

REINSTATEMENT OF *Hoplodactylus maculatus* (Boulenger) WITH REDESCRIPTION OF *H. pacificus* (Gray) (REPTILIA : SQUAMATA : GEKKONIDAE)

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Abstract. Evidence for the reinstatement of *Hoplodactylus maculatus* Boulenger is presented, based on the form of the rostral shield and the enlarged scales at the base of the tail; and the proportions of the head, ocular disc and foot. Revised synonymys and descriptions of *H. maculatus* and *H. pacificus* are given.

New Zealand has three genera of endemic geckos, of which *Naultinus* is restricted to the North Island and *Heteropholis* to the South Island, while *Hoplodactylus* occurs throughout the country, including most of the off-shore islands.

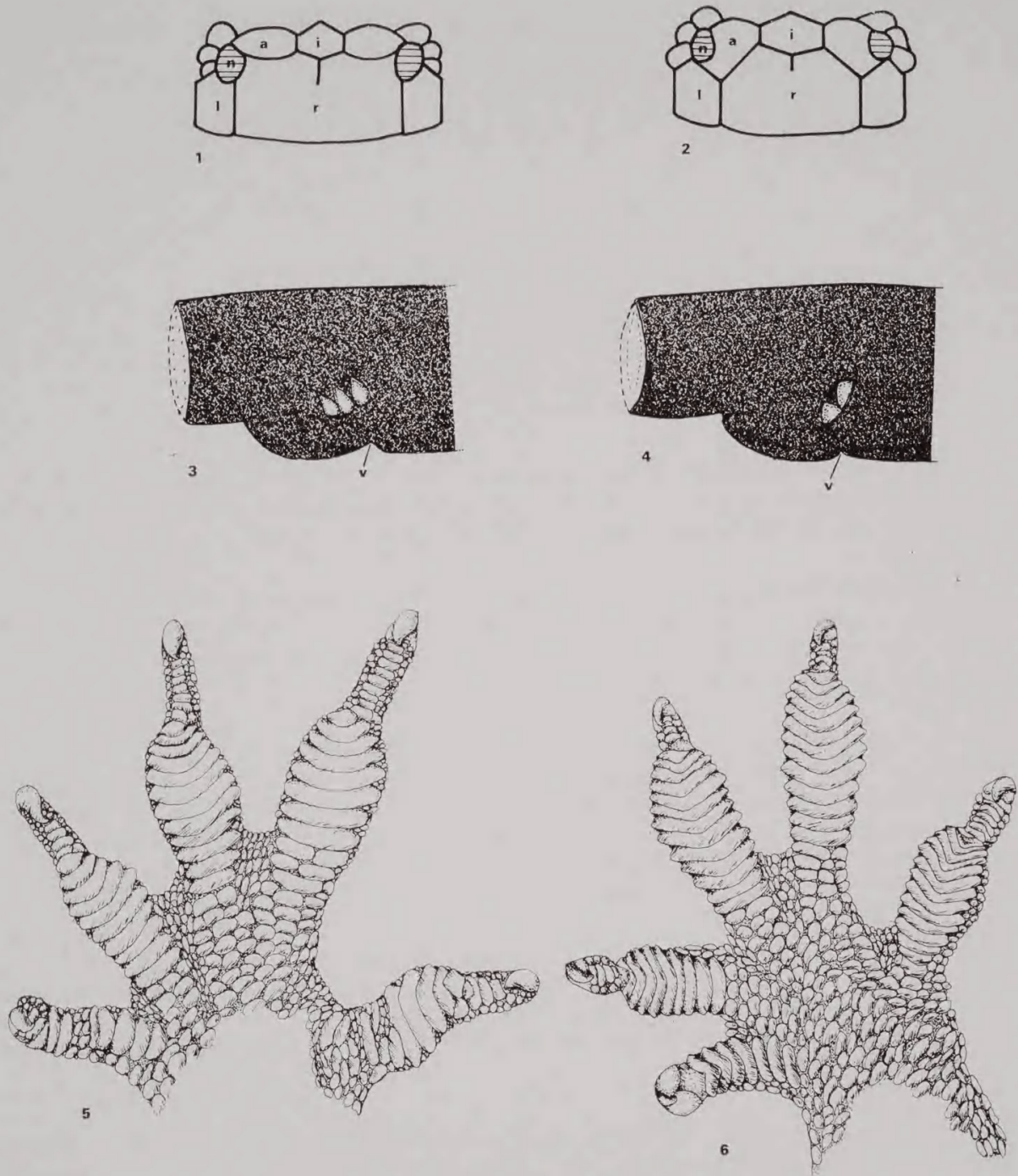
The genus *Hoplodactylus* was erected in 1843 by Fitzinger (1843) to accommodate a specimen named *Platydictylus duvauceli* Duméril & Bibron, 1836, which was thought at the time of description to come from Bengal, but was subsequently recognised as being endemic to New Zealand.

