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ANISODACTYLUS BINOTATUS FABR., A CARABID BEETLE NEW TO NEW ZEALAND, AND A REVIEW OF THE EXOTIC CARABID FAUNA

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Abstract: *Anisodactylus binotatus* Fabr. 1787 (Col.: Carabidae), an introduced species now established in Canterbury (South Island), New Zealand, is reported for the first time. The literature respecting other carabids sometimes recorded as introduced is reviewed; *Agonochila binotata* (White, 1846), *Agonum submetallicum* (White, 1846), *Hypharpax australasiae* (Dejean, 1829) and *Pentagonica vittipennis* Chaudoir, 1877 are shown to be better considered as endemic to the Australia - New Zealand area. Other species are classed as either native to New Zealand, clearly introduced though not all established, or of doubtful occurrence in New Zealand.

Introduction: The Carabidae of New Zealand are predominantly endemic species, but a small number of exotic species has been recorded. This paper reports a further introduction to the carabid fauna of this country and concludes with a survey of recorded exotic Carabidae in New Zealand.

Specimens of the newly-recorded species were collected in domestic gardens in Christchurch, and were included in a collection sent for identification to Dr. E. B. Britton, British Museum (Nat. Hist.), who kindly drew the writer's attention to the fact that they were so far unreported from New Zealand.

Description of adult (from New Zealand specimens) Fig. 1.

Anisodactylus binotatus Fabricius, 1787

Color: Head, pronotum, elytra and femora black; tibiae and tarsi light brown to red-black; palps and antennal segments 1–2 brown, remainder of antennae black; leg spines red-brown; head with small red spot on frons between eyes. (This spot is usually transversely elongate, but may be bilobed or even distinctly 2 separate spots). *Pronotum*: sides not sinuate, apical angles rounded, basal angles obtuse. Basal depressions shallow, broad and irregularly defined, with numerous obscure punctures. Median line faint. A single setiferous puncture in marginal groove about mid-length. *Elytra*: striae uniformly impressed, intervals only slightly convex, scutellar striole present. Uniform fine microsculpture gives rather matt appearance. Interval 9 with a number of setiferous punctures, more numerous towards apex. (Jeannel's description (1942) includes "...une soie sur le tiers apical du 3e interstrie..." but this does not appear to be constant in the specimens seen in New Zealand). Large number of short golden hairs (best seen in profile) present along sides of elytra from interval 8 to margin and on apical 1/4; also present along base of elytra and

in basal depressions of pronotum. *Legs*: tarsi narrow in ♀, but basal 4 segments of protarsi and segments 2–4 of mesotarsi expanded in ♂. Expanded segments with an extremely dense pile of short hairs beneath. *Length*: 10–12 mm.

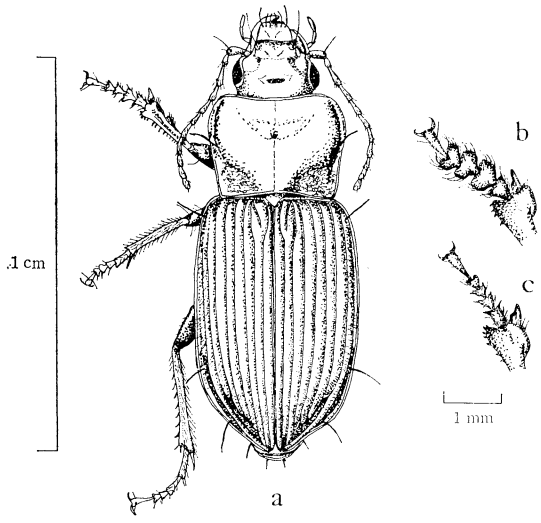

Fig. 1. *Anisodactylus binotatus*, drawn from specimens collected in Christchurch. a, ♀ sp.; b, left protarsus of ♂; c, left protarsus of ♀.

The egg, larva and pupa have not yet been discovered but it is clear from collecting records that the species is established in Christchurch and that the life-history is being carried on there. The 3 specimens obtained from outside Christchurch are sufficiently far away (up to more than 80 km) to suggest that the species occurs widely in mid-Canterbury at least. The whole area in which it has been found is one subjected to a fair amount of collecting in the past. Evidence from a single specimen found in Christchurch in 1938, followed by a gap of 18 years, suggests either 2 introductions or more likely that the species was earlier very rare, and has only recently succeeded in building up a noticeable population.

