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Revision of the stick insect genus *Clitarchus* Stål (Phasmatodea: Phasmatidae): new synonymies and two new species from northern New Zealand

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Abstract

We describe two new species of *Clitarchus* Stål from Northland, New Zealand. *Clitarchus rakauwhakanekeneke* sp. nov. is described from the Poor Knights Islands and *Clitarchus tepaki* sp. nov. is described from the Te Pahi / North Cape area and the Karikari Peninsula at the northernmost tip of New Zealand. Two new synonymies are proposed including *Clitarchus multidentatus* Brunner (syn. nov.) and *Clitarchus tuberculatus* Salmon (syn. nov.) as synonyms of *Clitarchus hookeri* (White). *Clitarchus magnus* Brunner, recorded from Thailand, is transferred to *Ramulus* Saussure and given the replacement name *Ramulus changmaiense* nom. nov. The holotype of *C. multidentatus* was recorded as being collected from New Caledonia; however we believe this is a labelling error and the specimen was collected from New Zealand. These taxonomic changes render *Clitarchus* endemic to New Zealand and consisting of three species; *C. hookeri*, *C. rakauwhakanekeneke* and *C. tepaki*. Keys to the adult males and females of *Clitarchus* species are given in addition to notes on host plants, ecology and geographic distributions.

Key words: Lanceocercata, Phasmatinae, Acanthoxylini, Poor Knights Islands, Te Pahi

Introduction

The New Zealand stick insect species *Clitarchus hookeri* (White) is found throughout most of the North Island and coastal regions of the north and east of the South Island (Buckley *et al.* 2010a). This species was among the first stick insects to be described from New Zealand based on specimens collected on the voyage of the *Erebus* and *Terror*, which visited the Bay of Islands, Northland, in 1841 (White 1846). *Clitarchus hookeri* was initially placed in the genus *Phasma* Lichtenstein, but was transferred to *Clitarchus* Stål (Stål 1875) of which the type species is *C. laeviusculus* Stål by subsequent designation of Kirby (1904). Further species of *Clitarchus* Stål were described from New Zealand by Colenso (1885), Hutton (1899), Brunner (1907) and Salmon (1991). Other stick insect species from New Caledonia and Thailand were placed in *Clitarchus* by Brunner (1907). Most recently, Salmon (1991) described the New Zealand species *C. tuberculatus* Salmon for female specimens of *Clitarchus* that were brown coloured with abundant tubercles on the body. Subsequent genetic studies (Trewick *et al.* 2005; Buckley *et al.* 2008, 2010a) showed that individual females matching the description of *C. tuberculatus* could not be differentiated genetically from *C. hookeri* suggesting that *C. tuberculatus* is a synonym of *C. hookeri* (see, also, Jewell & Brock 2002), and it was treated as such by Trewick *et al.* (2005), Buckley *et al.* (2008, 2010a), but not formalised. *Clitarchus* is placed in the Phasmatidae, Phasmatinae, Acanthoxylini by Günther (1953) and subsequent cataloguers (Otte and Brock 2005). Phylogenetic studies (Buckley *et al.* 2009; 2010b; Bradler 2009) show that along with all other New Zealand stick insects, *Clitarchus* is a member of the Australasian clade Lanceocercata (Bradler 2001). *Clitarchus* is sister to *Pseudoclitarchus* Salmon and this clade in turn is related to *Acanthoxyla* Uvarov and *Tepakiphasma* Buckley & Bradler (Buckley *et al.* 2008; 2010b; Dunning *et al.* 2013; Trewick *et al.* 2008).

Leschen 2013), including genetically divergent clades (e.g., Buckley & Leschen 2013; Morgan-Richards et al. 2001). The invertebrate fauna of this area also includes the recently described phasmid *Tepakiphasma ngatikuri* (Buckley & Bradler 2010), and so the present revision brings the number of newly described stick insects from this small geographic area to two. The Karikari Peninsula was also isolated during the Pliocene (Ballance and William 1982), but has fewer endemic species, possibly due to more extensive habitat degradation and the near absence of forest. Although, *C. tepaki* does not appear to be threatened due to the presence of multiple populations across the Te Paki / North Cape area and Karikari Peninsula, the presence of yet another endemic species in northern New Zealand reinforces the biological uniqueness of this area and supports the continuation of ongoing conservation efforts.