In 1842 Gray described *H. pacificus* under the name of *Naultinus pacificus* (Gray 1842). In 1845 he published his *Catalogue of Lizards* (Gray 1845) and on page 273 listed a number of corrections and amendments, which included an entry "*N. maculatus*, MSS". No description was given nor was a reference made to any specimen number, so presumably Gray had used the name *N. maculatus* somewhere in his draft manuscript, and then regarded it as part of the synonymy of *N. pacificus*.

Boulenger (1885) described *H. maculatus*, giving the synonymy as "*Naultinus pacificus* part. (*N. maculatus*), Gray, Cat. p. 273", and listing a number of specimens (including two types) in the collection of the British Museum. As Gray had not designated any types, Boulenger presumably selected his from among the British Museum specimens.

Lucas & Frost (1897) recognised the validity of *H. maculatus*, and quoted Boulenger's description almost verbatim, but added some comments on certain diagnostic features, and on the geographical range of the species, which indicates that they themselves had nevertheless examined a number of specimens. Garman (1901) erected a new genus of gecko from New Zealand, with one species — *Woodworthia digitata*. Romer (1956) synonymised *Woodworthia* with *Hoplodactylus*, and examination of the types of *H. digitatus* in the course of the present work has established that the species is *maculatus*.

Smith (1933) also recognised *H. maculatus*, though he claimed that Boulenger's key for the genus *Hoplodactylus* was inadequate, and proposed an alternative key, based mainly on the number and shape of the subdigital lamellae of toes 2-5.



Figs. 1-6. *Hoplodactylus* spp. 1. *H. pacificus*. Anterior head shields. 2. *H. maculatus*. Anterior head shields. 3. *H. pacificus*. Hemipenial sac and base of tail (lateral aspect) showing enlarged scales. 4. *H. maculatus*. Hemipenial sac and base of tail (lateral aspect) showing enlarged scales. 5. *H. pacificus*. Under-surface of foot. 6. *H. maculatus*. Under-surface of foot.

a, anterior nasal; i, internasal; l, first upper labial; n, nostril; r, rostral; v, vent.

McCann (1955), after examining all specimens available in New Zealand museums, and checking Boulenger's and Smith's definitions, claimed that neither key gave adequate grounds for separating *H. maculatus* from *H. pacificus*, and concluded that "there is but a single and very variable species". Accordingly, he relegated the former species to the synonymy of the latter. Wermuth (1965) adopted the same procedure.

Sharell (1966) drew attention to the fact that there appeared to be two distinct forms of *H. pacificus*, and referred to the less common one (in his experience) as the "Hauraki Gulf gecko". This in fact has proved to be *H. pacificus*. Benson (1976) in a study of the circadian rhythm of locomotor activity of "*H. pacificus*" recorded two distinct patterns of activity, and suggested that this indicated the existence of two separate forms within the species. He described these as Type A and Type B — now identified by the present authors as *H. maculatus* and *H. pacificus* respectively.

One of us (J. R.) has made detailed examination of syntypes of *H. maculatus* and *H. pacificus* (B.M. 1946.9.8.14. and B.M. 1946.8.22.65. respectively); the types of *H. digitatus* (M.C.Z. 6153 and M.C.Z. 152218); and all relevant material in the collections of the Auckland Institute and Museum and the Department of Zoology, University of Auckland (a total of 62 specimens); backed up by a survey of material in the collection of the National Museum, Wellington (a further 54 specimens). Both of us have observed animals in the wild and in captivity. The results show clearly that *H. maculatus* is indeed a valid species. It can be distinguished from *H. pacificus* on the form of the rostral alone (Figs. 1, 2), and in the males, by the number and shape of the scales forming the enlarged group on each side of the base of the tail (Figs. 3, 4). Strangely, the first of these two features was used by Boulenger (1885) in his key to separate *H. maculatus* from the other four species that he included in the genus, and its use was implied in general terms by Lucas & Frost (1897) in their descriptions of *H. maculatus* and *H. pacificus*, but was ignored by Smith (1933) and McCann (1955). The second feature (i.e. the form of the enlarged scales at the base of the tail) seems to have been noted only by McCann, though he did not recognise it as a species diagnostic feature.

