

NEW RECORDS OF TIGER BEETLES FROM NEW ZEALAND  
WITH TAXONOMIC AND NOMENCLATURAL NOTES  
ON THE GENUS *NEOCICINDELA*  
(Coleoptera, Cicindelidae)

FABIO CASSOLA (\*) and JIRI MORAVEC (\*\*)

INTRODUCTION

New Zealand has a small but entirely endemic tiger beetle fauna (Brouerius van Nidek 1965; Cassola 1990; Cassola & Pearson 2000) that has been under study for more than 200 years. Laporte de Castelnau (1867) first described larval forms of New Zealand species, *Cicindela* (in present day: *Neocicindela*) *tuberculata* (Fabricius, 1775, type-species of the genus) and *parryi* (White, 1846). Hudson (1934) first reported the natural history of larval *Neocicindela* with descriptions of their burrows, biology and behaviour. Additional early information on the biology of *N. tuberculata* was given by Walker (1921). W. Horn (1938) illustrated the elytral patterns of all the species then known. Rivalier (1963), on the basis of several characters including structures of the inner sac of aedeagi, ascribed all these species to his new genus *Neocicindela*, which, instead of expected taxonomic relations to Australian species, showed affinities to the Holarctic fauna (Rivalier 1963; Cassola 1990; Cassola & Putschkov 2009). More recently Savill (1999) revised the genus by synonymizing *circumpictoides* (W. Horn, 1900) under *helmsi* (Sharp, 1886) and provided distribution maps of the twelve species he recognized. In addition, recent field and laboratory research on populations of *N. perhispidata* (Broun, 1880) occurring on different-colored sand habitats showed that body coloration was correlated with the habitat substrate (Hadley et al. 1988). Varying spectral reflectances caused by the beetle coloration also had thermal and water loss consequences for survival (Hadley & Schultz 1987; Hadley et al. 1992; Hadley & Savill 1989).

(\*) Via F. Tomassucci, 12/20 - 00144 Roma, Italy. E-mail: [fabiocassola@alice.it](mailto:fabiocassola@alice.it)  
(Studies of Tiger Beetles, CLXVI).

(\*\*) P.O. Box 17/a, 679 04 Adamov u Brno, Czech Republic.  
E-mail: [jirmor@quick.cz](mailto:jirmor@quick.cz)

Larochelle & Larivière (2001) compiled recently an useful catalogue, which, however, despite the recent investigations by Cassola (2001) and Putschkov & Cassola (2005), still merges the Cicindelidae into the family Carabidae, even not as a subfamily but in a much lower position. Moreover, they treated *Neocicindela* as a subgenus of *Cicindela* Linné, 1758. However, larval characters, combined with some features of adults, indicate that the New Zealand species should be considered as a distinct genus. Pons et al. (2004), using analysis of mtDNA hypothesized that the Australian genus *Rivacindela* Brouerius van Nidek, which includes many species from the various ephemeral salt lakes in the Australian “outback”, is the established sister group of *Neocicindela*. Larochelle & Larivière (2001) also hypothesized that due to geographical proximity the “New Zealand tiger beetles will have to be related to the Australian fauna”. Although further study is certainly needed (Claridge & Vogler 2001a, b), our own impression and data do not apparently support such statements.

In recent times New Zealand’s tiger beetles were sampled by Wiesner (1988), Brzoska (2006) and the authors (FC: January 2006; JM: January-March 1993). During these visits, we observed and collected all species but *hamiltoni* (Broun, 1921). The goal of this article is to report on the natural history, distribution and the taxonomy and nomenclature of this fauna, including reestablishment of one species. Out of the thirteen species thus recognized, four species appear to be restricted to the North Island only, five to the South Island, and four apparently inhabit both islands. The specimens cited in the present paper are or are supposed to be deposited in the following collections: Fabio Cassola, Roma, Italy (FCC); Jiri Moravec, Adamov u Brno, Czech Republic (JMC); Natural History Museum, London, Great Britain (BMNH); Deutsche Entomologische Institut, Müncheberg, Germany (DEI); Dominion Museum & E.S. Gourlay Collection, Nelson, New Zealand (DMN); Entomology Division, Nelson, New Zealand (EDN); Muséum National d’Histoire Naturelle, Paris, France (MNHN); Plant Disease Division, Auckland, New Zealand (PDA).

## LIST OF SPECIES

### 1. *Neocicindela parryi* (White, 1846)

*Cicindela Parryi* White, 1846, Voyage Erebus & Terror, Insects, p. 1 [“New Zealand (Port Nicholson)”].

COLLECTED SPECIMENS: 51.

NORTH ISLAND, Central Plateau: Ohakune, 1500 m, near Taranaki Falls, argillaceous path embankment, 18.II.1993, J. Moravec, 3 ♂♂ 5 ♀♀ (JMC). Ohakune, near Whakapapa village, 1500 m, argillaceous paths and embankments, date?, 4 ♂♂ 3 ♀♀ (JMC). Rotorua, Blue Lake, 38°11.5S-176°20.2E, mossy vertical roadcut, 4.I.06, F. & P. Cassola, 3 ♂♂ 2 ♀♀ (FCC). Rotorua, Waiotapu, Mud Pool, 38°20.5S-176°22.2E, small mossy vertical roadcut, 5.I.06, F. & P. Cassola, 1 ♂ 1 ♀ (FCC). Ruapehu, Hy 1, km 30 N Waiouru, 39°10.4S-175°46.0E, mossy subvertical roadcut, 5.I.06, F. & P. Cassola, 4 ♂♂ 1 ♀ (FCC). Ruapehu, Hy 1, 4 km N Waiouru, 600m, 39°26.4S-175°4.8E, mossy subvertical roadcut, 6.I.06, F. & P. Cassola, 2 ♀♀ (FCC). Ruapehu, Hy 1, 3 km N Waiouru, 39°26.9S-175°40.8E, mossy subvertical roadcut, 6.I.06, F. & P. Cassola, 2 ♂♂ (FCC). Ruapehu, Hy 49, 16.5 km E Ohakune, subvertical clay roadcut, 39°28.2S-175°33.4E, 6.I.06, F. & P. Cassola, 4 ♂♂ 4 ♀♀ (FCC). Ruapehu, 21 km S Ohakune, Hy 4, 620m, small clay embankment, 39°30.1S-175°17.2E, 6.I.06, F. & P. Cassola, 2 ♂♂ 2 ♀♀ (FCC).

SOUTH ISLAND, Marlborough: Nelson, Hy 60, 13 km E Upper Takaka, 41°01.5S-172°52.8E, subvertical roadcut, 9.I.06, F. & P. Cassola, 1 ♂ 1 ♀ (FCC). 19 km E Upper Takaka, 41°01.8S-172°55.8E, mossy subvertical roadcut, 9.I.06, F. & P. Cassola, 3 ♂♂ 3 ♀♀ (FCC).

This widespread species (W. Horn 1938, tab. 60, fig. 19) is common to both North and South Islands and has the greatest altitudinal range of all New Zealand tiger beetle species (Brzoska 2006). It occurs in moist, mossy, shaded clay embankments. Adults are usually poor flyers. The larva was first described by Laporte de Castelnau (1867). Brouerius van Nidek (1965) reported that the type specimen of this species is deposited in BMNH, but it was just superficially seen by the second author. However, the identification of *N. parryi* is reliable due to its distinctive external characters.

### 2. *Neocicindela spilleri* Van Nidek, 1965 (fig. 1)

*Neocicindela spilleri* Brouerius van Nidek, 1965, N.Z. J. Sci., 8, 3, p. 355, f. 1 [“Swanson, under stones in stream bed” (North Island)].

COLLECTED SPECIMENS: 5.