The Poor Knights Islands are remnants of a volcanic system that dates back to the Late Miocene (Hayward 1991). Unlike many New Zealand offshore islands they were isolated from the mainland during the Last Glacial Maximum and possibly for as long as 2 million years (Hayward 1991). This isolation has allowed many endemic species of invertebrates to evolve (Watt 1982), although there is only one endemic plant taxon (de Lange and Cameron 1999). As with the Te Paki / North Cape area, the presence of another endemic invertebrate species supports conservation and biosecurity efforts to preserve the biota of these islands.

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References

- Ballance, P.F. & Williams, P.W. (1982) The geomorphology of Auckland and Northland. *In*: Soons, J.M. & Selby, M.J. (Eds.), *Landforms of New Zealand*. Longman Paul; Hong Kong, pp. 210–232.
- Beier, M. (1968) Phasmida (Stab- oder Gespenstschrecken). *In*: Helmcke, J.-G., Starck, D., & Wermuth, *Handbuch der Zoologie IV*. Walter De Gruyter & Co, Berlin, Germany, pp. 1–56.
- Bradler, S. (2001) The Australian stick insects, a monophyletic group within the Phasmatodea? *Zoology*, 104 (Supplement III), pp. 69.
- Bradler, S. (2009) Phylogeny of the stick and leaf insects (Phasmatodea). *Species, Phylogeny and Evolution*, 2, 3–139.
- Bradler, S., Robertson, J.A. & Whiting, M.F. (2014) A molecular phylogeny of Phasmatodea with emphasis on Necrosiinae, the most species-rich subfamily of stick insects. *Systematic Entomology*, 39, 205–222.
<http://dx.doi.org/10.1111/syen.12055>
- Bradley, J.C. & Galil, B.S. (1977) The taxonomic arrangement of the Phasmatodea with keys to the subfamilies and tribes. *Proceedings of the Entomological Society of Washington*, 79, 176–208.
- Brock, P.D. (1987) A third New Zealand stick insect (Phasmatodea) established in the British Isles, with notes on the other