Even if the species becomes very common in the fauna, there should be no fear that it will be harmful. Jeannel (1942) states, quoting Rupertsberger, that the imago, as well as the larva, is carnivorous and, quoting Blunck, that the larva feeds on worms and molluscs.

SPECIMENS COLLECTED: many, Christchurch, I. 1956–V. 1962; 1, Lincoln, IX. 1960; 1, nr. outlet Lake Ellesmere, XII. 1956, R. Cranfield; 1, nr. Staveley, I. 1956, Cranfield; ♂, no data, Clarke coll'n (Auckland Mus.); ♀, unidentified, Spreydon, Christchurch, 15. I. 1938, S. Lindsay (Canterbury Mus.).

A ♂ and a ♀ specimen of the species have been deposited in the collections at each of the following institutions: Auckland Mus., Entomology Div., Auckland; Horticulture Div., Levin; Dominion Mus., Wellington (acc. no. 1960/147); Entomology Div., Nelson; Canterbury Mus., Christchurch; Entomology Div., Lincoln; Otago Mus., Dunedin (acc. no. A. 60. 4). A number of specimens is also in the writer's collection.

Systematics: In attempting to key the species out using the key to tribes in Britton (1940), the only recent extensive work on New Zealand Carabidae, *A. binotatus* comes out in the Harpalini, a tribe not yet revised for New Zealand species. Alternatively, using the arrangement in Jeannel (1942), it can be completely followed through to the correct species. Jeannel employs a more complex series of taxa, but a correlation of the pertinent categories may be made by equating Jeannel's Harpalidae with Britton's Harpalini. However, Britton (pers. comm.) agrees that his Harpalini is better raised to subfamily rank (Harpalinae) as is done by Basilewsky (1953). He further suggests that until the group is revised for N. Z. forms, *Anisodactylus* be distinguished from the other genera which

key out to Harpalini in his 1940 paper (p. 475), by amending couplet 10 of the key as follows:

10 (9). Head with 1 supraorbital setiferous puncture, etc ..... 10′
Head with 2 setiferous punctures, etc..... 11

10′(10). With red spot on middle of frons; basal segment of posterior tarsus approximately 2× as long as segment 2..... **Anisodactylus binotatus**
Without red spot on frons; basal segment of posterior tarsus never 2× as long as 2nd .....Harpalini

The number of species of Carabidae recorded in the literature as exotic or introduced into New Zealand is small. Nevertheless, among them several appear to be falsely so described, owing to misidentification or otherwise. The bald lists given by Hutton (1904) and Hudson (1934) are misleading in the light of recent systematics and an appraisal of the situation is called for. For these reasons, it is proposed to review briefly the situation as far as it can be determined at present. It is to be recalled that in regard to the New Zealand fauna only a few groups among this large family have been revised in recent years and, until the remaining groups are similarly treated, conclusions reached with respect to species in them must be treated with reserve. An extensive search of the literature reveals that the undermentioned species have been at some time indicated as "introduced", but the connotation of this word varies with the author. By some it is intended to refer to species deliberately or accidentally imported by the agency of man, by others it refers more broadly to those whose areas of origin are outside New Zealand and which have secondarily, but by natural agencies, spread to this country. Tillyard (1923) gives data for several beneficial insects introduced by man into New Zealand but no Carabidae appear in the list. Thomson (1922, p. 283) refers to the fact that many Coleoptera, designated 'introduced' by Hutton, lack authentic details of their importation. This review is an attempt to clarify the situation and to bring later records into a single account.

Agonochila binotata (White), 1846 (Tribe Lebiini)

Lebia binotata White, 1846 (orig. design.).
Agonochila binotata: Chaudoir, 1848; Bates, 1874; Britton, 1941.
Gomelina binotata: Blanchard, 1853.
Coptodera (*Agonochila*) *antipodum* Bates, 1867.
Sarothrocrepis binotata: Redtenbacher, 1868.

This species, introduced according to Hudson (1923), is recorded from a widespread distribution in New Zealand from early collecting times, e. g. Port Nicholson and Waikouaiti (White), Akaroa (Blanchard). Since then it has been found throughout the country and is probably quite common judging from specimens in collections. It occurs in Australia and Tasmania (Britton, 1941) and is to be regarded as an element common to the fauna of those localities and of New Zealand.