NORTH ISLAND, Northland: Hy 14, Whangarei-Dargaville, 5 km E Kirikapuni, 35°49.2S-174°01.9E, subvertical roadcut, 1.I.06, F. & P. Cassola, 1 ♂ 1 ♀ (FCC); 3.I.06, F. & P. Cassola, 2 ♀♀ (FCC). Central Plateau: Ruapehu, 21 km S Ohakune, Hy 4, 620m, small clay embankment, 39°30.1S-175°17.2E, 6.I.06, F. & P. Cassola, 1 ♂ (FCC).

This very rare species is apparently restricted to the North Island. Adults are likely crepuscular or even nocturnal in habits. The first author found it at just two sites on vertical clay embankments hiding in cracks (fig. 1), a behaviour noted also by Brzoska (2006). According to Brouerius van Nidek (1965) the type specimens of this species should be deposited in EDN and PDA, but they were not examined by us.

### 3. *Neocicindela tuberculata* (Fabricius, 1775) (fig. 2)

*Cicindela tuberculata* Fabricius, 1775, Syst. Ent., p. 225 [„Habitat in nova Zelandia”].

*Cicindela Huttoni* Broun, 1880, Man. New Zeal. Coleopt., p. 2 [“Martin Bay, west coast of Otago” (South Island)] (synonymy by Brouerius van Nidek 1965, p. 353).

TYPE SPECIMENS EXAMINED: 2.

Holotype of *Cicindela tuberculata*: „*Cicindela tuberculata* [handwritten]/Fab. Entom p. [printed], 225 p. 7 [handwritten]; Revision 2007-08 by/F. Cassola & J. Moravec/Holotypus/*Cicindela tuberculata*/Fabricius, 1775” [red printed label]; Revision 2007-08 by/F. Cassola & J. Moravec/*Neocicindela/tuberculata*/(Fabricius,1775) [printed]”, 1 ♂ HT [BMNH, from Banks collection]

Holotype of *Cicindela huttoni*: “Type [round printed label with red ring]”, “♂ [handwritten]”, “2 [printed]”, “New Zealand/Broun Coll./Brit. Mus./1922-482 [printed]”, “Tairua [printed]”, “*Cicindela huttoni* [handwritten]”, “NHM/Broun Coll. [handwritten]”, 1 ♀ (BMNH).

COLLECTED SPECIMENS: 334.

NORTH ISLAND, Northland: Dargaville, Baylys Beach, on the grassy margin of the beach, 30.I.1993, J. Moravec, 18 ♂♂ 12 ♀♀ (JMC). Dargaville, near a lodging house, on argillaceous path and opened places, 30.I.1993, J. Moravec, 8 ♂♂ 6 ♀♀ (JMC). Hy 12, Dargaville, N of Baylys Beach jct, 35°41.0S-173°34.5E, subvertical roadcut, 1.I.06, F. & P. Cassola, 19 ♂♂ 6 ♀♀ (FCC). Whangarei, rd to Marsden Point, 35°52.1S-174°26.2E, subvertical clay embankment nr rd, 3.I.05, F. & P. Cassola, 1 ♂ 1 ♀ (FCC). Hy 14, Whangarei-Dargaville, 4.8 km E Kirikapuni, 35°49.2S-174°01.9E, subvertical roadcut, 3.I.06, F. & P. Cassola, 3 ♂♂ 2 ♀♀ (FCC). Whangarei, rd to Marsden Point, 35°52.1S-174°26.2E, subvertical clay embankment nr rd, 3.I.05, F. & P. Cassola, 1 ♂ 1 ♀ (FCC). Hy 14, Whangarei-Dargaville, 4.8 km E Kirikapuni, 35°49.2S-174°01.9E, subvertical roadcut, 3.I.06, F. & P. Cassola, 3 ♂♂ 2 ♀♀ (FCC). Hy 1F, 30 km N of Kaitaia, 34°53.9S-173°10.5E, subvertical roadcut, 2.I.06, F. & P. Cassola, 30 ♂♂ 15 ♀♀ (FCC). Hy 1F, S of Te Kao, 3 km N Ngataki, 34°43.1S-173°02.4E, subvertical roadcut, 2.I.06, F. & P. Cassola, 26 ♂♂ 6 ♀♀ (FCC). Ngataki, Henderson Bay, 6.II.1993, J. Moravec, 16 ♂♂ 11 ♀♀ (JMC). W of Auckland: Muriwai Beach, subvertical roadcut, 31.XII.05, F. & P. Cassola, 1 ♂ (FCC). Bay of Plenty: 15 km W Rotorua, 37°59.5S-175°51.0E, clay embankment nr rd, 4.I.06, F. & P. Cassola leg., 5 ♂♂ 1 ♀ (FCC). Rotorua, Blue Lake, 38°11.5S-176°20.2E, mossy vertical roadcut, 4.I.06, F. & P. Cassola, 2 ♀♀ (FCC). Central Plateau: Waitapu-Taupo, Hy 5, clay erosion in pasture, 38°39.8S-176°04.8E, 5.I.06, F. & P. Cassola, 11 ♂♂ 5 ♀♀ (FCC). Lake Taupo, 15 km N Taupo, Hy 5, 386m, small clay embankment, 38°33.9S-176°13.9E, 5.I.06, F. & P. Cassola, 2 ♂♂ 4 ♀♀ (FCC). Ruapehu, Hy 1, km 30 N Waiouru, 39°10.4S-175°46.0E, mossy subvertical roadcut, 5.I.06, F. & P. Cassola, 4 ♂♂ 1 ♀ (FCC). Ruapehu, Hy 1, 10 km N Waiouru, dirt rd in “desert”, 39°22.5S-175°42.8E, 5.I.06, F. & P. Cassola, 1 ♀ (FCC). Ruapehu, Hy 1, 7 km N Waiouru, dirt road in “desert”,

6.I.06, F. & P. Cassola, 2 ♂♂ 1 ♀ (FCC). Ruapehu, Hy 49, 16.5 km E Ohakune, subvertical clay roadcut, 39°28.2S-175°33.4E, 6.I.06, F. & P. Cassola, 6 ♂♂ 4 ♀♀ (FCC). Ruapehu, Hy 49, 11 km E Ohakune, subvertical roadcut, 39°30.1S-175°17.2E, 619m, 6.I.06, F. & P. Cassola, 34 ♂♂ 32 ♀♀ (FCC). Ruapehu, 21 km S Ohakune, Hy 4, 620m, small clay embankment, 39°30.1S-175°17.2E, 6.I.06, F. & P. Cassola, 3 ♂♂ 2 ♀♀ (FCC). Ruapehu, Ohakune, Tama Lake, 1800 m, argillaceous paths, embankments and margin of the lake crater, 1800 m, 18.II.1993, J. Moravec, 21 ♂♂ 14 ♀♀ (CCJM). River Region: 47 km NE Wanganui, nr River Manyawhero, subvertical roadcut, 6.I.06, F. & P. Cassola, 1 ♀ (FCC). Wellington: S of Levin, Otaki Beach, 40°45.4S-175°06.2E, sandy trail nr rd, 7.I.06, F. & P. Cassola, 5 ♂♂ 1 ♀ (FCC). S of Pukerua Bay, 41°02S-174°53E, subvertical roadcut, 7.I.06, F. & P. Cassola, 3 ♂♂ 2 ♀♀ (FCC).