- species, including a correction. In Mazzini, M., Scali, V. (Eds). *1st International Symposium on Stick Insects*. University of Siena, pp. 125–132.
- Brock, P.D. (1997) Taxonomic changes relating to New Zealand stick insects. *Phasmid Studies*, 6, 21–23.
- Brunner von Wattenwyl, K. (1907) *Die Insektenfamilie der Phasmiden. Phasmidae Anareolatae (Clitumnini, Lonchodini, Bacunculini)*. Wilhelm Engelmann, Leipzig, Germany, pp. 181–340.
- Buckley, T.R., Attanayake, D., Park, D.-C., Ravindran, S., Jewell, T.R. & Normark, B.B. (2008) Investigating hybridization in the parthenogenetic New Zealand stick insect *Acanthoxyla* (Phasmatoidea) using single-copy nuclear loci. *Molecular Phylogenetics and Evolution*, 47, 335–349.
<http://dx.doi.org/10.1016/j.ympev.2008.02.016>
- Buckley, T.R., Attanayake, D. & Bradler, S. (2009) Extreme convergence in stick insect evolution: phylogenetic placement of the Lord Howe Island tree lobster, *Proceedings of the Royal Society, B*, 276, 1055–1062.
<http://dx.doi.org/10.1098/rspb.2008.1552>
- Buckley, T.R., Marske, K. & Attanayake, D. (2010a) Phylogeography and ecological niche modelling of the New Zealand stick insect *Clitarchus hookeri* (White) support survival in multiple coastal refugia. *Journal of Biogeography*, 37, 682–695.
<http://dx.doi.org/10.1111/j.1365-2699.2009.02239.x>
- Buckley, T.R., Attanayake, D., Nylander, J.A.A. & Bradler, S. (2010b) The phylogenetic placement and biogeographical origins of the New Zealand stick insects (Phasmatoidea). *Systematic Entomology*, 35, 207–225.
<http://dx.doi.org/10.1111/j.1365-3113.2009.00505.x>
- Buckley, T.R. & Bradler, S. (2010) *Tepakiphasma ngatikuri*, a new genus and species of stick insect (Phasmatoidea) from the Far North of New Zealand. *New Zealand Entomologist*, 33, 118–126.
<http://dx.doi.org/10.1080/00779962.2010.9722200>
- Buckley, T.R., Palma, R.L., Johns, P.M., Gleeson, D.M., Heath, C.G., Hitchmough, R.A. & Stringer, I.A.N. (2012) The conservation status of small or less well known groups of New Zealand terrestrial invertebrates. *New Zealand Entomologist*, 35, 137–143.
<http://dx.doi.org/10.1080/00779962.2012.686319>
- Buckley, T.R. & Leschen, R.A.B. (2013) Comparative phylogenetic analysis reveals long term isolation of lineages on the Three Kings Islands, New Zealand. *Biological Journal of Linnean Society*, 108, 361–377.
<http://dx.doi.org/10.1111/j.1095-8312.2012.02009.x>
- Chapple, D.G., Patterson, G.B., Bell, T. & Daugherty, C.H. (2008) Taxonomic revision of the New Zealand copper skink (*Cyclodina aenea*: Squamata: Scincidae) species complex, with descriptions of two new species. *Journal of Herpetology*, 42, 437–452.
<http://dx.doi.org/10.1670/07-110.1>
- Clark Sellick, J.T. (1997) Descriptive terminology of the phasmid egg capsule, with an extended key to the phasmid genera based on egg structure. *Systematic Entomology*, 22, 97–122.
<http://dx.doi.org/10.1046/j.1365-3113.1997.d01-30.x>
- Clark Sellick, J.T. (1998) The micropylar plate of the eggs of Phasmida, with a survey of the range of plate form within the order. *Systematic Entomology*, 23, 203–228.
<http://dx.doi.org/10.1046/j.1365-3113.1998.00056.x>
- Colenso, W. (1885) A description of some newly discovered New Zealand insects believed to be new to science. *Transactions of the New Zealand Institute*, 17, 151–155.
- Crosby, T.K., Dugdale, J.S. & Watt, J.C. (1998) Area codes for recording specimen localities in the New Zealand subregion. *New Zealand of Zoology*, 25, 175–183.
<http://dx.doi.org/10.1080/03014223.1998.9518148>
- Davidson, J., Grant-Mackie, J.A., Morton, J.E. & Rattenbury, J.A. (1969) North Cape: a scientific case for conservation. *Tane*, 15, 5–11.
- de Lange, P. & Cameron, E.K. (1999) The vascular flora of Aorangi Island, Poor Knights Islands, northern New Zealand. *New Zealand Journal of Botany*, 37, 433–468.
<http://dx.doi.org/10.1080/0028825X.1999.9512646>
- de Lange, P.J., Heenan, P.B. & Dawson, M.I. (2003) A new species of *Leucopogon* (Ericaceae) from the Surville Cliffs, North Cape, New Zealand. *New Zealand Journal of Botany*, 41, 13–21.
<http://dx.doi.org/10.1080/0028825X.2003.9512829>
- Druce, A.P., Bartlett, J.K. & Gardner, R.O. (1979) Indigenous vascular plants of the serpentine area of Surville Cliffs and adjacent cliff tops, northwest of North Cape, New Zealand. *Tane*, 25, 187–206.
- Dunning, L.T., Thomson, G., Dennis, A.B., Sinclair, B.J., Newcomb, R.D. & Buckley, T.R. (2013) Positive selection in glycolysis among Australasian stick insects. *BMC Evolutionary Biology*, 13, 1–215.
<http://dx.doi.org/10.1186/1471-2148-13-215>
- Gardner, N.W. (1967) Descriptions of six new species of land snails from the far north of New Zealand. *Transactions of the Royal Society of New Zealand Zoology*, 8, 215–220.
- Gardner, R.O. & Bartlett, J.K. (1980) Forest flora of the North Cape region. *Tane*, 26, 223–234.
- Gottardo, M. & Valotto, D. (2014) External macro- and micromorphology of the male of the stick insect *Hermarchus leytensis* (Insecta: Phasmatoidea) with phylogenetic considerations. *Comptes Rendus Biologies*, 337, 258–268.