Agonum (**Europhilus**) **submetallicum** (White), 1846 (Tribe Anchomenini)

Colpodes submetallicus White, 1846 (orig. design.).
Anchomenus submetallicus: Bates, 1867; Broun, 1880.
Colpodes submetallicus: Sloane, 1920b.
Platynus marginicollis Macleay, 1871; Sloane, 1920b.
Agonum (*Europhilus*) *submetallicum*: Csiki, 1931.

This species is widespread in both islands of New Zealand, and must be taken as an element common to the fauna of both New Zealand and Australia.

Anomotarus aeneus (Macleay), 1873 (Tribe Lebiini)

Originally described as *Cymindis aeneus* by Macleay, 1873 but this name proved to have been used before, as *Cymindis aenea* Dejean, 1831. Macleay's species was transferred to *Anomotarus* by Csiki in 1932, who synonymised with it *Cymindis illiwarrae* Macleay, 1873.

A single specimen is reported by Mr. C. Watt, beaten from foliage at Swanson, near Auckland in 1955. The species is known from Australia (N. S. Wales, Victoria and Tasmania) whence it is evidently introduced.

A 2nd species of this genus has been found, also in the North Island, but awaits identification which is being undertaken by Dr. E. B. Britton at the British Museum (Nat. Hist.).

Aulacopodus brouni (Csiki), 1930 (Tribe Pterostichini)

Originally described as *Pterostichus adoxus* Broun, 1908 but this proved to be a homonym of *Pterostichus adoxus* Say, 1825 and was renamed *Pterostichus brouni* by Csiki (1930) and catalogued as *Megadromus brouni*. It was recorded as *Aulacopodus brouni* by Britton (1940), with which is synonymised *Rhytisternus puella* Chaudoir, 1865 by Britton (**New Synonymy**, pers. comm.).

This species is included because Hudson (1923) lists *Rh. puella* as introduced, a statement probably based on Hutton's (1904) listing it from N. S. Wales. Thomson (1922) states that Hudson took it at Karori (Wellington) in 1882, but there are few specimens found since that time. In the collections at Entomology Div., Auckland, specimens labelled *Rh. puella* in Broun's handwriting (2 ex.) and in Brooke's handwriting (3 ex.) appear to be identical with *Rhytisternus miser* (Mrs. B. May, pers. comm.).

Aulacopodus brouni is recorded as an endemic species (Britton, 1940), but its more recently established synonymy with the Australian *Rh. puella* makes it seem probable that it has arrived in New Zealand from Australia. The very small number of specimens recorded in this country supports this interpretation.

Calosoma schayeri Erichson, 1842 (Tribe Calosomini)

On each of 2 occasions, 19. X. 1955 & 23. X. 1958, 2 specimens were intercepted in wheat imported from Ardrossan, Australia. There is no evidence to suggest that this species represents more than an accidental import or that it is established here. The specimens are in the collection of the Department of Agriculture, Levin.

Carabus nemoralis O. F. Müller, 1764 (Tribe Carabini)

Spiller (1949) first recorded this species on the basis of 4 specimens obtained in earth at Avondale, Auckland. It no doubt was accidentally introduced to New Zealand, but its presence here could perhaps prove beneficial should it become widespread. In this respect it is worth noting that it is regarded as an important agent of biological control in the northern hemisphere. Its natural home appears to be Europe, from the British Isles to Eastern Russia (Lindroth, 1957), whence it has been deliberately introduced into North

America. Some confusion exists as to the status of this species in various places in that continent. Thus Lindroth (p. 136) says that 'The statement made by Evans (1952, p. 217–218), that *Carabus nemoralis* had been purposely introduced into eastern Canada as a general predator, is due to a misinterpretation of Cosens.' Cosens (1923) is in fact very brief, stating that 'The introduced Ground Beetle, *Carabus nemoralis*, is becoming so common...' and that with others it was '...among the most beneficial of our insects.' His report refers to the Toronto district but it is to be noted that Cosens was not categorical that the beetle was introduced into Canada itself. It appears that *C. nemoralis* was introduced *inter alia* into the U. S. A. as a possible predator against the Gypsy Moth (*Porthetria* (*Lymantria*) *dispar*) and the Brown-tail Moth (*Nygmia phaerrhoea*). Howard & Fiske (1911) record it in this context, further details being given by Crossman & Webber (1924), while Hatch (1953) shows that specimens were collected in the Pacific Northwest as early as 1909.