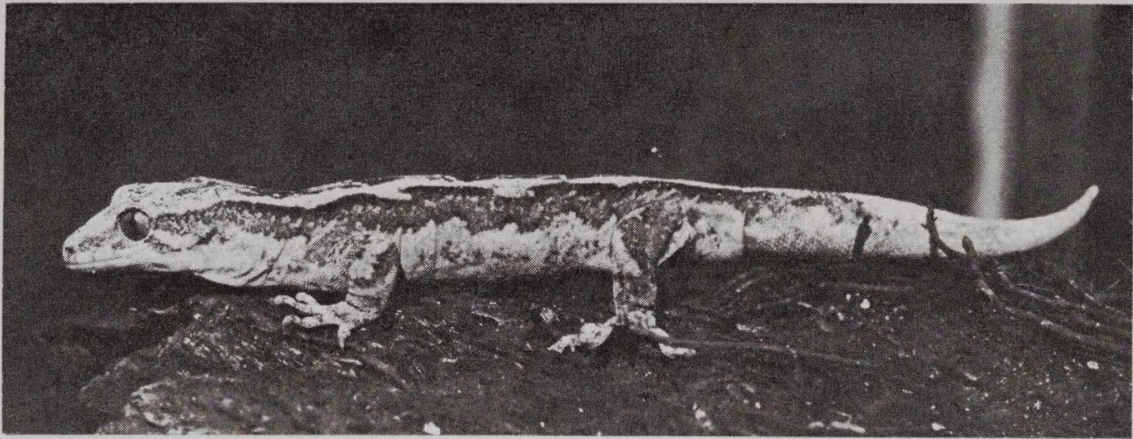
Several other characteristics, such as the proportions of the head, ocular disc and feet, are also distinctive of the two species (Table 1, and Figs. 5 - 10).

Table 1. Morphometric data relating to *Hoplodactylus pacificus* and *H. maculatus*.

	<i>H. pacificus</i> ¹			<i>H. maculatus</i> ²		
	Mean numbers	Mean length (mm)	Standard Deviation	Mean numbers	Mean length (mm)	Standard Deviation
Snout/vent length		73.15	8.55		65.27	8.07
Snout/eye length		9.08	3.01		7.05	2.65
Eye/ear length		6.31	2.51		6.40	2.53
Diameter of ocular disc		4.22	2.05		3.18	1.70
No. of upper labials	12.09		3.47	10.73		3.27
No. of lower labials	11.30		3.36	10.35		3.20
4th toe						
Width of dilation		2.24	1.40		2.06	1.40
Length of dilation		5.89	2.42		5.23	2.28
Length of distal phalange		3.36	1.80		2.26	1.50
Total length of toe		8.64	2.94		7.05	2.65
No. of subdigital lamellae	12.31		3.50	11.59		3.40

¹ Sample size — 40.

² Sample size — 18.



7



8



9



10

Figs. 7-10. *Hoplodactylus* spp. 7, 9. *H. pacificus*. 8, 10. *H. maculatus*. (Photos: J. Robb).

Hoplodactylus pacificus (Gray, 1842)

(Figs. 1, 3, 5, 7, 9)

- 1842 *Naultinus pacificus* Gray, *Zool. Misc.*, pp. 53, 72.
 1843 *Naultinus pacificus* Gray, In Dieffenbach, *N. Zeal.* 2, p. 203.
 1845 *Naultinus pacificus* (part) Gray, *Cat. Liz.*, p. 169.
 1851 *Platydactylus pacificus* A. Duméril, *Cat. Méth.*, Rept. p. 35.
 1857 *Hoplodactylus pomarii* Girard, *Proc. Acad. Philad.* p. 197.
 1857 *Hoplodactylus pomarii* Girard, *U.S. Exploring Exped. Herp.*, p. 294.
 1867 *Dactylocnemis pacificus* Steindachner, *Novara Rept.*, p. 11.
 1871 *Naultinus pacificus* (part?) Buller, *Trans. Proc. N.Z. Inst.* 3: 7.
 1872 *Naultinus pacificus* Hutton, *Trans. Proc. N.Z. Inst.* 4: 172.
 1885 *Hoplodactylus pacificus* Boulenger, *Cat. Liz.* 1, p. 173.
 1897 *Hoplodactylus pacificus* Lucas & Frost, *Trans. Proc. N.Z. Inst.* 29: 273.
 1955 *Hoplodactylus pacificus* (part) McCann, *Dom. Mus. Bull.* 17: 44.
 1961 *Naultinus pacificus* (part) Chrapliwy, Smith & Grant, *Herpetologica* 17: 7.
 1965 *Hoplodactylus pacificus* (part) Wermuth, *Das Tierreich* 80: 95.