- <http://dx.doi.org/10.1016/j.crv.2014.02.005>
- Goulstone, J.F., Mayhill, P.C. & Parish, G.R. (1993) An illustrated guide to the land Mollusca of the Te Pahi Ecological Region, New Zealand. *Tane*, 34, 1–32.
- Günther, K. (1953) Über die taxonomische Gliederung und geographische Verbreitung der Insektenordnung der Phasmatodea. *Beiträge zur Entomologie*, 3, 541–563.
- Hayward, B.W. (1991) Geology and geomorphology of the Poor Knights Islands, Northern New Zealand. *Tane*, 33, 23–37.
- Hennemann, F.H., Conle, O.V. & Zhang, W. (2008) Catalogue of the stick and leaf-insects (Phasmatodea) of China, with a faunistic analysis, review of recent ecological and biological studies and bibliography (Insects: Orthoptera: Phasmatodea). *Zootaxa*, 1735, 1–77.
- Hoare, R.J.B. (2010) *Izatha* (Insecta: Lepidoptera: Gelechioidea: Oecophoridae). *Fauna of New Zealand. Vol. 65*. Manaaki Whenua Press, Lincoln, New Zealand, 201 pp.
- Holloway, B.A. (1961) A systematic revision of the New Zealand Lucanidae (Insecta: Coleoptera). *Dominion Museum Bulletin*, 20, 1–139.
- Hutton, F.W. (1898) The Phasmidae of New Zealand. *Transactions of the New Zealand Institute*, 30, 160–166.
- Hutton, F.W. (1899) Revision of New Zealand Phasmidae. *Transactions of the New Zealand Institute*, 31, 55–59.
- Jewell, T. & Brock, P.D. (2002) A review of the New Zealand stick insects: new genera and synonymy, keys, and a catalogue. *Journal of Orthoptera Research*, 11, 189–197.
[http://dx.doi.org/10.1665/1082-6467\(2002\)011\[0189:AROTNZ\]2.0.CO;2](http://dx.doi.org/10.1665/1082-6467(2002)011[0189:AROTNZ]2.0.CO;2)
- Kirby, W.F. (1904) *A synonymic catalogue of Orthoptera. Vol. 1*. Longmans & Co., London, 501 pp.
- Klug, R. & Bradler, S. (2006) The pregenital abdominal musculature in phasmids and its implications for the basal phylogeny of Phasmatodea (Insecta: Polyneoptera). *Organisms, Diversity and Evolution*, 6, 171–184.
<http://dx.doi.org/10.1016/j.ode.2005.08.004>
- Larochelle, A. & Larivière, M.C. (2005) *Harpalini* (Insecta: Coleoptera: Carabidae: Harpalinae). *Fauna of New Zealand. Vol. 53*. Manaaki Whenua Press, Lincoln, New Zealand, 160 pp.
- Littig, K.S. (1942) External anatomy of the Florida walking stick *Anisomorpha buprestoides* Stoll. *The Florida Entomologist*, 3, 33–41.
<http://dx.doi.org/10.2307/3492435>
- Marshall, B.A. & Barker, G.M. (2007) A revision of New Zealand landsnails of the genus *Cytora* Kobelt & Mollendorff, 1897 (Mollusca: Gastropoda: Pupinidae). *Tuhinga*, 18, 49–113.
- Morgan-Richards, M., Trewick, S.A. & Wallis, G.P. (2001) Chromosome races with Pliocene origins: evidence from mtDNA. *Heredity*, 86, 303–312.
<http://dx.doi.org/10.1046/j.1365-2540.2001.00828.x>
- Morgan-Richards, M. & Trewick, S.A. (2005) Hybrid origin of a parthenogenetic genus? *Molecular Ecology*, 14, 2133–2142.
<http://dx.doi.org/10.1111/j.1365-294X.2005.02575.x>
- Morgan-Richards, M., Trewick, S.A. & Stringer, I.A. (2010) Geographic parthenogenesis and the common tea-tree stick insect of New Zealand. *Molecular Ecology*, 19, 1227–1238.
<http://dx.doi.org/10.1111/j.1365-294X.2010.04542.x>
- Myers, S.S., Trewick, S.A. & Morgan-Richards, M. (2013) Multiple lines of evidence suggest mosaic polyploidy in the hybrid parthenogenetic stick insect lineage *Acanthoxyla*. *Insect Conservation and Diversity*, 6, 537–548.
<http://dx.doi.org/10.1111/icad.12008>
- Otte, D. & Brock, P.D. (2005) *Phasmida Species File: A Catalog to the Stick Insects of the World* (The Orthopterists Society), 504 pp.
- Ragge, D.R. (1965) *Grashoppers, crickets and cockroaches of the British Isles*. Wayside and Woodland series, Warne, London, 299 pp.
- Salmon, J.T. (1955) The genus *Acanthoxyla* (Phasmidae). *Transactions of the Royal Society of New Zealand*, 82, 1149–1156.
- Salmon, J.T. (1991) *The Stick Insects of New Zealand*. Reed, Auckland, New Zealand. 124 pp.
- Seldon, D.S. & Leschen, R.A.B. (2011) Revision of the *Mecodema* curvidens species complex (Coleoptera, Carabidae, Broscini). *Zootaxa*, 2829, 1–45.
- Stål, C. (1875) *Recensio Orthopterorum. Revue critique des Orthoptères décrits par Linné, de Geer et Thunberg*. Vol. 3. P.A. Norstedt & Söner, Stockholm, 105 pp.
- Stringer, I.A.N. (1969) Blastokinesis and embryology of the phasmid *Clitarchus hookeri*. *Tane*, 15, 41–52.
- Stringer, I.A.N. (1970) The nymphal and imaginal stages of the bisexual stick insect *Clitarchus hookeri*. *New Zealand Entomologist*, 4, 85–95.
<http://dx.doi.org/10.1080/00779962.1970.9722927>
- Trewick, S.A., Goldberg, J. & Morgan-Richards, M. (2005) Fewer species of *Argosarchus* and *Clitarchus* stick insects (Phasmida: Phasmatinae): evidence from mitochondrial and nuclear DNA sequences. *Zoologica Scripta*, 34, 483–491.
<http://dx.doi.org/10.1111/j.1463-6409.2005.00204.x>
- Trewick, S.A., Morgan-Richards, M. & Collins, L.J. (2008) Are you my mother? Phylogenetic analysis reveals orphan hybrid stick insect genus is part of a monophyletic New Zealand clade. *Molecular Phylogenetics and Evolution*, 48, 799–808.
<http://dx.doi.org/10.1016/j.ympev.2008.05.025>
- Vink, C.J., Fitzgerald, B.M., Sirvid, P.J. & Dupérré, N. (2011) Reuniting males and females: redescrptions of *Nuisiana arboris*