According to Lindroth, the species was collected in New Brunswick in 1870, and its distribution is still significantly associated with coastal districts of North America, both east and west, and with the Great Lakes waterways of the U. S.—Canada border.

Spiller's specimens are in the collection at Entomology Div., Auckland; no further examples being known so that it is not considered as established.

Clivina rugithorax Putzeys, 1866 (Tribe Scaritini)

This species appears to be widespread in the North Island, where it has been implicated as a pest of strawberries and sweet corn (Muggeridge, 1939). It is not reported from the South Island, but a specimen found by the writer in Christchurch, Jan. 1957 is in the collection of the Canterbury Museum. It is now recognized as a native species, but is included in this account in order to clarify certain confusion in the literature.

Following Putzey's description it was recorded by Broun (1880) from Auckland. Bates (1874) remarked that the species was close to *C. australasiae*, and it may be that this similarity led Sloane (1920b) to state that the latter species ranges from Australia to New Zealand. Cottier's statement (1956, p. 257) referring to the 'Introduced *C. rugithorax*...' is in error (Cottier, pers. comm.).

Hypharpax australasiae (Dejean), 1829 (Tribe Harpalini)

Original description as *Harpalus australasiae* by Dejean in 1829, subsequently recorded as *Harpalus australasiae* Dejean by Redtenbacher (1868), referred to the genus *Hypharpax* by Bates (1874), recorded as *Hypharpax australasiae* by Hudson (1923).

Thomson (1922) states that 'This Australian beetle was considered by Captain Hutton, on the authority of Mr. W. Bates, to be an introduced species. It was recorded in 1874.' Bates (1874), however, attributes the New Zealand record to Redtenbacher, whose report (p. 15) is very brief:—'97 *Harpalus australasiae* Dejean...Von Neu-Seeland' (Curiously, Broun (1880) ascribes the New Zealand record correctly to Redtenbacher, but states '... though the author specifies New Holland as its habitat.' This remark is not substantiated.)

Specimens in the collections at the British Museum (Nat. Hist.) and at Entomology Div., Auckland (Clarke coll'n.) show that the species occurs widespread in both islands. It must therefore be considered as an element common to the fauna of both Australia and New Zealand.

Hypharpax australis (Dejean), 1829 (Tribe Harpalini)

Originally described as *Harpalus australis* by Dejean in 1829, subsequently recorded as *Harpalus australis* Dejean by Redtenbacher (1868), referred to the genus *Hypharpax* by Bates (1874), recorded as *Hypharpax australis* by Hudson (1923).

The existence of this species in New Zealand is dubious. Thomson (1922) gives it as 'Common among grass, in vegetation, etc., in Taranaki, according to Mr. W. W. Smith (in 1919). An Australian species first recorded in 1874.' I am unable to trace Smith's publication (if indeed there was any) and it seems that the first record should be based on Redtenbacher (p. 15) where *H. australis* is referred to immediately below *H. australasiae*, and its locality given as 'Von eben daher.' It would appear that it is on this authority that Bates (1874) makes his reference to New Zealand. No specimens have been reported in the collections in this country or among those at the British Museum (Nat. Hist.) so that it is likely the species does not occur in New Zealand. It should be noted that the genus and even the tribe (Harpalini) need revision for New Zealand forms, and the question may not be properly settled until this done.

Kenodactylus capito Broun, 1909 (Tribe Trechini)

Described from a single ♂ specimen discovered on the beach at Campbell I., this species has since been found at Campbell and Auckland I., as well as on Tierra del Fuego and Falkland Is. (Brookes, 1951). It is apparently littoral in habitat and would seem to be distributed around the antarctic regions in high latitudes. There is no reason to regard its New Zealand occurrence as anything but natural within the latter context.

Laemostenus complanatus (Dejean), 1828 (Tribe Pterostichini)

Originally described as *Laemosthenes complanatus* by Dejean in 1828, subsequently recorded as *Pristonychus terricola* Herbst by Hudson (1923) (as a misdetermination?) and as *Laemostenus complanatus* by Britton (1940).

This species is very abundant and widespread in New Zealand, where it is certainly established not only near the coasts but in the center of both islands. Britton (1940) states 'This species, of European or N. African origin, is cosmopolitan, having been carried about by shipping.' Jeannel (1942) refers to it as found 'Par places dans les regions littorales, surtout au voisinage des ports.' In New Zealand it is common in domestic gardens and, in Christchurch, is the commonest carabid found. Its ascribed littoral distribution may be merely a coastal one deriving from introductions *via* shipping rather than one dependent on biological factors of marine associations.