Diagnosis. A medium to large-sized *Hoplodactylus*; nostril contacts the rostral for approximately $\frac{1}{4}$ of its circumference; rostral twice as wide as deep, subquadrangular; distance between snout and eye distinctly greater than the distance between eye and ear-opening; webbing between toes 2, 3 and 4 distinct; distal phalange of 4th toe usually at least half the length of the dilated portion; 3-4 enlarged, pointed, conical scales forming a fan-like group on each side of the base of the tail.

Description. Head oviform; snout distinctly longer than the distance between the eye and the ear-opening, 1.7 to 2.6 (usually 2.0 to 2.2) times the diameter of the ocular disc; forehead slightly concave; ear-opening large, oval, oblique; body and limbs moderate to robust; digits somewhat dilated, the length of the dilated portion of the 4th toe being approximately 2.6 times its width, and approximately 1.7 times the length of the distal phalange; anterior inferior lamellae slightly angular, posterior ones straight; 10-16 (usually 12-13) lamellae under 4th toe; a distinct web between toes 2, 3 and 4, but web slight between toes 1 and 2, and absent between toes 4 and 5; head covered with granular scales, of moderate size on the snout, and tiny on the remainder of the head; rostral broad, subquadrangular, in contact with the nostril, short median cleft from upper border; nostril pierced between rostral, first upper labial and 3-6 (usually 4-5) nasals, the anterior-most of which is enlarged; 1 large internasal; 9-16 (usually 11-13) upper labials, and 8-14 (usually 10-13) lower labials; mental subtriangular, shorter than, or occasionally equal to, first lower labials; dorsal scales minute, granular; abdominal scales small, juxtaposed or subimbricate; in the males, 1-4 angular series of preanal pores (9 in Stephens Island specimen), forming a roughly triangular patch, the number of pores very variable; no femoral pores (except in Stephens Island specimen); in the females a patch of enlarged preanal scales, but no pores; tail cylindrical, tapering, covered with small subquadrangular, juxtaposed scales arranged in whorls; in the males, the base of the tail swollen to accommodate the hemipenes, and with 3-4 enlarged, pointed, conical scales in a fan-like group on each side of the swelling; females usually with vestiges of the enlarged scales.

COLOUR. This species is extremely variable in colour and markings, although these normally involve shades of brown, grey, fawn, yellow-orange and olive green, and black. Dorsally there is usually a form of transverse patterning, often in rich moss-like or bark-like tones, although sometimes there are instead 2-3 longitudinal stripes. In many individuals there is a V-shaped mark on the forehead between the eyes, similar to that seen in *H. granulatus*. The ventral surface normally lacks any pattern or marking, and may be off-white, grey or brown. Some specimens have a lunate patch of mustard yellow on the nape, or the base of the tail.



Fig. 11. Localities of specimens examined.

RANGE. In this survey, specimens of *Hoplodactylus pacificus* have been recorded from the Three Kings Islands¹ (approximately 58 km north west of the top of the North Island), from many islands off the eastern coast of the North Island, and from Stephens Island² at the western entrance to Cook Strait; and from a wide variety of localities in the North Island, as far south as Palmerston North (approximately 40.40°S) (Fig. 11). No specimens were recorded from the Wellington district, the islands inside Cook Strait, or from the South Island. Hutton (1872) refers to specimens from Lake Guyon, Nelson, but these, as Lucas & Frost (1897) pointed out, would almost certainly have been *H. maculatus*, which Hutton did not recognise as a separate species.

HABITAT AND HABITS. *Hoplodactylus pacificus* occurs in a wide variety of habitats, often in the same general areas as *H. maculatus*. By day, individuals shelter in cracks in clay banks; under stones, logs and debris on the ground in forest, scrub or cleared land; and under loose bark or in hollow trees. In coastal regions it does not occur as close to high tide level as does *H. maculatus*. *H. pacificus* is a strongly nocturnal species and emerges at night to climb about in the vegetation in search of insects and nectar.

Types. B.M. 1946.8.22.65, B.M. 1946.8.22.67.

