in 4 paddock (4 specimens) and 11 roadside (34 specimens) samples, indicating its preference for the longer herbage and relatively undisturbed conditions. The maximum catch was from a roadside sample at Whangaehu on 30.1.57 which yielded 14 adults. Adults are known to occur from November to March.



Fig. 7.—Distribution map for the cixiid *Oliarus oppositus*. He. 2.

Fig. 8.—Distribution map for the aphid *Rhopalosiphum splendens*. He. 38.

Fam. FLATIDAE

He. 35. *Sephena cinerea* Kirk.

Distribution

Myers (1922) describes this species as "an introduced Australian species which carries fireblight." It is widespread throughout the North Island and the north of the South Island. It was taken in the present survey at Levin (31.1.57), Gisborne-Tiniroto (12.2.57) and Taumararui (8.3.57). Only 5 adults were taken.

Habits

These have not been studied in New Zealand.

Economic Significance

This species is an important pest of shrubs and garden plants, but is not important in pastures.

Fam. RICANIIDAE

He. 28. *Scolytopa australis* Walk. (Passion-vine Hopper)

Distribution

This is regarded as an Australian species which has been in the country at least since 1897 (Hutton 1897). It is now widespread in the North Island and the north of the South Island. In the present survey single adults were taken at Uruti (24.1.57), Tutira (11.2.57), Te Matai (4.3.57), and Tauranga (5.3.57).

Habits

This species has not been studied in detail in New Zealand. In Australia it does not occur in dense populations comparable with those met in New Zealand on native vegetation and in gardens and orchards. This suggests that it is controlled in the former country by parasites or predators which do not exist here.

Economic Significance

The species is undoubtedly damaging to trees, shrubs, and garden plants, but is not of importance in pastures. Paterson (1947) incriminated this species in connection with poison honey through its production of contaminated honey-dew when feeding on *Coriaria arborea* Lindsay in central North Island districts.

Fam. PSYLLIDAE

He. 31. *Ctenarytaina pollicaris* Ferris et Klyver

Tuthill (1952) indicates that this species is present in both North and South Islands, its host plant being *Leptospermum ericoides* A. Rich. In the present survey single adults were taken at Kaitaia (16.1.57), Whangaroa (17.1.57), and Wellsford (22.1.57), where adjacent *Leptospermum* was undoubtedly responsible for its presence. It is restricted to its host and is therefore of no importance in pastures.

Fam. APHIDIDAE

He. 8. *Hypermyzus lactucae* (L.)

Distribution

This species is of world-wide distribution. Cottier (1953) records it from Auckland and Cape Terawhiti. In the present survey it was taken at Warkworth (22.1.57), Horotiu (23.1.57), Eltham (24.1.57), Whangaehu (30.1.57), Paekakariki (31.1.57), Hihitahi (18.3.57), and Pahiataua (25.3.57), so would appear to be widespread in the North Island.

Habits

Smith (1931) records it as a pest of lettuce in Europe and as overwintering on currants and gooseberries.

In the present survey it appeared in 2 paddock (10 specimens) and 5 roadside (40 specimens) samples, the greatest number (31) being taken in the roadside sample from Eltham.

Economic Significance

This species is of no obvious importance in pastures, probably being associated with attendant weeds.

He. 8. *Brevicoryne brassicae* (L.)*Distribution*

This species is world-wide. Cottier (1953) states "the species is well distributed over the Dominion". In the present survey it was taken at Warkworth (22.1.57), Piopio (24.1.57), Te Matai (4.3.57), Taumarunui (8.3.57) and Greytown (25.3.57).

Habits

This is the well known aphid associated with cruciferous crops.

Economic Significance

The species is of no importance in pastures. Only 7 specimens were taken and these could be accounted for by drift or the presence of cruciferous weeds.

He. 37. *Myzus persicae* (Sulz.)

Cottier (1953) describes this world-wide species as being "ubiquitous and of much economic importance", and records it from 47 host plants in New Zealand. In the present survey it was taken in 2 samples, Norsewood (11.2.57), 1 specimen, and Whakatane (14.2.57), 3 specimens. There is no information available suggesting that it may be of importance in pastures.