SOUTH ISLAND, Marlborough: Nelson, Hy 60, Rangihaeata nr Takaka, 40°48.5S-173°48.9E, 9.I.06, F. & P. Cassola, 3 ♂♂ (FCC). Nelson, Hy 60, 13 km E Upper Takaka, 41°01.5S-172°52.8E, subvertical roadcut, 9.I.06, F. & P. Cassola, 10 ♂♂ 5 ♀♀ (FCC). 29.7 W Wairau Valley, 41°39.0S-173°13.2E, 360m, gentle slope nr rd, 10.I.06, F. & P. Cassola, 8 ♂♂ 13 ♀♀ (FCC). 6 km E Ward, 41°53.2S-174°07.0E, 57m, clay embankment nr rd, 11.I.06, F. & P. Cassola, 11 ♂♂ 10 ♀♀ (FCC). Orinoco Valley near Motueca, on argillaceous paths and low embankments, 3.III.1993, J. Moravec, 11 ♂♂ 8 ♀♀ (JMC).

This is the type species of genus *Neocicindela* (Rivalier 1963) (W. Horn 1938, tab. 60, fig. 20). Because this species occurs in open areas with little vegetation, it is likely that, as extensive deforestation occurred on the North Island, it benefited and expanded to become the most commonly encountered species. It is found in the North Island and the northern part of the South Island (Savill 1999) in a wide range of altitudes and open habitats, most frequently on vertical clay embankments (fig. 2). Hundreds of adults were, for instance, observed by the second author on open places and paths near Henderson Beach, some of them even flying onto his hair and shirt, and hundreds of larval tunnels were present in a great density in the area. The larvae of this species are commonly used by native fishermen as a favourite bait. Examination of the *huttoni* holotype specimen (BMNH) fully confirmed its synonymy with *tuberculata*, a change first proposed by Brouerius van Nidek (1965). In contrast, Olivier's type specimen of *tuberculosa* should be in MNHN, but it was not found nor examined by us. Although almost certainly valid, the synonymy of *tuberculosa* under *tuberculata*, stated by W. Horn (1915), is considered by us to be acceptable, but with reservations until the type specimens are located and examined. The larva of *tuberculata* was first described by Laporte de Castelnau (1867).

#### 4. *Neocicindela latecincta* (White, 1846) (fig. 5)

*Cicindela late-cincta* White, 1846, Voy. Ereb. & Terror, p. 1, t. 1, f. 1 ["New Zealand (Waikouaiti)" (South Island)].

*Cicindela laticincta* [sic!]; White, 1847, Rev. zool., p. 84 (incorrect subsequent spelling).

TYPE SPECIMENS EXAMINED: 1.

Holotype (by monotypy) of *Cicindela latecincta*: “Type [round printed label with red ring]”, “N. Zeal. [handwritten]”, “*Cicindela latecincta* White/Zool. Erebus & Terror [handwritten]”, Waikouaiti [handwritten]”, ♂ (BMNH).

HISTORICAL SPECIMENS EXAMINED: 1.

“N. Seeland/Garnier. [handwritten]”, “Coll. W. Horn/DEI Eberswalde [printed]”, “*latecincta* White [bluish handwritten label, manuscript by W. Horn]”, “*Neocicindela/latecincta* (White, 1846), det. F. Cassola & J. Moravec 2007”, 1 ♂ DEI.

COLLECTED SPECIMENS: 45.

SOUTH ISLAND, Marlborough: Clarence River, 42°09.8S-173°54.5E, 20m, riverbed, 11.I.06, F. & P. Cassola, 1 ♂ 1 ♀ (FCC). Canterbury: Christchurch, Banks Peninsula, nr Akaroa Harbour, 43°45.0S-172°51.9E, 450m, subvertical roadcut, 12.I.06, F. & P. Cassola, 1 ♀ (FCC). Christchurch, Banks Peninsula, 43°44.9S-172°50.2E, 220m, subvertical roadcut, 12.I.06, F. & P. Cassola, 11 ♂♂ 3 ♀♀ (FCC). Hy 73, 24 km NW Springfield, rd to Porter Heights, 43°15.6S-171°41.3E, 800m, subvertical roadcut, 12.I.06, F. & P. Cassola, 11 ♂♂ 10 ♀♀ (FCC). 1 km S Timaru, 44°25.5S-171°14.5E, 35m, gentle slope nr rd, 13.I.06, F. & P. Cassola, 1 ♂ 1 ♀ (FCC). Central Otago: Falls Dam nr St. Bathans, 44°52.5S-169°54.1E, 587m, subvertical roadcut along lake, 15.I.06, F. & P. Cassola, 1 ♂ 4 ♀♀ (FCC).

This species (W. Horn 1938, tab. 60, fig. 21) is apparently restricted to the South Island (Savill 1999; Brzoska 2006). Regarding the species name spelling, White (1847), subsequent to his original description (White 1846), incorrectly wrote *laticincta* instead of *latecincta*. Although both forms are grammatically correct and commonly used in Latin, doubts still remained about the correct original spelling of White’s species, but thanks to the kindest help of Dr. Phil Parkinson (librarian at the Alexander Turnbull Library, New Zealand), we ascertained that the original spelling by White (whose first paper was published in 1846 indeed, although the whole book was accomplished in 1874 only, when its frontispice was printed at last) was *latecincta*. Moreover, the examination of the holotype specimen (BMNH) showed that it bears a handwritten label (apparently an manuscript by White himself: W. Horn et al. 1990, plate 37, fig. 12) unquestionably spelling the species name “*latecincta*”. Thus the spelling “*laticincta*” is likely a lapsus, we considerate it to be an incorrect subsequent spelling (ICZN, 1999) and the original spelling “*latecincta*” is adopted here. Examination of the type specimen, a second historical specimen in W. Horn’s collection (DEI) and many recently collected specimens, confirm *latecincta* to be distinct from *tuberculata*.





Fig. 1 – North Island, Northland, Hy 14 at 5 km E Kirikapuni: habitat of *Neocicindela spilleri* (photo: F. Cassola).



Fig. 2 – North Island, Northland, Hy 12, N of Baylys Beach jct nr Dargaville: habitat of *Neocicindela tuberculata* (photo: F. Cassola).

## 5. *Neocicindela waiouraensis* (Broun, 1914)

*Cicindela waiouraensis* Broun, 1914, Bull. NZ Inst. I, 3, p.146 ["Waiouru, near Mt. Ruapehu" (North Island)].

TYPE SPECIMENS EXAMINED: 1.

Holotype (by monotypy) of *Cicindela waiouraensis*: "Holotype [round printed label with red ring]", "New Zealand/Broun Coll./Brit. Mus./1922-482 [printed]", "3504 ♂ [handwritten]", "Waioura/Ruapehu [handwritten]", "Cicindela waiouraensis [handwritten]", "Cicindela waiouraensis Brn./Holotype/ [handwritten]/H.K. Kenward/V.1973 [printed]", "NHM/Broun Coll. [handwritten]", ♂ (BMNH).

COLLECTED SPECIMENS: 9.

NORTH ISLAND, Central Plateau: Ruapehu, Ohakune, Tama Lake, 1800 m, dry sandy area with sparse, low vegetation in the bottom of the lake crater (distant from the lake water), 18.II.1993, J. Moravec, 1 ♀ (JMC).

SOUTH ISLAND, Marlborough: 29.7 km W Wairau Valley, 41°38.8S-173°13.4E, 315m, dirt road up from river, 10.I.06, F. & P. Cassola, 1 ♂ 5 ♀♀ (FCC); 360m, rd along Argyll Stream, 10.I.06, F. & P. Cassola, 1 ♂ 1 ♀ (FCC).

This species (W. Horn 1938, tab. 60, fig. 22) inhabits both North and South Island. It was originally described from the North Island. It is the largest species of the genus, resembling a large *tuberculata* with a similar pattern of elytral markings (see also W. Horn 1938, pl. 60, fig. 22). However, besides the conspicuously larger size, *waiouraensis* differs externally from *tuberculata* in having a notable purple lustre on the elytra. Examination of the type (BMNH) and other specimens confirm the differences emphasized by Savill (1999). Both *tuberculata* and *waiouraensis* occur away from standing or running usually in sandy or clay open areas and dirt tracks close to vegetation.