- (Marples 1959) and *Cambridgea reinga* Forster & Wilton 1973 (Araneae: Desidae, Stiphidiidae). *Zootaxa*, 2739, 41–50.
- von Konrat, M.J. & Braggins, J.E. (2005) *Frullania wairua*, a new and seemingly rare liverwort species from Northland, New Zealand. *New Zealand Journal of Botany*, 43, 885–893.
<http://dx.doi.org/10.1080/0028825X.2005.9512998>
- Watt, J.C. (1982) Terrestrial arthropods from the Poor Knights Islands, New Zealand. *Journal of the Royal Society of New Zealand*, 12, 283–320.
<http://dx.doi.org/10.1080/03036758.1982.10415350>
- White, A. (1846) *The Zoology of the voyage of H.M.S. Erebus and Terror; 1. Insects of New Zealand*. E.W. Janson, London, United Kingdom, 27 pp.
- Winterbourn, M.J. (2009) A new genus and species of Leptophlebiidae (Ephemeroptera) from northern New Zealand. *New Zealand Journal of Zoology*, 36, 423–430.
<http://dx.doi.org/10.1080/03014223.2009.9651475>

APPENDIX 1. Material examined.

Specimen data follows the following format: Crosby *et al.* (1998) area code, number of individuals, gender / eggs, locality, NZAC accession code, latitude, longitude, date of collection, collectors.