It is world-wide in its present distribution and has evidently been described under a variety of names in different countries according to Jeannel (1937). It should be noted (Jeannel, 1942) that *Pristonychus terricola* is a valid species occurring in Europe and North America. Jeannel's key separating *P. terricola* from *L. complanatus* makes it clear that the latter is the species in New Zealand. Hudson's record must thus be regarded as a misdetermination, which, according to Thomson (1922) is attributable to Walker's identification of specimens found by Hudson in 1888.

Mecyclothorax ambiguus (Erichson), 1842 sub. sp. **rotundicollis** (White), 1846 (Tribe Nomiini).

I. Original description of *Oöpterus rotundicollis* was by White (1846), subsequently recorded

as: *Cyclothorax rotundicollis* (White) by Hudson (1923), *Pseudoopterus rotundicollis* by Csiki (1928) and reduced to subspecific rank as *Mecyclothorax ambiguus* (Erichson) *rotundicollis* (White) by Britton (1948).

II. Original description of *Anchomenus ambiguus* was by Erichson (1842) with which was synonymised *Olisthopus insularis* Motschulsky 1864 by Bates (1874) (this is not the same as *Olisthopus insularis* Karsch, 1881 which is a homonym); renamed *Mecyclothorax ambiguus* by Csiki (1929).

III. Original description of *Drimostoma striatopunctata* was by Castelnau in 1867 which was synonymised with *Olisthopus insularis* Motsch. by Bates (1874), renamed *Cyclothorax insularis* by Bates (1874) and synonymised with *Anchomenus ambiguus* by Bates (1874); *D. striatopunctata* was renamed *Tropidopterus striatopunctata* by Csiki (1929), when he also synonymised with it *Olisthopus insularis* Motsch.

No species in the present paper has such a confused and indefinite synonymy as this.

Erichson described *Anchomenus ambiguus* from Australia while Bates (1874) stated that there was only a slight color difference between it and *Cyclothorax insularis* (Motsch.). Bates was recording this latter species from 'Auckland and Canterbury', renaming *Olisthopus insularis* Motsch. in the process and synonymising *Drimostoma striatopunctata* Casteln. with it. Broun incorporated this opinion in his Manual (1880, p. 29). However, Sloane (1898) denied that *D. striatopunctata* Casteln. is synonymous with *C. insularis* (Motsch.). Csiki (1929) included *ambiguus* Erichs. in *Mecyclothorax* Sharp, and is followed in this by Britton (1948) who regards the New Zealand *rotundicollis* (White) as being '...not more than a subspecies of *M. ambiguus* (Erichson) of Australia and Tasmania.'

White described *Oöpterus rotundicollis* from New Zealand (Bay of Islands), the collections being ascribed to Dr. Sinclair and Charles Darwin. This species was accepted as distinct by Bates (1874) and Broun (1880). Hudson (1923) recorded it under *Cyclothorax* (in which genus he listed *insularis* Motsch. as a separate species). Csiki (1928) erected *Pseudoopterus* to receive *rotundicollis* and other species.

As mentioned above, Bates placed *Olisthopus insularis* Motsch. in the genus *Cyclothorax* Macleay (1871) and gave among the synonyms *Drimostoma striatopunctata* Casteln. 1867, but this latter step was denied by Sloane (1898). Britton (1940) is '...content to recognise the synonymy [of Bates]', which, as shown earlier in this account, implies ultimately synonymy of *D. striatopunctata* with *Mecyclothorax ambiguus*. Csiki (1929) placed *striatopunctata* in *Tropidopterus* Sol., giving *O. insularis* Motsch. as a synonym.

Finally, to take count of other confusions in the literature, 2 further insects are to be noted here. The genus *Metrothorax* Sharp, 1903 was sunk in synonymy with *Mecyclothorax* Sharp, 1903 by Britton (1948), but this author failed to recognise that *Metrothorax rotundicollis* Sharp, 1903 becomes *Mecyclothorax rotundicollis* (Sharp) and thus a homonym of *Mecyclothorax rotundicollis* (White, 1846). Britton (pers. comm.) acknowledges this omission, but has not yet published any correction. Karsch in 1881 named *Olisthopus insularis*, evidently unaware that the name was preoccupied by Motschulsky's species. Sharp (1913) synonymised Karsch's species with *Cyclothorax montivagus* Blackburn, 1878 and is followed in this by Britton (1948) who refers the species to *Mecyclothorax*, stating nevertheless that the Hawaiian *M. montivagus* is '...remarkably similar to the Australian *M. ambiguus* (Erichson) and *M. insularis* (Motschulsky) from New Zealand...'.