## 6. *Neocicindela dunedensis* (Laporte de Castelnau, 1867)

*Cicindela dunedensis* Laporte de Castelnau, 1867, Trans. Roy. Soc. Victoria 8, p. 35 ["Dunedin" (South Island)].

*Cicindela Wakefieldi* Bates, 1874, Ann. Mag. N.H. (4) 13: 234 ["near Christchurch" (South Island)] (synonymy by W. Horn 1915: 319).

TYPE SPECIMENS EXAMINED: 3.

Lectotype (designated here) of *wakefieldi*: "Christchurch [handwritten]/New Zealand/C.M. Wakefield/B.M. 1946-280 [printed]"; "Revision 2007-08 by/F.Cassola & J. Moravec/Lectotypus/Cicindela wakefieldi/Bates, 1874 [red printed label]"; "Revision 2007-08 by/F.Cassola & J. Moravec/Neocicindela/dunedensis/(Laporte de Castelnau, 1867)" [printed], 1 ♂ BMNH. This and the following specimens apparently came from the Wakefield collection and were subsequently donated to the BMNH by Wakefield's daughter, thus probably being the ones examined by H.W. Bates (M. Barclay, pers. comm. to first author, 2008).



Paralectotype (designated here) of *wakefieldi*: “Christchurch [handwritten]/New Zealand/C.M. Wakefield/B.M. 1946-280 [printed]”; “Revision 2007-08 by/F.Cassola & J. Moravec/Paralectotypus/Cicindela wakefieldi/Bates, 1874 [red printed label]”; “Revision 2007-08 by/F.Cassola & J. Moravec/Neocicindela/dunedensis/(Laporte de Castelnaud, 1867 [printed])”, 1 ♂ BMNH.

Paralectotype (designated here) of *wakefieldi*: “Christchurch [handwritten]/New Zealand/C.M. Wakefield, B.M. 1946-280 [printed]”; “Revision 2007-08 by/F.Cassola & J. Moravec/Paralectotypus/Cicindela wakefieldi/Bates, 1874 [red printed label]”; “Revision 2007-08 by/F.Cassola & J. Moravec/Neocicindela/dunedensis/(Laporte de Castelnaud, 1867 [printed])”, 1 ♂ BMNH.

HISTORICAL SPECIMENS EXAMINED: 4.

“Neu Seeland [handwritten]”, “Coll. W. Horn/DEI Eberswalde [printed]”, “Neocicindela/dunedensis/(Laporte de Castelnaud, 1867)/det. F. Cassola & J. Moravec 2007 [printed]”; 1 ♂ DEI.

“Christchurch [handwritten]/New Zealand/C.M.Wakefield/B.M. 1946-280 [printed]”; “Revision 2007-08 by/F. Cassola & J. Moravec/Lectotypus/Cicindela wakefieldi/Bates, 1874 [red printed label]”; “Revision 2007-08 by/F. Cassola & J. Moravec/Neocicindela/dunedensis/(Laporte de Castelnaud, 1867) [printed]”, 1 ♂ (BMNH) (Lectotype of *Cicindela wakefieldi*, from Wakefield collection).

“Christchurch [handwritten]/New Zealand/C.M.Wakefield/B.M. 1946-280 [printed]”; “Revision 2007-08 by/F. Cassola & J. Moravec/Paralectotypus/Cicindela wakefieldi/Bates, 1874 [red printed label]”; “Revision 2007-08 by/F. Cassola & J. Moravec/Neocicindela/dunedensis/(Laporte de Castelnaud, 1867) [printed]”, 1 ♂ (BMNH) (Paralectotype of *Cicindela wakefieldi*, from Wakefield collection).

“Christchurch [handwritten]/New Zealand/C.M.Wakefield/B.M. 1946-280 [printed]”; “Revision 2007-08 by/F. Cassola & J. Moravec/Paralectotypus/Cicindela wakefieldi/Bates, 1874 [red printed label]”; “Revision 2007-08 by/F. Cassola & J. Moravec/Neocicindela/dunedensis/(Laporte de Castelnaud, 1867) [printed]”, 1 ♂ (BMNH) (Paralectotype of *Cicindela wakefieldi*, from Wakefield collection).

COLLECTED SPECIMENS: 109.

SOUTH ISLAND, Central Otago: E of Kurow, dirt rd along River Hakataramea, 44°43.8S-170°29.1E, 215m, 14.I.06, F. & P. Cassola, 46 ♂♂ 33 ♀♀ (FCC). NW edge of Alexandra, Hy 8, 45°14.5S-169°22.3E, 145m, grassy/sandy area near power line, 14.I.06, F. & P. Cassola, 2 ♂♂ 1 ♀ (FCC). Lindis Valley, 10.5 km N of Tarras, Hy 8, 44°47.7S-169°30.4E, 265m, subvertical clay erosion nr rd, 14.I.06, F. & P. Cassola, 5 ♂♂ 5 ♀♀ (FCC). Falls Dam nr St. Bathans, 44°52.5S-169°54.1E, 587m, grassy/sandy area under dam, 15.I.06, F. & P. Cassola, 10 ♂♂ 7 ♀♀ (FCC).

This is the smallest species in New Zealand (W. Horn 1938, tab. 60, fig. 23) and its occurrence is restricted to the east-central part of South Island (Savill 1999). It was found in a dirt road in a river valley (away from water) as well as in a sparsely vegetated sandy area below a dam in Central Otago. According to Brouerius van Nidek (1965) the type specimens of *dunedensis* should be deposited in BMNH, but only those of *wakefieldi* were found. Nevertheless, we reconfirm the synonymy first proposed by W. Horn (1915).



Fig. 3 – South Island, Marlborough, Wairau River: a specimen of *Neocicindela helmsi* (photo: F. Cassola).



Fig. 4 – South Island, Marlborough, Wairau River: habitat of *Neocicindela helmsi*, *N. austromontana* and *N. feredayi* (photo: F. Cassola).



Fig. 5 – South Island, Marlborough, Clarence River: three tiger beetle species (*Neocicindela latecincta*, *N. helmsi* and *N. feredayi*) were found here (photo: F. Cassola).

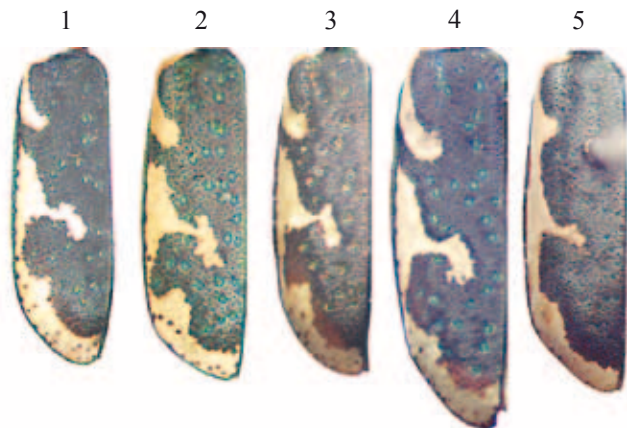


Fig. 6 – Left elytron of: *N. helmsi*, holotype (BMNH) (1); *N. halli* (= *N. novaseelandica*), syntype (BMNH) (2); *N. novaseelandica*, lectotype (DEI) (3); *N. novaseelandica*, paralectotype (DEI) (4); *N. circumpictoides* (= *N. helmsi*), holotype (DEI) (5). (Photo: J. Moravec).