He. 38. *Rhopalosiphum splendens* (Theo.)*Distribution*

Cottier (1953) records this world-wide species from Auckland (*Hordeum*), Palmerston North (*Lolium*), and Mt. Egmont, 4,000 ft (*Psilopilum*).

Fig. 8 indicates the stations at which this species was taken. It was present in 9 paddock (167 specimens) and 3 roadside (3 specimens) samples, the greatest number being 150 in the paddock sample from Marton on 27.3.57.

Habits

Cottier states "This is a rare species in New Zealand and has not yet been reported to cause damage in the field, although it has proved

injurious to grasses under glass". It appears from records that this species tends to build up late in the season.

Economic Significance

It seems likely that this species does cause considerable damage to pastures. Studies late in the season in ryegrass areas should indicate its relative importance.

He. 39. *Rhopalosiphum padi* (L.)

Distribution

This species is world-wide. Cottier (1953) records it from Aramoho (*Gramineae*), Pukekohe (*Hordeum*), Palmerston North (*Lolium*, *Triticum*, *Zea*), Otago (*Avena*), and Taieri (*Phalaris*).

In the present survey it was taken at Eltham (24.1.57), Bulls (30.1.57), Rotorua (4.3.57), Mangapakeha (25.3.57), Marton (27.3.57), and Tarata (2.4.57), the greatest number being an estimated 500 in the sample from Marton. It is thus shown to be widespread in New Zealand.

Habits and Economic Significance

Cottier's remarks are of particular interest. "This species is the common aphid infesting Gramineae in New Zealand. It has been observed severely infesting young wheat about a foot tall. From centres of infestation it spreads in ever widening circles, plants turning yellow and quickly becoming stunted. In the Southland district it has caused similar injury to oats. Although widely distributed the species is, however, seldom a severe pest in the field. It is commonly found on maize, but does not appear to cause noticeable injury. The species is very troublesome on Gramineae grown under glass".

This species is thus suspected of being of importance in pastures, and like *R. splendens* might repay late seasonal studies. In addition to mechanical damage there is the possibility of virus transmission in these common grass-infesting species.

He. 40. *Geoica lucifuga* (Zehn).

This species is world-wide in its distribution. Cottier (1953) records it from the roots of *Danthonia* at Kerikeri. One specimen, an alate, was taken at Opotiki on 14.2.57 in a paddock sample. It is not of economic importance.

He. 41. *Capitophorus elaeagni* (Del Guercio)

This world-wide species has been recorded by Cottier (1953) on *Carduus*, *Cirsium*, *Cryptostemma*, *Cynaea*, *Elaeagnus* and *Silybum*, from widely scattered localities in the North Island and from the north of the South Island. In the present survey it occurred in paddock samples at Whakatane (14.2.57) and Manaia, Taranaki (3.4.57) in small numbers indicating its probable association with weeds. It is of no importance in pasture.

He. 42. *Aulacorthum solani* (Kltb.)

This species is world-wide. Cottier (1953) records it from 38 host plants in widely scattered districts of both Islands. In the present survey a single specimen was taken in paddock samples at Eltham (24.1.57), and Gisborne (12.2.57). It is not of importance in pastures.

He. 43. *Aphis craccivora* Koch

Cottier (1953) records this world-wide species from 11 host plants at widely separated points in both Islands. It is the common black species infesting legumes. One specimen from a paddock sample at Kerikeri (18.1.57) and 2 from a paddock sample at Warkworth (22.1.57) are recorded. It is not of importance in pastures.

He. 44. *Macrosiphum avenae* (F.)

This is a world-wide species. Cottier (1953) records it from Waitakere and Tararua Ranges (Gramineae), Auckland (*Paspalum* and *Secale*), and Palmerston North (*Rhipogonum*). In the present survey single specimens were taken from paddock samples at Opotiki (14.2.57), Coromandel (6.3.57), and Hunterville (18.3.57). It is not of importance in pastures.

He. 45. *Macrosiphum euphorbiae* (Thos.)