It seems quite clear that the true synonymy of the insect(s) involved requires a thorough

overhaul based on collections from both Australia and New Zealand, together with an examination of the original specimens so variously described. It is impossible to determine, at the present, whether the name which is used at the heading of this discussion is a correct synonym for all the species subsequently mentioned, but attention has been drawn to the fact that the insect has been in New Zealand for a sufficiently long time (Darwin s visit was in 1836) to suggest that it is not a recent introduction by man. Britton (1948) is of the opinion that the New Zealand population could have entered New Zealand, after its separation from Australia, by means of drift-wood. Many specimens are in collections throughout the country and it is evidently very common.

Nemaglossa (Thenarotes) atriceps (Macleay), 1871 (Tribe Harpalini)

Originally described as *Trechus atriceps* by Macleay (1871). The species was transferred to *Thenarotes* by Blackburn (1895), but Csiki (1932) regarded *Thenarotes* Bates 1878 as synonymous with *Nemaglossa* Solier 1849.

This Australian species has been taken very discontinuously from north of Auckland from 1918. Csiki quotes the species as occurring in Queensland, Australia, but its presence in New Zealand for over 40 years indicates that either it has been repeatedly introduced or it has become established in this country. Evidence from the more recent collecting data (fig. 2) suggests that the latter interpretation is more likely and that the species is

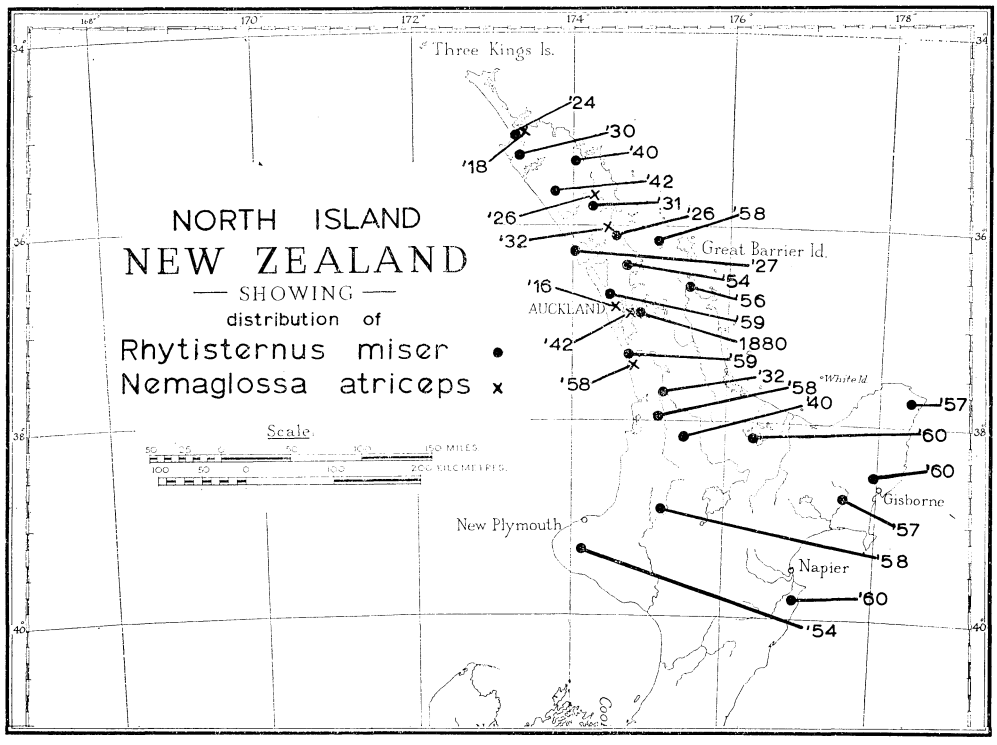

Fig. 2. Map of North I., N. Z. showing distribution of *Rhytisternus miser* (●) and of *Nemaglossa atriceps* (×) derived from collecting data. Only 1st record is given for each locality. Dates in 20th century are abbreviated, thus '59 means 1959.

spreading southwards. Data (fig. 2) are from information on specimens in the collections of Entomology Div., Auckland; Auckland Mus.; and Mr. C. Watt. Two additional specimens are reported by Gourlay (1963).