## 7. *Neocicindela hamiltoni* (Broun, 1921)

*Cicindela Hamiltoni* Broun, 1921, Bull. N.Z. Inst. 1, 7, p. 594 [“Mouat’s Lookout, Awatere River Basin” (South Island)].

This poorly known species was not found by us. It is apparently endemic to the South Island, where it occurs at high elevations on glacial till with sparse vegetation (Brzoska 2006). According to Brouerius van Nidek (1965) the type specimen of this species should be housed in DMN, but it was not examined by us. However, in the Canterbury Museum collection (Christchurch, New Zealand), the first author observed several specimens collected by R.A. Savill in clay pockets at Porter Heights, West Canterbury (skifields at over 1800 m on the sea level) in March 1992.

## 8. *Neocicindela helmsi* (Sharp, 1886) (figs 3, 4, 5, 6)

*Cicindela Helmsi* Sharp, 1886, Trans. Dublin Soc. 3, p. 358 [“... this species was sent to me some years ago from Texas, North America, by Mr. Belfrage, who also informed me that it came from Greymouth ... New Zealand“].

*Cicindela circumpictoides* W. Horn 1900, D. ent. Z., p. 207 [«Oceania (patria exacta ignota: verisimillime Nova-Zeelandia)»] (synonymy by Savill 1999, p. 129).

TYPE SPECIMENS EXAMINED: 2.

Holotype (by monotypy) of *Cicindela helmsi*: “Type/H.T. [round printed label with red ring]”, “Greymouth/New Zealand/(Helms) [printed]”, “Sharp Coll./1905-313 [printed]”, “*Cicindela helmsi* Type D.S., Greymouth-Belfrage [handwritten]”, ♂ (BMNH).

Holotype (by monotypy) of *Cicindela circumpictoides*: “Witte, Oceania [handwritten]”, “Type! Dr. W. Horn [printed]”, “Holotypus [red printed label]”, “*circumpictoides mihi* [handscript by W. Horn, bluish label]”, “Revision 2007 by F. Cassola & J. Moravec: Holotype (by monotypy) *Cicindela circumpictoides* W. Horn, 1900 [red printed label]”; “*Neocicindela helmsi* (Sharp, 1886); det. F. Cassola & J. Moravec 2007 (syn.: *N. circumpictoides* W. Horn)» [printed], ♂ (DEI) (Döbler 1973).

HISTORICAL SPECIMENS EXAMINED: 5.

“Wellington, New Zealand [handwritten]”, “Baker dedit [handwritten]”, “*Neocicindela helmsi* (Sharp, 1886); det. F. Cassola & J. Moravec 2007 (syn.: *N. circumpictoides* W. Horn) [printed]», 1 ♂ DEI.

“N. Seeland” [handscript by W. Horn]”, “Coll. Baden Ruge [handwritten]“, „*Neocicindela helmsi* (Sharp, 1886); det. F. Cassola & J. Moravec 2007 (syn.: *N. circumpictoides* W. Horn) [printed]», 1 ♂ DEI.

“N. Seeland” [handscript by W. Horn], “*Neocicindela helmsi* (Sharp, 1886); det. F. Cassola & J. Moravec 2007 (syn.: *N. circumpictoides* W. Horn) [printed]», 1 ♂ DEI.

“Waiiau Riv., Marlborough, S. Isl., N. See1d. [handscript by W. Horn]”, “Hudson ded. [handscript by W. Horn]“, 1 ♂ DEI.

“Waiiau Riv., Marlborough, S. Isl., N. See1d. [handscript by W. Horn]”, “Hudson ded. [handscript by W. Horn]”, 1 ♀ DEI.

COLLECTED SPECIMENS: 73.

SOUTH ISLAND, Marlborough: 29.7 km W Wairau Valley, 41°38.9S-173°13.4E, 315 m, sand bar nr river, 10.I.06, F. & P. Cassola, 25 ♂♂ 28 ♀♀ (FCC). Marlborough: Clarence River, sand and stone gravel in the river bed near the main road bridge, 2.III.1993, 8 ♂♂ 6 ♀♀ J. Moravec (JMC). Marlborough: Clarence River, 42°09.7S-173°54.6E, 20m, sand bar in riverbed, 11.I.06, F. & P. Cassola, 2 ♂♂ 3 ♀♀ (FCC). Canterbury: Hy 77, E of Mount Hutt, Rakaia River, 43°31.1S-171°39.5E, 275m, sand bar in riverbed, 13.I.06, F. & P. Cassola, 1 ♂ (FCC).

Sharp's description of *helmsi* (Sharp 1886) clearly stated that the only specimen he saw came from "Greymouth", which is on the South Island, the type locality written in the label of the holotype specimen (BMNH). Both Brzoska (2006) and the present authors found *helmsi* in the South Island abundantly occurring on sandy/muddy river bars such as those of the Wairau (figs 3, 4) and Clarence (fig. 5) Rivers, syntopically with *austromontana* and *feredayi*. As to the status of the name *circumpictoides*, although nothing is known about its origins, a comparison of its type specimen (DEI) to the *helmsi* holotype (BMNH) showed that these two taxa are synonyms, with *circumpictoides* obviously being the junior one. Synonymy of *circumpictoides* under *helmsi* was firstly established by Savill (1999), allegedly based on examination of the primary types of both species, and is confirmed here, based on our examination of both types as well as of other specimens in DEI. Our specimens from the Wairau and Clarence Rivers (with few poorly marked elytral foveae) are nearly identical to each other. This species is apparently restricted to the South Island.

## 9. *Neocicindela novaseelandica* (W. Horn, 1892), **comb. nov.**, bona species (figs 6, 7, 8)

*Cicindela novaseelandica* W. Horn, 1892, Deutsche ent. Zeitschr., p. 83 ["... Dr. Richter Sammlung, in welcher sie mit der falschen Bestimmung *C. Feredayi* Bat. Nov. Zeeland steckten"] (synonymy by W. Horn 1893, p. 335).

*Cicindela Halli* Broun, 1917, Bull. N.Z. Inst. 1 (5): 350 [Type locality: Hollyford, Fiordland] (synonymy by Rivalier 1963, p. 37).

TYPE SPECIMENS EXAMINED: 3.

Lectotype (designated here) of *Cicindela novaseelandica*: "N. Seeland [handwritten]", "Type!/Dr. W. Horn [printed]", "Syntypus [red printed label]", "ex coll./Dr. Richter [printed]", "novaseelandi/ca mihi [handscript by W. Horn, bluish label]", "Coll. W. Horn/DEI Eberswalde [printed]", "Helmsi Sharp [handscript by W. Horn, bluish label]", "helmsi/(novaseelandica) (handwritten)", "Lectotype *Cicindela/novaseelandica* W. Horn, 1892/designated by/F. Cassola & J. Moravec 2007 [red printed label]"; "*Neocicindela novaseelandica* (W. Horn, 1892) c. n./det. F. Cassola & J. Moravec 2007 [printed]", ♂ DEI (Döbler 1973, Brouerius van Nidek 1965).





Figs 7-8 – *Neocicindela novaseelandica* (lectotype) (DEI) (photo: J. Moravec) (7). *Neocicindela novaseelandica* (syntype of *Cicindela halli*) (BMNH) (photo: J. Moravec) (8).



9



10

Figs 9-10 – South Island, Marlsborough, Wairau River: a specimen of *Neocicindela austromontana* (photo: F. Cassola) (9). *Neocicindela austromontana* (holotype of *Cicindela incognita*) (DEI) (photo: J. Moravec) (10).



Fig. 11 – South Island, Marlsborough, Wairau River: a mating pair of *Neocicindela feredayi* (photo: F. Cassola).





Fig. 12 – North Island, Northland, Bayllys beach: habitat of *Neocicindela p. perhispidata* (photo: F. Cassola).