This is a world-wide species. Cottier (1953) records it on 46 host plants from throughout both Islands. In the present survey 5 specimens were taken in a paddock sample from near the Mohaka River (Napier-Taupo road), 15.2.57, and 1 specimen in a roadside sample at Whangaehu on 30.1.57. The species is of no importance in pastures.

He. 46. *Lipaphis erysimi* (Kltb.)

This is a world-wide species. Cottier (1953) records it on crucifers from Waipu to Palmerston North in the North Island. It is a severe pest of stock and occasionally damages other crucifers. In the present survey a single specimen was taken from a roadside sample at Te Matai on 4.3.57.

He. 47. *Macrosiphum sonchi* (L.)

The species is of world-wide distribution. A single specimen was taken in a roadside sample from Paekakariki on 31.1.57. Dr. W. Cottier (pers. comm.) states that this species is found on thistle, and has not previously been recorded from New Zealand.

HEMIPTERA – HETEROPTERA

Fam. CRYPTOSTEMMATIDAE

He. 36. *Ceratocombus* sp.

One adult was taken from a paddock sample at Mangapakeha on 25.3.57. Dr. T. E. Woodward (pers. comm.) in identifying the genus states that this species is "almost certainly new to science." The family is not generally regarded as being of economic importance.

Fam. MIRIDAE

He. 10. *Megaloceroea reuteriana* F.B. White.*Distribution*

Hutton (1897) records the species from Canterbury. Myers (1926) records it from "North Auckland through Lake Taupo to Wellington", and in the central plateau area at least to 3,000 ft. In the South Island he records it from Governor's Bay and Mt. Grey. Woodward (1954) records the species as being "widespread in Australia and New Zealand".

The distribution encountered in the present survey is shown in Fig. 9. The apparent break between the northern and southern distribution areas may not be so real as would appear here.

Habits

Woodward states that it "is common on grasses, sedges and rushes" and Myers states that it "has been swept from pasture and from marram grass (*Ammophila arenaria* (L.) Link.), the latter being much favoured." Myers also mentions a second species of *Megaloceroea* from cocksfoot at Wanganui in December and January, but was probably confusing a colour variant of *M. reuteriana*.

This species appeared in 23 paddock (125 specimens) and 22 roadside (258 specimens) samples, the maximum catch being 8 adults and 63 nymphs in a roadside sample from a poor pasture area in high



Fig. 9.—Distribution map for the mirid *Megaloceroea reuteriana* He. 10.

Fig. 10.—Distribution map for the mirid *Eurystylus australis*. He. 17.

country near Palmerston North. Nymphs and adults were taken in January, February, and March. No information is available on feeding habits.

Economic Significance

Moderate populations of this insect were encountered, but without further information on feeding habits its importance cannot be determined. It is not suspected of being of importance, however.

He. 17. *Eurystylus australis* Poppius

Distribution

Myers (1926) records this species from Auckland and Nelson. The species also occurs in Australia, and it is thought to have been introduced into New Zealand fairly recently. The distribution encountered in the present survey is shown in Fig. 10.

Habits

Myers records it as a serious pest of the passion-vine (*Passiflora edulis* Sims) and from apple and grasses. In the present survey it was taken in 5 paddock (5 specimens) and 8 roadside (16 specimens) samples, the greatest number being 4 adults in the case of a roadside sample from Opotiki on 14.2.57. Nymphs were taken in January and March, and adults in January, February, and March.

Economic Significance

It is not regarded as being of importance in pastures.

He. 18. *Halticus tibialis* Reuter

Distribution

Woodward (1950) states "This small bug was described from Java (1891) and has since been widely recorded from tropical Africa and Asia (including Ceylon, the Carolines, Amboina and Macassar)". He records for the first time its occurrence in New Zealand from specimens taken in the Bay of Islands.

The distribution encountered in the present survey is shown in Fig. 11. It is seen that it is generally distributed in the northern portions but does not appear to have reached the eastern side of the main ranges. Speed of spread southward from the presumed entry point of Auckland may be slowed down by the species preference for warmer conditions. It would seem to be a comparatively recent arrival.