Pentagonica vittipennis Chaudoir, 1877 (Tribe Pentagonicini)

Originally described as *Pentagonica vittipennis* by Chaudoir in 1877 with which was synonymised *Wakefieldia vittata* Broun, 1880 and recorded as *Pentagonica vittata* Brown (1880) by Sloane (1920b) [The spelling error for 'Broun' is Sloane's]; recorded as *Wakefieldia vittata* by Hudson (1923), and recorded as *Pentagonica vittipennis* by Britton (1941).

Broun merely records 'I found four examples in different localities', but specimens have since been taken from a very wide distribution in both islands of New Zealand, from which it is inferred that it is endemic here. Sloane's inclusion of it in his list of 'Australian Carabidae which range beyond Australia and its adjacent dependencies' should, therefore, not be construed as indicating that it is introduced from that country. Most likely it is a species common to the fauna of Australia and New Zealand.

Rhytisternus miser Chaudoir, 1865 (Tribe Pterostichini)

Originally described as *Rhytisternus miser* by Chaudoir in 1865 with which have been subsequently synonymised *Holcaspis rugifrons* Broun, 1880 and *Rhytisternus erythrognathus* Broun, 1893 by Britton (1940).

This species, which is found in Australia and Tasmania (Sloane, 1920a; Britton, 1940), is evidently a recent import to New Zealand. The distribution of specimens collected since Broun's 1st record from Auckland indicates that the species is gradually spreading southwards from an introduction at Auckland or elsewhere on the North Auckland Peninsula. By 1960 it had been found over more than half of the North Island, but none is known outside this area. (See fig. 2).

Discussion: It is clear that the species considered in the foregoing account fall into several categories in respect to their endemism or otherwise.

a. The following may be regarded as belonging properly to the New Zealand native fauna, sharing this distribution with a natural occurrence in Australia: *Agonochila binotata, Agonum submetallicum, Hypharpax australasiae, Pentagonica vittipennis.*

b. The only species, erroneously recorded previously as introduced but clearly to be considered as native, is *Clivina rugithorax*, while *Mecyclothorax ambiguus* s. sp. *rotundicollis* may tentatively be taken as a native subspecies of the Australian species.

c. The situation respecting *Aulacopodus brouni*, following Britton's new synonymy, is not quite clear. The few specimens collected in New Zealand suggest that the species has been introduced from Australia, but it could be an element common to the fauna of both countries though rare in New Zealand. *Rhytisternus miser* and *Nemaglossa atriceps* appear more clearly to be introduced from Australia and established here.

d. *Kenodactylus capito* is a species native to New Zealand though not on the mainland, and is found in other high-latitude localities in an almost circum-polar distribution.

e. The occurrence of *Hypharpax australis* in New Zealand is dubious. Unless specimens are forthcoming, the species should be deleted from New Zealand lists.

f. The remaining species are clearly the result of introductions, all presumably acci-

dental, by the agency of man. To date, there is no sign that *Anomotarus aeneus*, *Calosoma schayeri* or *Carabus nemoralis* are established here. *Anisodactylus binotatus* is certainly established in Canterbury and *Laemostenus complanatus* has become very successful throughout the country. Of these species, only *C. schayeri* has been collected in the act of entering the country, the remainder presumably having arrived either as adults or immature stages unnoticed.

The Carabidae as a whole are unwilling to fly, indeed many are flightless, and their distribution over seas should be considered in terms of passive transport; Britton (1948) suggests drift-wood as a means for dispersal of *Mecyclothorax*. Owing to the scarcity and inaccessibility of the relevant ships' manifests of the 19th century, it has not been possible to carry out elaborate investigations along the lines followed by Lindroth (1957) who deduces from compelling evidence much about the introduction of carabids from Europe to North America, often in ships' ballast. There does not appear to have been much marine traffic to New Zealand in ballast, but a great deal of 'general cargo' including wooden cases, straw packing, etc., could readily accommodate carabids for a short voyage, such as across the Tasman Sea. Brookes (1951) records *Laemostenus complanatus* arriving on Campbell I. from the mainland, evidently in vegetable crates.

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