Clitarchus hookeri

ND, 1, Herekino Nth Head, Rangikohu Rd, far end, NZAC03009381, 23 Dec 2010, D S Seldon; ND, 1, East Herekino, Kaitaia Walkway, NZAC03009469, 35 9.803, 173 16.197, 16 Jan 2010, TR Buckley D Seldon R Hoare; ND, eggs, East Herekino, Kaitaia Walkway, NZAC03014415, 35 9.803, 173 16.197, 16 Jan 2010, TR Buckley D Seldon R Hoare; ND, 1, Paihia, Opuā SF, NZAC03009447, 35 17.312, 174 05.220, 17 Mar 2011, R Leschen N Lord; ND, 1, ♀, Whakaangi, NZAC03006378, 34 56.863, 173 32.684, 18 Jan 2010, TR Buckley D Seldon R Hoare; ND, 1, ♀, Gum Hole Reserve, NZAC03006389, 34 58.024, 173 22.828, 17 Jan 2010, TR Buckley D Seldon R Hoare; ND, 1, ♀, Paranui Scenic Reserve, NZAC03006384, 35 4.122, 173 26.441, 17 Jan 2010, TR Buckley D Seldon; ND, 1, ♀, Junction of SH10 and Takou Bay Rd, 2 km N of Te Whau, Kerikeri, NZAC03000090, 35 8.211, 173 52.775, 23 Mar 2005, K Hill D Marshall; ND, 1, Junction of SH10 and Takou Bay Rd, 2 km N of Te Whau, Kerikeri, NZAC03000057, 35 8.211, 173 52.775, 23 Mar 2005, K Hill D Marshall; ND, 1, ♀, Mangamuka Gorge Scenic Reserve, roadside, NZAC03000323, 35 9.486, 173 25.521, 6 Feb 2006, TR Buckley R Hoare; ND, 1, ♂, Mangamuka Gorge Scenic Reserve, roadside, NZAC03000500, 35 9.486, 173 25.521, 6 Feb 2006, TR Buckley R Hoare; ND, 1, ♂, Mangamuka Gorge Scenic Reserve, roadside, NZAC03000125, 35 9.486, 173 25.521, 6 Feb 2006, TR Buckley R Hoare; ND, 1, ♂, Lake Ngatu, NZAC03005489, 35 1.622, 173 11.935, 12 Dec 2008, TR Buckley R Leschen D Seldon; ND, 1, ♀, Lake Ngatu, NZAC03005458, 35 1.622, 173 11.935, 12 Dec 2008, TR Buckley R Leschen D Seldon; ND, 1, ♂, Lake Ngatu, NZAC03005460, 35 1.622, 173 11.935, 12 Dec 2008, TR Buckley R Leschen D Seldon; ND, 1, ♂, Lake Ngatu, NZAC03005463, 35 1.622, 173 11.935, 12 Dec 2008, TR Buckley R Leschen D Seldon; ND, 1, ♂, Lake Ngatu, NZAC03005472, 35 1.622, 173 11.935, 12 Dec 2008, TR Buckley R Leschen D Seldon; ND, 1, ♂, Lake Ngatu, NZAC03005468, 35 1.622, 173 11.935, 12 Dec 2008, TR Buckley R Leschen D Seldon; ND, 1, ♀, Lake Ngatu, NZAC03005475, 35 1.622, 173 11.935, 12 Dec 2008, TR Buckley R Leschen D Seldon; ND, 1, ♀, Lake Ngatu, NZAC03005490, 35 1.622, 173 11.935, 12 Dec 2008, TR Buckley R Leschen D Seldon; ND, 1, ♂, Lake Ngatu, Kaitaia, NZAC04030718, 5 Jan 1963, E S