Habits

It was taken in 27 paddock (196 specimens) and 2 roadside (2 specimens) samples, the maximum number being in a paddock sample from Waitoa on 5.3.57 which contained 20 adults and 12 nymphs. Nymphs were taken in January (North Auckland) and March (majority), and adults in January, February, and March.



Fig. 11.—Distribution map for the mirid *Halticus tibialis*. He. 18.

Fig. 12.—Distribution map for the mirid *Stenotus binotatus*. He. 25.

Economic Significance

The species is recorded as being injurious to beans in the Carolines. It seems unlikely to be of very great importance as a pasture pest although close observation of field habits would be necessary for accurate assessment.

He. 25. *Stenotus binotatus* (F.)

Distribution

This species is widely distributed in Europe and North America. Myers (1926) records it in the North Island from the extreme north to Wellington, and in the South Island from Nelson, Canterbury, and the west coast. The distribution met in the present survey is indicated in Fig. 12, which shows it to be more common in western areas of the North Island.

Habits

Only adults were taken in the present survey. The species occurred in 3 paddock (5 specimens) and 12 roadside (27 specimens) samples, the greatest number being 7 in a roadside sample from Waverley on 24.1.57.

Myers states that "the adult appears in October, is plentiful in December and January, and also occurs in February . . . points to the ovum being the overwintering stage". He indicates that in Europe

and America the insect is essentially a pest, sometimes a serious one, of cocksfoot, ryegrass, and timothy, and states that in New Zealand "it is sufficiently numerous on and destructive to pasture grasses to be considered a pest."

Economic Significance

The foregoing remarks on habits, together with Morrison's (1938) account incriminating the species as an important causal agent of "sticky dough" in wheat, make this species of considerable economic importance. As a pest of pastures, however, it is more likely to be of significance in areas saved for seed production. High populations are probably more common in the South Island.

He. 26. *Deraeocoris maoricus* Woodward

Distribution

Woodward (1950) describing this species, records it from the Bay of Islands, Auckland, and Nelson. In the present survey it appeared in 5 paddock (9 specimens) and 3 roadside (4 specimens) samples taken at Warkworth (22.1.57), Bulls (30.1.57), Tutira (11.2.57), Gisborne (13.2.57), Whakatane (14.2.57), Okere Falls (4.3.57), Waitoa (5.3.57), and Otorohanga (7.3.57). The species is thus widespread in the North Island.

Habits and Economic Significance

Nothing is known of the habits of this species. Only adults were taken. It is not considered to be of economic importance.

He. 27. *Calocoris norvegicus* (Gmelin)

Distribution

This species is widespread, occurring commonly in Europe. It is recorded (Cumber 1953b), following its determination by Dr. T. E. Woodward, in light-trap catches in the Manawatu. It has also been taken at Paihia, Bay of Islands, in early January 1949. The present survey records it from Te Kuiti, Piopio, Waitara, Eltham, and Alton, all on 24.1.57. Nymphs and adults were present, the greatest catch being 5 adults in the Piopio sample.

Habits and Economic Significance

This species appears to be a fairly recent introduction from overseas. All specimens were taken in roadside sweeps. It is not likely to prove troublesome in North Island pastures.

He. 29. *Lopus decolor* (Fallen)

Distribution

Dr. T. E. Woodward (pers. comm.) advises that this is a widespread holarctic species, not previously recorded from New Zealand. It has evidently arrived in the country quite recently, being taken in only one sample—that of the roadside sweep at the top of Bombay Hill, near Pukekohe, on 23.1.57.

Habits and Economic Significance

Only adults (19) were taken. Dr. Woodward advises that "Kullenberg, who has made the most careful biological observations on this species, found it to feed in Sweden mainly on the seed-heads of *Agrostis tenuis* and *A. canina*, and occasionally on other grasses, and also on *Trifolium*. According to some other authors, it lives mainly on composites like *Chrysanthemum* and *Hieracium* (Kullenberg doubts this) and in Germany has been recorded from *Carex* sp. Kullenberg notes it inserting its eggs into the stalks of the panicles of *Agrostis*, and Knight records oviposition in *Juncus* in North America."