Fig. 13 – North Island, Northland, Uretiti Beach near Waipu: a mating pair of *Neocicindela brevilunata* (photo: F. Cassola).

Paralectotype of *Cicindela novaseelandica*: “N. Seeland [handscript by W. Horn]”, “Type!/Dr. W. Horn [printed]”, “Syntypus [red printed label]”, “ex coll./Dr. Richter [printed]”, “Coll. W. Horn/DEI Eberswalde [printed]”, “vergl. mit cotype von *C. halli* 1927! (handscript by W. Horn)”, “Revision 2007 by F. Cassola & J. Moravec: Paralectotype *Cicindela/novaseelandica* W. Horn, 1892 [red printed label]”; “*Neocicindela/novaseelandica* (W. Horn, 1892) c. n./det. F. Cassola & J. Moravec 2007 [printed]”, ♀ (DEI).

Syntype of *Cicindela halli*: “Type [round printed label with red ring]”, “3783 ♂ [handwritten]”, “N. Zeal./Broun Coll./Brit.Mus./1922-482 [printed]”, “NHM Broun Coll. [handwritten]”, “Hollyford/23.2.1914 [handwritten]”, *Cicindela halli* [handwritten]”, ♂ (BMNH).

HISTORICAL SPECIMENS EXAMINED: 1.

“W. Otago/New Zeal. [handwritten]”, “3783 ♂ [handwritten]”, “Coll./T. Hall

[handwritten]“, “Coll. W. Horn/DEI Eberswalde [printed]“, “Halli Brn. [bluish handwritten label, manuscript by W. Horn]”, “Historical specimen: *Cicindela halli* Broun, 1917/ (=Neocicindela novaseelandica (W. Horn, 1892) c. n./det. F. Cassola & J. Moravec 2007 [printed]”; 1 ♂ DEI.

COLLECTED SPECIMENS: 49.

NORTH ISLAND, Central Plateau: Ruapehu, Ohakune, Tama Lake, 1800 m, argillaceous paths, embankments and margin of the lake crater, 1800 m, 18.II.1993, J. Moravec, 4 ♂♂ 4 ♀♀ (JMC, FCC). Central Plateau: Ohakune, near Whakapapa village, 1500 m, argillaceous paths and embankments, 3 ♂♂ 2 ♀♀ (JMC). Central Plateau: Ohakune, 1500 m, near Taranaki Falls, argillaceous path embankment, 18.II.1993, J. Moravec, 8 ♂♂ 5 ♀♀ (JMC, FCC). Central Plateau: Waiouru, Rangiro desert, on black lava sand and gravel of the opened place along the Desert Road, 16.II.1993, J. Moravec, 7 ♂♂ 6 ♀♀ (JMC, FCC).

Although similar to *helmsi*, this species differs by having larger and more numerous elytral foveae (figs 6, 7), and occurring in a markedly different habitat (volcanic craters far from water, instead of riverbanks). “*Cicindela halli*”, which is synonymous with *novaseelandica*, was apparently described, in contrast, from the South Island, as the type locality of a syntype specimen in BMNH (“Hollyford”, Fiordland) would seem to demonstrate. However, because this syntype specimen (fig. 8), although supposedly from Hollyford in the South Island, is practically identical to our *novaseelandica* specimens from the North Island, it is possible either that *novaseelandica* occurs in both islands, or that the *halli* syntype specimen is mislabelled (a common event in old specimens that were donated to authors but whose provenance was poorly labeled). W. Horn (1892) did not provide a type locality for *novaseelandica* (generally indicating that it came from New Zealand) in his original paper. It is unlikely that the specimen labelled “Hollyford” was ever seen by Broun. This casts doubt on the claim that it is a valid *halli* syntype. We prefer to re-establish *novaseelandica* from synonymy with *helmsi*, as it is markedly similar to the “syntype” of *halli*. It also differs from *helmsi* not only by the stronger and more numerous elytral foveae and the much different habitat but also because of the disjunct white elytral markings that do not form a continuous marginal band. The male holotype of *helmsi* has the humeral lunule separated, while the apical one is connected with the middle lunule. This pattern variation may fall within the usual variability. As to *Cicindela halli*, it is apparently a junior synonym of *novaseelandica*. Apart from the puzzling “syntype” specimen, whose provenance is questionable, *novaseelandica* appears to be restricted to the North Island. Resurrection from synonymy of this species is perhaps the most interesting result of this study.

## 10. *Neocicindela austromontana* (Bates, 1878) (figs 4, 9, 10)

*Cicindela austromontana* Bates, 1878, Ent. Monthly Mag. 15, p. 22 [“Caste Hill, Eastern slope of New Zealand Alps, Canterbury” (South Island)].

*Cicindela incognita* W. Horn 1892a, D. ent. Z., p. 82 [“Nov. Zealand”] (synonymy by W. Horn 1926b, p. 200).

COLLECTED SPECIMENS: 126.

SOUTH ISLAND, Marlborough: 29.7 km W Wairau Valley, 41°38.9S-173°13.4E, 315m, sand bar nr river, 10.I.06, F. & P. Cassola, 54 ♂♂ 44 ♀♀ (FCC). Marlborough: 29.7 W Wairau Valley, 41°39.0S-173°13.2E, 325 m, dirt rd up from river, 10.I.06, F. & P. Cassola, 1 ♀ (FCC). Marlborough: Kaituna, River Wairau, 41°28.6S-173°48.9E, 40m, 10.I.06, F. & P. Cassola, 15 ♂♂ 11 ♀♀ (FCC). Canterbury: Hy 73, 24 km NW Springfield, rd to Porter Heights, 43°15.7S-171°41.2E, 800 m, subvertical roadcut, 12.I.06, F. & P. Cassola, 1 ♀ (FCC).

*N. austromontana* is apparently confined to the north-eastern part of the South Island. It occurred abundantly on sandy or muddy riverbars of the Wairau River (fig. 4), together with the congeners *helmsi* and *feredayi*. One specimen, however, was found 24 km NW of Springfield on a subvertical roadcut, indicating that this species is not only a riverbank inhabitant. According to Brouerius van Nidek (1965) type specimens of *austromontana* and *incognita* are housed respectively in MNHN and DEI, but we could not locate them there.

## 11. *Neocicindela feredayi* (Bates, 1867) (figs 4, 5, 11)

*Cicindela Feredayi* Bates, 1867, Ent. Monthly Mag. 4, p. 53 [“near Christchurch, in the Middle Island” (South Island)].

COLLECTED SPECIMENS: 54.

SOUTH ISLAND, Marlborough: 29.7 km W Wairau Valley, 41°38.9S-173°13.4E, 315m, sand bar nr river, 10.I.06, F. & P. Cassola, 12 ♂♂ 13 ♀♀ (FCC). Marlborough: Clarence River, 42°09.7S-173°54.6E, 20m, sand bar in riverbed, 11.I.06, F. & P. Cassola, 11 ♂♂ 12 ♀♀ (FCC). Canterbury: Hy 77, E of Mount Hutt, Rakaia River, 43°31.1S-171°39.5E, 275m, sand bar in riverbed, 13.I.06, F. & P. Cassola, 5 ♂♂ 1 ♀ (FCC).

This species is known from both islands, but it is much more common in the South Island (Brzoska 2006). The first author found it occurring in sandy or muddy riverbars such as those of the Wairau (figs 4, 11), Clarence (fig. 5), and Rakaia Rivers, together with *helmsi* and *austromontana*. According to Brouerius van Nidek (1965) the type specimen of this species is deposited in MNHN, but we could not locate it there.

## 12. *Neocicindela perhispidata* (Broun, 1880)

*Cicindela perhispidata* Broun, 1880, Man. N.Z. Col. 1, p 4 ["near Hokianga; ... Marden Point, Whangarei Harbour" (North Island)].