Hoplodactylus maculatus (Boulenger, 1885)

(Figs. 2, 4, 6, 8, 10)

- 1845 *Naultinus pacificus* (part) Gray, *Cat. Liz.*, p. 273.
- 1871 *Naultinus pacificus* (part?) Buller, *Trans. Proc. N.Z. Inst.*, 3: 7.
- 1871 *Naultinus granulatus* (part) Buller, *loc. cit.*, 3: 9.
- 1872 *Naultinus pacificus* (part) Hutton, *Trans. Proc. N.Z. Inst.*, 4: 172.
- 1885 *Hoplodactylus maculatus* Boulenger, *Cat. Liz.*, 1., p. 171.
- 1897 *Hoplodactylus maculatus* Lucas & Frost, *Trans. Proc. N.Z. Inst.*, 29: 271.
- 1901 *Woodworthia digitata* Garman, *Bull. Mus. Harvard*, 39: 4.
- 1955 *Hoplodactylus pacificus* (part) McCann, *Bull. Dom. Mus.*, 17: 44, Fig. 6.
- 1961 *Naultinus pacificus* (part) Chrapliwy, Smith & Grant, *Herpetologica* 17: 7.
- 1965 *Hoplodactylus digitatus* Wermuth, *Das Tierreich*, 80: 94.
- 1965 *Hoplodactylus pacificus* (part) Wermuth, *loc. cit.*, 80: 95.

Diagnosis. A small to medium-sized *Hoplodactylus*; nostril excluded from the rostral by the anterior nasal and first upper labial; rostral may be twice as long as deep, subpentagonal; distance between snout and eye equal to, or slightly greater than, distance between eye and ear-opening; webbing between toes 2, 3 and 4 slight or moderate; distal phalange of 4th toe seldom more than half the length of the dilated portion; in males, 1-2 bluntly conical enlarged scales on the base of the tail.

Description. Head short, oviform; snout equal to, or slightly longer than, the distance between the eye and the ear-opening, 1.7 to 3.4 (usually 2.1) times the diameter of the ocular disc; forehead not, or very slightly, concave; ear-opening moderate, oval, oblique; body and limbs slender to moderate; digits somewhat dilated, the length of the dilated portion being approximately 2.5 times the length of the distal phalange; anterior inferior lamellae chevron-shaped, the posterior ones straight; 9-15 (usually 10-13) under 4th toe; a small web between digits 2, 3 and 4 but slight between

¹ The specimens from Three Kings and Mokohinau Islands are particularly robust in all dimensions.

² The Stephens Island *H. pacificus* may eventually require subspecific status, but more specimens are needed before this can be established. As well as the unusually large number of preanal pores, and the presence of femoral pores mentioned above, the only male examined had a small mental shield, flanked by very large anterior lower labials.

digits 1 and 2, and absent between digits 4 and 5; head covered with granular scales, of moderate size on the snout, tiny on the remainder of the head; rostral broad, sub-pentagonal, with a short median cleft from the upper border, rostral excluded from the nostril by the first upper labial and anterior nasal; nostril pierced between first upper labial, and 4-6 (usually 4) nasals, the anterior-most of which is considerably enlarged; 1-3 (usually 1 large) internasals; 9-16 (usually 10-13) upper labials, 8-14 (usually 10-13) lower labials; mental subtriangular or trapezoid, equal in length to, or occasionally slightly shorter than, first lower labials; dorsal scales minute, granular; abdominal scales small, juxtaposed or subimbricate; in the males three or four (occasionally more) angular series of preanal pores, and 2-4 parallel rows of femoral pores, together forming an extended triangular patch; in the females there is often a patch of enlarged preanal scales, but no pores; tail cylindrical, tapering, covered with small subhexagonal juxtaposed scales arranged in whorls; in the males the base of the tail is swollen to accommodate the hemipenes, and with 1-2 bluntly conical enlarged scales on each side of this swelling; females usually have vestiges of these enlarged scales.

COLOUR. This species shows much the same range of variation of colour and pattern as does *H. pacificus*; colour is therefore of little use in distinguishing between the two species.

RANGE. *Hoplodactylus maculatus* occurs widely throughout New Zealand (Fig. 11). It has not been recorded from the Three Kings Islands, but is common on the Cavalli Islands off the east coast of Northland (35.00°S), and on most of the other off-shore islands south of the Cavalli group, including those in Cook Strait. It is found in the North Island, particularly in coastal regions, and is common in a wide variety of habitats, both coastal and inland, in the South Island.

HABITAT and HABITS. *Hoplodactylus maculatus* occurs in the same general types of habitat as does *H. pacificus*, but tends to be somewhat less arboreal than the latter species, and is more frequently found under stones, logs and debris in cleared areas; on shingle beds; and in coastal areas, within a few metres of high tide level. It tends to be active both day and night, but in general remains under cover during its periods of daylight activity, except when basking. It also has a more sluggish appearance than *H. pacificus*, keeping its head and body close to the ground (Fig. 8), whereas *H. pacificus* moves about with the head and forepart of the body slightly raised (Fig. 7).

Types. B.M. 1946.9.8.14, B.M. 1946.9.8.15.

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