It will be interesting to watch the spread of this as yet unimportant pasture species in New Zealand.

He. 30. *Calocoris laticinctus* (F. Walker)

Hutton (1897) records this species from New Zealand. Woodward (1954) records it from the Three Kings Islands taken when sweeping *Blechnum*, grasses, and sedges, and indicates that this species is known only from New Zealand.

The present survey records two adult specimens from a paddock sample at Whangaroa on 17.1.57 in rough *Danthonia* with interspersed bracken country. The writer also has taken this species in southern Manawatu so that it would appear to be widespread in the North Island. It is not important in pastures.

Fam. ANTHOCORIDAE

He. 33. *Xylocoris* sp. possibly *flavipes* (Reuter)

A single specimen was taken in a paddock sample from Napier on 11.2.57. *Xylocoris flavipes* "is quite widespread in the Pacific and elsewhere" (Woodward pers. comm.). This is the first suspicion that the species may be present in New Zealand. However, it may yet prove to be a new species of *Xylocoris*.

Fam. NABIDIDAE

He. 12. *Nabis capsiformis* Germar*Distribution*

Woodward (1954) records the species as being "widespread in the Pacific and is now nearly cosmopolitan". Myers (1926) describes it as being "the most abundant and widely distributed nabid in New Zealand". The distribution encountered in the present survey is shown in Fig. 13.

Habits

Nabididae are predaceous and commonly found on herbage where they attack phytophagous insects. Myers records host plants for *N. capsiformis* as weeds, tall grasses, lucerne, red clover, *Juncus*,

Sparganium, and *Cyperus*.

This species appeared in 17 paddock (27 specimens) and 11 roadside (21 specimens) samples, the greatest catch being in a paddock sample at Maramarua on 6.3.57 which yielded 2 adults and 3 nymphs. Both adults and nymphs were taken in January, February, and March.

Economic Significance

This species occurs in relatively small numbers, and the only injury to plants could be through oviposition in stems. It cannot therefore be regarded as a damaging species, and, on the contrary, because of its predaceous nature, must be regarded as a highly desirable and useful species being doubtless instrumental in reducing the numbers of injurious insects.

He. 16. *Nabis maoricus* F. Walker

Distribution

Woodward (1954) indicates that the species is "Endemic to New Zealand, where it is common and widespread". In the present survey the species was taken at Waitarā (24.1.57), Kai-Iwi (24.1.57), Himatangi (30.1.57), Hihitahi (18.3.57), Pahiatua (25.3.57), Taueru (25.3.57), Norsewood (26.3.57), and Hunterville (27.3.57).

Habits

There is little specific information, but the same general remarks apply to this as to *N. capsiformis*. Woodward records it from *Lepto-*

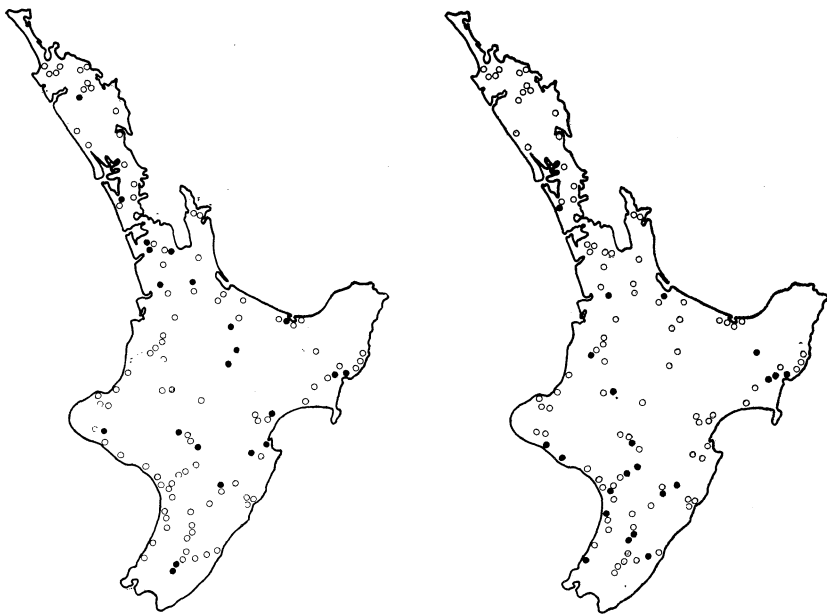


Fig. 13.—Distribution map for the nabid *Nabis capsiformis*. He. 12.