Gourlay; ND, 1, ♀, eggs, East Herekino, Kaitaia Walkway, NZAC03005572, 35 9.803, 173 16.197, 14 Jan 2010, TR Buckley D Seldon R Hoare; ND, 1, Ahipara, road to Gumlands, NZAC03000129, 35 11.069, 173 7.314, 6 Feb 2006, TR Buckley R Hoare; ND, 1, ♂, Ahipara, road to Gumlands, NZAC03000351, 35 11.069, 173 7.314, 6 Feb 2006, TR Buckley R Hoare; ND, 1, ♂, Ahipara, road to Gumlands, NZAC03000396, 35 11.069, 173 7.314, 6 Feb 2006, TR Buckley R Hoare; ND, 1, Ahipara, Reef Point, NZAC03005280, 10 Feb 1988, G Messenger; ND, 2, Ahipara, Herekino Bush, NZAC03005319, Jan 1987, G Messenger; ND, 1, ♀, Herekino Gorge, Kaitaia Awaroa Rd, NZAC03000386, 35 12.3000, 173 11.015, 7 Feb 2006, TR Buckley R Hoare; ND, 1, Herekino Gorge, Kaitaia Awaroa Rd, NZAC03000359, 35 12.3000, 173 11.015, 7 Feb 2006, TR Buckley R Hoare; ND, 1, ♀, Herekino Forest Track, Herekino Forest, NZAC03000127, 35 12.587, 173 11.650, 7 Feb 2006, TR Buckley R Hoare; ND, 1, ♂, Herekino Forest Track, Herekino Forest, NZAC03000113, 35 12.587, 173 11.650, 7 Feb 2006, TR Buckley R Hoare; ND, 1, ♂, Opuā Forest, Oromahoe Rd, NZAC04028289, 35 19.251, 174 03.936, 14 Dec 2006, K Hill, D Marshall; ND, 1, ♂, Opuā Forest, Oromahoe Rd, NZAC04028293, 35 19.251, 174 03.936, 14 Dec 2006, K Hill, D Marshall; ND, 1, ♀, Opuā Forest, Oromahoe Rd, NZAC04028313, 35 19.251, 174 03.936, 14 Dec 2006, K Hill, D Marshall; ND, 1, ♂, Pawarenga, Warawara Forest, NZAC03004868, 35 21.497, 173 15.044, 15 Dec 2007, TR Buckley D Seldon R Hoare; ND, 1, ♂, Pawarenga, Warawara Forest, NZAC03004783, 35 21.497, 173 15.044, 15 Dec 2007, TR Buckley D Seldon R Hoare; ND, 1, ♂, Pawarenga, Warawara Forest, NZAC03004907, 35 21.497, 173 15.044, 15 Dec 2007, TR Buckley D Seldon R Hoare; ND, 1, ♂, Pawarenga, Warawara Forest, NZAC03005009, 35 21.497, 173 15.044, 15 Dec 2007, TR Buckley D Seldon R Hoare; ND, 1, Eggs, Warawara Forest, NZAC03005021, 35 21.497, 173 15.044, 15 Dec 2007, TR Buckley D Seldon R Hoare; ND, 1, ♀, Warawara Forest, NZAC03004871, 35 22.159, 173 17.002, 15 Dec 2007, TR Buckley D Seldon R Hoare; ND, 1, ♀, Warawara Forest, NZAC03004982, 35 22.159, 173 17.002, 15 Dec 2007, TR Buckley D Seldon R Hoare; ND, 1, ♀, eggs, Whakarungangana gumland, ca 3km SW of Kaikohe, NZAC03005530, 35 26.67, 173 45.31, 3 Feb 2007, R