The polytypic species *Neocicindela perhispidata* is a North Island endemic. Two "forms" or "subspecies" are herein recognized.

### 12a. *Neocicindela perhispidata perhispidata* (Broun, 1880) (fig. 12)

*Cicindela perhispidata* Broun, 1880, Man. N.Z. Col. 1, p. 4 ["near Hokianga; ... Marsden Point, Whangarei Harbour" (North Island)].

*Cicindela Campbelli* Broun, 1887, Man N.Z. Col. 4, p. 817 ["Waikato Heads" (North Island)] [synonymy by W. Horn 1915, p. 319]

COLLECTED SPECIMENS: 117 specimens.

NORTH ISLAND, W of Auckland: Huapai, Muriwai Beach, black sand of the beach, 11.II.1993, J. Moravec, 10 ♂♂, 8 ♂♂ (JMC). Northland: Dargaville, Baylys Beach, 35°57.0S-173°44.5E, sand dunes below escarpment, 30.I.1993, J. Moravec, 18 ♂♂, 15 ♀♀ (JMC); 1.I.06, F. & P. Cassola, 38 ♂♂ 28 ♀♀ (FCC).

According to Brouerius van Nidek (1965) the type specimen of *perhispidata* is deposited in BMNH, but we did not find it there. The white elytral markings extend variously on the elytral disc, ranging from the dark *campbelli* Broun, 1880 to the almost fully white *giveni* Brouerius Van Nidek, 1965. This colour corresponds to the colour of the substrate found in their respective localities (Hadley et al. 1988). This pattern of substrate matching does not follow the generally accepted definition of subspecies, and thus the validity of these is questionable. The typonominal subspecies is found on transitional beaches between Ninety Miles Beach in the north and the entrance of Kaipara Harbour in the south (Savill 1999), on the western side of the northern narrow peninsula (fig. 12), but also on the eastern side (Marsden Point near Whangarei: Broun, 1880). As for *campbelli*, it was described as a species (Broun 1887), but it is here considered to be a *perhispidata* population with particularly dark colouration associated with the dark volcanic sand on which it lives. In fact, the dark to black ground coloration is prevailing only in a few adults collected by the second author at Muriwai Beach, Huapai (which lies somewhat south of the type localities of *perhispidata*), and all the other specimens from the same black-sand beach have elytral coloration and markings exhibiting a range of intermediate coloration similar to or identical with that of *perhispidata*. According to Brouerius van Nidek (1965)

the type specimen of *campbelli* is also deposited in BMNH, but we could not find it there.

## 12b. *Neocicindela perhispidata giveni* Brouerius van Nidek, 1965

*Neocicindela perhispidata giveni* Brouerius van Nidek, 1965, N.Z. J. Sci., 8, 3, p. 353 ["Spirits Bay" (North Island)].

*Neocicindela perhispidata savilli*; Wiesner, 1988, Entomol. Blätter, 84 (3), p. 176 ["Rarawa Beach, 10 km north of Pukenui" (North Island); synonymy by Savill 1999].

COLLECTED SPECIMENS: 82.

NORTH ISLAND, Northland: Spirits Bay (Kapowairua), 34°25.5S-172°51.4E, fore sand dunes and directly on the beach, 16 ♂♂ 18 ♀♀, 5.II.1993, J. Moravec (JMC); fore sand dunes, 2.I.06, F. & P. Cassola, 8 ♂♂ 6 ♀♀ (FCC). Northland: Ngataki, Rarawa Beach, fore sand dunes and sand of the beach, 7.II.1993, J. Moravec, 16 ♂♂, 18 ♀♀ (JMC).

This "subspecies" has the elytra extensively white obviously because it lives on light, white, predominantly quartz beaches. We found it to be fairly common at Spirits Bay in the extreme northern tip of the North Island. The very similar "ssp." *savilli*, described from Rarawa Beach, 10 km N Pukenui (Wiesner 1988), was recently synonymized under *giveni* by Savill (1999). This nomenclatural change is likely appropriate as this population is separated by less than 50 kms from Spirits Bay. However, the elytral markings of *savilli* from the Rarawa Beach are consistently different in having the basal elytral bronzed area notably narrower than that of *giveni*. Therefore, we are unsure of the status of this taxon.

## 13. *Neocicindela brevilunata* (W. Horn, 1926) (fig. 13)

*Cicindela brevilunata* W. Horn, 1926, Ent. Blätter 22, p. 168 ["N-Seeland"].

COLLECTED SPECIMENS: 76.

NORTH ISLAND, Northland: Waipu, Breem Bay, fore sand dunes, 9.II.1993, J. Moravec, 18 ♂♂ 24 ♀♀ (JMC). Northland: Hy 1, N of Waipu, Uretiti Beach, 35°54.0S-174°27.4E, fore sand dunes, 3.I.06, F. & P. Cassola, 20 ♂♂ 14 ♀♀ (FCC).

This species occurs on fore dunes of the ocean beach and is endemic to a limited part of the northeastern coast of the North Island, south of Whangarei, as well as on a few barrier islands (Brzoska 2006). The specimens mentioned above were all collected near Waipu at Uretiti Beach (fig. 13) and Breem Bay. Type specimens of this species are deposited in DEI and BMNH (Brouerius van Nidek 1965), and they were only hastily seen by the second author.

ACKNOWLEDGEMENTS. The Authors wish to thank very much Max Barclay and Conrad Gillett (Natural History Museum, London, U.K.; BMNH), as well as Lothar Zerche (Deutsche Entomologische Institut, Müncheberg, Germany; DEI) for the kindest loan of several important type specimens. Thanks are also due to Dr. Phil Parkinson (Alexander Turnbull Library, New Zealand), who helped us to solve the nomenclatural problem related to the original spelling of *Neocicindela latecincta*, and to Dr. David L. Pearson (Arizona State University, Tempe, USA) who kindly reviewed the English text.

#### ABSTRACT

The present paper deals with several new faunistic data and remarks on the taxonomy and nomenclature of the New Zealand endemic genus *Neocicindela* Rivalier, 1963, based on examination of type specimens of several taxa. *N. novaseelandica* (W. Horn, 1892) **comb. nov.** is restored as an independent species closely related to but well separated from *N. helmsi* (Sharp, 1886). Field photographs, as well as those of type specimens and some of their characters are given.

#### RIASSUNTO

*Nuovi dati sulle Cicindele della Nuova Zelanda e note sulla tassonomia e nomenclatura del genere Neocicindela (Coleoptera, Cicindelidae).*

Il presente lavoro porta nuovi dati faunistici e diverse osservazioni sulla tassonomia e nomenclatura del genere *Neocicindela* Rivalier, 1963, endemico della Nuova Zelanda, basati sull'esame degli esemplari tipici di diverse specie. *N. novaseelandica* (W. Horn, 1892) **comb. nov.** Viene ripristinata come buona specie a se stante, vicina a ma distinta da *N. helmsi* (Sharp, 1886). Vengono fornite inoltre fotografie fatte in natura come pure quelle di alcuni esemplari tipici o di loro caratteri.