Fig. 14.—Distribution map for the lygaeid *Cymus novae-zelandiae*. He. 3.

spermum ericoides and *Myoporum laetum*. This species was taken in 3 paddock (18 specimens) and 5 roadside (13 specimens) samples, the maximum catch being 1 adult and 15 nymphs from the paddock sample at Himatangi. Nymphs and adults were taken in January and March.

Economic Significance

As in the case of *N. capsiformis*, the species is to be regarded as a beneficial one.

Fam. LYGAEIDAE

He. 3. *Cymus novaezealandiae* Woodward

Distribution

This species was described by Woodward (1954), but its presence was noted under the genus *Cymodema* sp. by Myers (1926). Myers and Woodward record it from widely scattered North Island districts, and from Christchurch. This widespread distribution is borne out in Fig. 14 which indicates the survey occurrences.

Habits

According to Myers "Adults have been taken in August, December, and February in the sweeping net, and in May and July in winter quarters at the bases of the rush clumps, where they were most abundant in the later month. Meadow grasses, especially *Bromus unioloides* H.B.K., are favoured. In winter the bases of *Juncus effusus* L. afford them shelter".

In the present survey, the species occurred in 28 paddock (81 specimens) and 4 roadside (7 specimens) samples. The greatest catch was in the case of a roadside sample from Gisborne-Tiniroto on 12.2.57 which yielded 20 adults. Adults and nymphs were taken in January, February, and March.

Economic Significance

It seems probable that the species is of little importance in pastures, although there may be some damage during seed formation. The numbers encountered are low. Habits appear to be similar to those of the species which immediately follows.

He. 9. *Nysius huttoni* F.B. White

Distribution

Hutton (1897) records the species as common in Canterbury and Otago. Myers (1926) records it as widely distributed throughout both Islands and plentiful up to an altitude of 5,000 ft in the Tararua Range. Fig. 15 indicates the distribution met in the present survey.

Habits

Morrison (1938) incriminated this species as one of the causal agents of the condition in wheat which gives rise to "sticky dough".

Gurr (1952) indicated that this species damages crucifer seedlings, and gives a summary of its life history. Adults overwinter and give rise to at least two generations during the following spring and summer. This species thrives where conditions are dry and the vegetation is relatively sparse.

It was taken in 12 paddock (30 specimens) and 12 roadside (64 specimens) samples. The greatest catch was 39 adults and 3 nymphs from a roadside sample taken at Taumarunui on 8.3.57. Nymphs were taken in February and March, adults in January, February, and March.

Economic Significance

It seems probable that any pasture damage is of a minor nature as close turf does not provide the ideal conditions for their congregation and rapid build-up. A study of seed crops would be necessary before their importance in this direction could be ascertained.

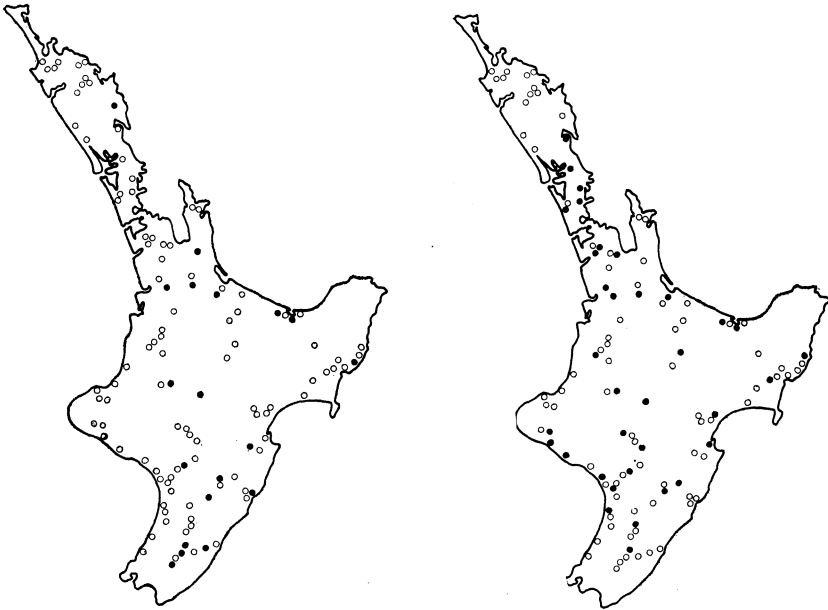


Fig. 15.—Distribution map for the lygaeid *Nysius huttoni*. He. 9.

Fig. 16.—Distribution map for the pentatomid *Dictyotus caenosus*
He. 1.

He. 23. *Pachybrachius nigriceps* (Dallas)

Distribution

Woodward (1954) states that this species "is widespread in the Pacific area". It has been recorded from North Auckland, Greytown, and Wellington. The present survey produced single adults from Helensville (23.1.57), Paekakariki (31.1.57), Wairoa (12.2.57), and Okere Falls (4.3.57).

Habits and Economic Significance

The habits are, apart from its casual association with *Phormium*, *Juncus*, *Carex*, *Scirpus*, *Leptospermum*, and *Lotus*, not known. It is not important as a pest of pastures.

He. 34. *Rhypodos clavicornis* (F.)*Distribution*

Myers (1926) indicates that this endemic species is distributed widely from Whangarei to Otago, being present over a considerable range of altitudes. In the present survey, single nymphs were taken at Opotiki and Whakatane on 14.2.57.

Habits and Economic Significance

Myers also indicates that there is probably only one generation each year with overwintering adults. He records it from grasses and a number of forest trees, but there are no grounds for suspecting that it is important in pastures.

Fam. PENTATOMIDAE

He. 1. *Dictyotus caenosus* (Westwood)*Distribution*

This species also occurs in Australia, being found in Tasmania as well as on the mainland. Hutton (1897) records it as occurring from Auckland to Otago. Myers (1926) indicates its distribution as being from Kaitaia to Wellington in the North Island, and as being plentiful in Marlborough and Canterbury in the South Island. The distribution met in the present survey is shown in Fig. 16, indicating its presence throughout the North Island.

Habits

D. caenosus overwinters in the adult stage. After mating in spring, eggs are laid on herbage and the nymphs which hatch out develop into adults during the summer months, there apparently being only one brood each year. Myers also states that this species "seems to prefer grasses and low herbage generally. It has been swept from English grasses, including cocksfoot, ryegrass, lucerne, and red clover, and from pastures and roadside grasses . . . found in large numbers sheltering . . . at the bases of rushes".

This species was taken in 15 paddock (28 specimens) and 26 roadside (71 specimens) samples. The greatest catch was in a roadside sample from Whangaehu on 31.1.57 which yielded 7 adults and 8 nymphs. Nymphs and adults were present in January, February and March.

During the examination of dung in pastures, it was found that considerable numbers of adults and nymphs took advantage of the protection afforded by dry pats.

Economic Significance

It seems probable that, in keeping with the habits of phytophagous pentatomids generally, *D. caenosus* draws largely upon developing seed embryos and is most likely to prove damaging in this capacity. Where large populations occur in crops grown for seed, the insect should be regarded with considerable suspicion. The possibility that it causes significant damage in crops of lucerne grown for seed might warrant investigation.

He. 22. *Nezara viridula* (L.)

Distribution

The species is world-wide. It reached New Zealand in 1944 and since then has spread to most parts of the North Island. It has recently appeared in northern portions of the South Island. In the southern portions of its range it is probably restricted to lower areas. In the present survey it was taken at Wellsford (22.1.57), Mokau (24.1.57), Waitara (24.1.57), Whakatane (14.2.57), and Okere Falls (4.3.57).