#### REFERENCES

- BATES, H.W. 1867. New species of Insects from the Province of Canterbury, New Zealand, collected by R.W. Fereday, Esq. Proceedings of the Zoological Society of London, 52-55.
- BATES, H.W. 1874. On the Geodephagous Coleoptera of New Zealand. The Annals and Magazine of Natural History, (4) 13: 233-322.
- BATES, H.W. 1878. New species of Geodephagous *Coleoptera* from New Zealand. Proceedings of the Zoological Society of London, 22-23.
- BROUERIUS VAN NIDEK, C.M.C. 1965. Cicindelidae of New Zealand with descriptions of a new species and subspecies. New Zealand Journal of Science, 8 (3): 352-358.
- BROUN, Th. 1880. New Zealand Coleoptera. Wellington, New Zealand, James Hughes, 1-6.
- BROUN, Th. 1887. Manual of the New Zealand Coleoptera. Part IV. Group Cicindelidae, p. 817.
- BROUN, Th. 1914. Descriptions of new genera and species of Coleoptera. Bulletin of the New Zealand Institute, 1 (3): 143-146.
- BROUN, Th. 1917. Descriptions of new genera and species of Coleoptera (Part V). Bulletin of the New Zealand Institute, 1 (5): 347-350.
- BROUN, Th. 1921. Descriptions of new genera and species of Coleoptera. Bulletin of the New Zealand Institute, 1 (7): 591-595.



- BRZOSKA, D. 2006. Collecting Notes from New Zealand. *Cicindela*, 38 (1-4): 21-36.
- CASSOLA, F. 1990. Studies on Tiger Beetles. LV. Biogeography of the Cicindelidae (Coleoptera) of the Australo-Papuan region. In: Biogeographical Aspects of Insularity (Atti dei Convegni Lincei, 85), Accademia Nazionale dei Lincei, Roma, 559-574.
- CASSOLA, F. 2001. Studies of tiger beetles. CXXIII. Preliminary approach to the macrosystematics of tiger beetles (Coleoptera: Cicindelidae). *Russian Entomological Journal*, 2001, 10 (3): 265-272.
- CASSOLA, F. & D. PEARSON. 2000. Global patterns of tiger beetle species richness (Coleoptera: Cicindelidae): their use in conservation planning. *Biological Conservation*, 95: 197-208.
- CASSOLA, F. & A. PUTCHKOV. 2009. Descriptions of the larvae of four species of the New Zealand tiger beetle genus *Neocicindela* Rivalier, 1963 (Coleoptera, Cicindelidae). *Bollettino della Società entomologica italiana*, 141 (1): 17-27.
- CLARIDGE, E.M. & A.P. VOGLER. 2001. The radiation of *Neocicindela* tiger beetles in New Zealand. Symposium: Deep time? Recent advances in Insect Biogeography. Entomological Society of America Annual Meeting, San Diego.
- CLARIDGE, E.M. & A.P. VOGLER. 2001. The radiation of *Neocicindela* tiger beetles from New Zealand. Newsletter of the Systematics Association, 17: 6 (Internet).
- FABRICIUS, I.C. 1775. *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Flensburgi et Lipsiae, in Off. Libraria Kortii, 832 pp.
- HADLEY, N.F. & A. SAVILL. 1989. Water loss in three subspecies of the New Zealand tiger beetle *Neocicindela perhispidata*: correlations with cuticular hydrocarbons. *Comparative Biochemistry and Physiology*, 97A (4): 749-753.
- HADLEY, N.F., A. SAVILL & T.D. SCHULTZ. 1992. Coloration and its thermal consequences in the New Zealand tiger beetle *Neocicindela perhispidata*. *Journal of Thermal Biology*, 17 (1): 55-61.
- HADLEY, N.F. & T.D. SCHULTZ. 1987. Water loss in three species of tiger beetles (*Cicindela*): correlations with epicuticular hydrocarbons. *Journal of Insect Physiology*, 33 (10): 677-682.
- HADLEY, N.F., T.D. SCHULTZ & R.A. SAVILL. 1988. Spectral reflectances of three tiger beetle subspecies (*Neocicindela perhispidata*): correlations with their habitat substrate. *New Zealand Journal of Zoology*, 15: 343-346.
- HORN, W. 1892. Fünf Dekaden neuer Cicindeleten. *Deutsche entomologische Zeitschrift*, 65-92.
- HORN, W. 1900. De novis Cicindelidarum speciebus. *Deutsche entomologische Zeitschrift*, 193-212.
- HORN, W. 1915. Coleoptera Adephega, Fam. Carabidae, Subfam. Cicindelinae: 209-486, pls 6-15. In: P. Wytzman (ed.), *Genera Insectorum*, Fasc. 82C. Bruxelles.
- HORN, W. 1926. Ueber neue und alte Cicindelinen der Welt. *Entom. Blätter*, 22 (4): 164-173.
- HORN, W. 1938. 2000 Zeichnungen von Cicindelinae. *Entomologische Beihefte aus Berlin-Dahlem*, 5: 1-71, pls. 1-90.
- HORN, W., I. KAHLE, G. FRIESE & R. GAEDIKE. 1990. *Collectiones Entomologicae. Ein Kompendium über den Verbleib entomologischer Sammlungen der Welt bis 1960*. Akademie der Landwirtschaftswissenschaften der Deutschen Demokratische Republik, Berlin, 2 volumes, pp. 1-573.
- HUDSON, G.V. 1934. *New Zealand Beetles and Their Larvae; an Elementary Introduction to the Study of Our Native Coleoptera*. Ferguson & Osborn Ltd., Wellington, 236 pp.
- INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1999. *International Code of Zoological Nomenclature (ICZN)*. Fourth Edition, London, XXIX+306 pp.

- LAPORTE DE CASTELNAU, F.L. 1867. Notes on Australian Coleoptera. Transactions and Proceedings of the Royal Society of Victoria, 8 : 30-38.
- LAROCHELLE, A. & M.-C. LARIVIÈRE. 2001. Fauna of New Zealand, 43. Carabidae (Insecta: Coleoptera): catalogue. Lincoln, Canterbury, New Zealand, pp. 1-285.
- PONS, J., T. FUJISAWA, ELIN M. CLARIDGE, R.A. SAVILL, T.G. BARRACLOUGH & A.P. VOGLER. 2004. From individuals to clades: comparing tiger beetles in the genus *Neocicindela* with radiations outside New Zealand. Unpublished manuscript, pp. 41.
- PUTCHKOV, A. & F. CASSOLA. 2005. Tiger beetles deserve separate family status in suborder Adephaga (Coleoptera, Cicindelidae). Bulletin de la SEF, Paris, 110 (3): 281-293.
- RIVALIER, E. 1963. Démembrement du genre *Cicindela* L. (fin). V. Faune Australienne (et liste récapitulative des genres et sous-genres proposés pour la faune mondiale). Revue française d'Entomologie, 30 (1): 30-48.
- SAVILL, R.A. 1999. A key to the New Zealand tiger beetles, including distribution, habitat and new synonyms (Coleoptera: Carabidae: Cicindelinae). Records of the Canterbury Museum, 13: 129-146.
- SHARP, D. 1886. On New Zealand Coleoptera. Transactions of the Royal Dublin Society, 3: 358, 451.
- WALKER, J.J. 1921. Some aspects of insect life in New Zealand. Transactions of the entomological Society of London (1920), p. CXXI.
- WHITE, A. 1846. Insects of New Zealand: 1-24 (p. 1, pl. 1, f. 1). In: J. Richardson and J.E. Gray (eds.), The Zoology of the Voyage of H.M.S. Erebus & Terror, under the Command of Captain James Clark Ross, RN, during the years 1839 to 1843, etc. London, E.W. Janson, 1846-1874.
- WHITE, A. 1847. Voyage autour du Monde des navires de Sa Majesté britannique Erebus et Terror. Insectes de la Nouvelle-Zélande. Revue Zoologique, 84-85.
- WIESNER, J. 1988. Sandlaufkäfer (Col., Cicindelidae) von der Nordinsel Neuseelands. Entomologische Blätter, 84 (3): 175-181.
- WISE, K.A.J. 1988. Sand dune tiger beetles of northern New Zealand coasts (Coleoptera: Cicindelidae). Records of the Auckland Institute Museum, 25: 147-180.