Habits

These are well known (Cumber 1949, 1951) the insect being a serious pest of vegetables and fruit. Forming seeds in legumes are keenly sought, and undisturbed roadside patches of clover often harbour moderate populations.

Economic Significance

It is not regarded as a potential pasture pest.

He. 24. *Rhopalimorpha obscura* A. White

Distribution

Hutton (1897) and Myers (1926) indicate that this species is present throughout New Zealand. In the present survey it was taken at Te Kuiti (24.1.57), Kai-Iwi (24.1.57), Bulls (30.1.57), and Gisborne-Tiniroto (12.2.57).

Habits

The above records concern nymphs with the exception of the last mentioned. The greatest catch was 5 nymphs at Kai-Iwi. Myers gives considerable data on the life history. He indicates that it overwinters as adults and that there is one generation each year. It occurs in "miscellaneous herbage, long grass, English grasses, sedges. On cocksfoot the nymphs feed with avidity on the fully formed but not yet hardened seeds".

Economic Significance

This species is not regarded as being of importance in pastures.

DISCUSSION

The Hemiptera concerned here include both endemic and introduced species. Some of the endemic species are new to science. The introduced species include some which are unrecorded, and many which have been recorded quite recently.

The pattern of distribution of an introduced species will be related to its port of entry, its period of existence in the country, the climate of the area from which it has come, and the nature of the countryside surrounding the port of entry.

Lopus decolor is probably a very recent introduction with Auckland as the port of entry, for this species was found only at Bombay Hill, Pukekohe.

Halticus tibialis (Fig. 11) may also be a fairly recent introduction. It probably arrived in Auckland and spread northwards in keeping with its preference for warmer habitats. Its southern spread is apparently to a line between Marton and Opotiki. Its further dispersal may also be hampered by the axial mountain chain, so that it may not reach Hawke's Bay for some time.

Rather an interesting distribution is shown by *Megaloceroea reuteriana* (Fig. 9). It would appear that Auckland and Napier have each received this species independently. There is even evidence that the Hawke's Bay population may have spread through to the Manawatu via the Gorge area. However, in view of the relatively limited sampling, a note of caution should be sounded in respect of such hypotheses.

In contrast to the introduced species, those that are endemic, or are known to have been present in the country for a long period, tend to be widespread and without evidence of zoning. However, climatic preferences may be indicated as in the species *Erythroneura zealandica* (Fig. 1), which is more commonly found in the southern portions of the North Island, and, if the trend continues may be of considerable importance in the South Island.

To forecast the importance of a particular insect species is a difficult task, especially in the case of endemic species which in their native habitats are in balance with natural controlling agents. Such a forecast must include a prediction of agricultural trends and managements.

The survey has indicated a number of potential pest species whose real importance may be determined only by closer study. The importance of the species may be governed by any special purpose for which the pasture is required, e.g. early spring feed, or seed crops. Insidious damage may be suspected where there are high populations of phytophagous insects, especially when they are selective feeders and potential virus transmitters.

A study of the jassids will undoubtedly be necessary in New Zealand sooner or later, and not only in respect of pastures. They have received considerable attention in other countries in relation to forage problems. Their pest potentialities have already been indicated, and their ability to defy quarantine measures is well known.

Two aphid species are shown to be capable of considerable build-up in late summer. It would appear that under conditions of normal grazing, pasture is too disturbed to favour such a build-up, but in closed pastures—especially those held for seed—there may be considerable damage.

In the mirids and lygaeids there are several potentially important species, but it would appear as in the aphids, that build-up and damage of economic importance may only occur under specialised conditions as in the closing of pastures for seed production.

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In survey work of the type carried out here, assistance from specialists is unavoidable, and it is also necessary to draw heavily upon existing literature. Dr. W. Cottier, Director, Entomology Division, Department of Scientific and Industrial Research, has identified and provided information on the aphids. Dr. J. W. Evans, Director of the Australian Museum, Sydney, has assisted with the jassids. The greater part of the remaining material was identified by Dr. T. E. Woodward, University of Queensland, Brisbane, whose assistance is especially acknowledged. Field assistance by the staff of the Entomology Division substation at Palmerston North is also gratefully acknowledged.

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