

Identifying geckos in Otago

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Published by
Science & Technical Publishing
Department of Conservation
PO Box 10-420
Wellington, New Zealand

Cover: Adult Southern Alps gecko (*Hoplodactylus* aff. *maculatus* 'Southern Alps') from Falls Dam, Home Hills, February 2005.

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ISBN 0-478-14050-9

This is a client report commissioned by Otago Conservancy and funded from the Science Advice Fund. This report was prepared for publication by Science & Technical Publishing; editing and layout by Amanda Todd. Publication was approved by the Chief Scientist (Research, Development & Improvement Division), Department of Conservation, Wellington, New Zealand.

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Introduction

Otago is a major centre of diversity for New Zealand geckos. At least nine extant species occur within the Conservancy (Table 1) and it is likely that further species await discovery. Many of the species are so similar to one another that they have only been recognised following genetic analysis, and most still remain undescribed (Hitchmough 1997).

Several of the Otago species have been classified as threatened (Hitchmough 2002), and even the more common species have locally significant conservation value. If the Otago geckos are to be managed effectively, it is essential that field workers are able to recognise the significance of specimens that they encounter, and which individuals could be collected for further study.

TABLE 1. SPECIES OF GECKO RECORDED FROM OTAGO.

VERNACULAR NAME	SCIENTIFIC NAME OR TAG NAME
Common geckos	<i>Hoplodactylus maculatus</i> group
Central Otago gecko	<i>H. aff. maculatus</i> 'Central Otago'
Cromwell gecko	<i>H. aff. maculatus</i> 'Cromwell'
Southern Alps gecko	<i>H. aff. maculatus</i> 'Southern Alps'
Otago/Southland large gecko	<i>H. aff. maculatus</i> 'Otago/Southland large'
Goldstripe geckos	<i>Hoplodactylus cbryosireticus</i> group
Southern mini gecko	<i>H. sp.</i> 'southern mini'
Forest geckos	<i>Hoplodactylus granulatus</i> group
Takitimu gecko	<i>H. cryptozoicus</i>
Roys Peak gecko	<i>H. sp.</i> 'Roys Peak'
Southern forest gecko	<i>H. sp.</i> 'southern forest'
Green geckos	<i>Naultinus</i>
Jewelled gecko	<i>N. gemmeus</i>

It is important to note that all native lizards in New Zealand are protected under the Wildlife Act, so that authorisation is required before carrying out surveys where lizards will be disturbed, captured or sampled. Permits are issued by the Department of Conservation (DOC). Further information and application forms are available on the DOC website: www.doc.govt.nz.

Previous keys to the geckos of New Zealand (McCann 1956; Towns 1988; Bauer 1990; Gill & Whitaker 1996; Hitchmough 1997) have become outdated due to recent discoveries, changes to species definitions, and improved information about intraspecific variation. This field guide provides an identification method for the gecko fauna of Otago, current as of August 2005. Necessary field equipment and collection techniques are outlined in the appendices.

The four members of the *Hoplodactylus maculatus* complex are too similar, and too variable within species, to enable construction of a reliable morphological key for the whole region. Instead, for this group, Otago has been divided into a series of smaller areas that delineate and isolate the main identification problems. Emphasis is also placed on working from a series of adult specimens rather than from a lone individual or from juveniles, as this will greatly improve the reliability of the identification process.

How to use this guide

AIMS AND LIMITATIONS

The focus of this field guide is to allow people who are not already familiar with gecko identification to work with the current species-concept for Otago. It needs to be appreciated that in Otago there are several *extremely* similar species that have been recognised using genetic data. Therefore, under field conditions it is not always possible to use clear-cut, reliable morphological characters to distinguish them. What this guide aims to do is to provide field workers with a simple method for identifying those specimens that can be identified, and to provide guidance on what to do when unusual or unidentifiable specimens are encountered.

PREPARATION

Before undertaking a gecko survey, a small amount of preparation can dramatically improve the accuracy of identification. First, read a guide to become familiar with the gecko fauna and the identification methods.

More information is available than provided in this guide. Every year new distribution records are collected, identification problems discovered or resolved, and (occasionally) entirely new forms and species are found. Up-to-date advice can be sought from DOC staff and herpetologists who are familiar with the identification issues and research needs of Otago geckos. DOC's Herpetofauna database (available from the DOC website¹) can be searched for new and additional locality records. There is a small but growing catalogue of reports that provide detailed information about the identification issues and/or survey results for geckos in particular parts of Otago (i.e. Jewell &

¹ www.doc.govt.nz/Conservation/001~Plants-and-Animals/001~Native-Animals/Herpetofauna/index.asp

McFarlane 1997; Hitchmough et al. 1998; Tocher et al. 2000; Tocher & Marshall 2001; Jewell 2002). Whitaker & Thomas (1989) and Whitaker et al. (2002) provide extensive lists of additional literature about Otago lizards. Whitaker et al. (2002) provide detailed information about the conservation priorities, goals and objectives for the lizards of Otago Conservancy, as of July 2002.

The only piece of equipment needed to make identification using this guide is a ruler; however, a magnifying glass and a good map of the area to be surveyed will help in some circumstances. A list of basic field equipment for gecko research is given in Appendix 1.

IDENTIFICATION PROCEDURE

This guide uses dichotomous keys, descriptions and photographs to identify geckos. The keys are a simple means of making a tentative identification; the descriptions and photographs are a back-up system allowing the identification to be checked in more detail. The identification of geckos will be most reliable if the following sequence of steps is taken:

1. Use the 'Primary Key' (p. 17), which will assign the specimen either to one of the five more easily distinguished species (in which case proceed directly to step 3), or to the problematic *Hoplodactylus maculatus* complex.
2. For the members of the *H. maculatus* ('common gecko') complex, a separate key is provided for each of five geographic areas within Otago. See p. 18 for further instructions.
3. Once an identification has been made using the keys, turn to the description provided for the nominate species, and check the information provided. Make sure the specimen/population is within the range of colour, size, distribution, and habitat for that species. Also check the colour photographs, to ensure that the specimen is

consistent in general appearance and colour pattern. If there are obvious inconsistencies between the specimen/population and the descriptions/photographs, it will be necessary to review the descriptions and photographs for the other species, to see whether any of them match more closely. Also check the descriptions for 'Other species that may occur in Otago' (pp. 50-54).

4. If the identification of the specimen/population remains unclear, or if it is suspected to be a species or range extension not included in this guide, consult Appendix 2, which provides information about how to seek expert advice, and what can be done while still in the field to help an expert achieve an identification at a later time.

USING THE KEYS

The aim of a dichotomous key is to allow specimens to be identified via a systematic sequence of questions. Each step taken is a couplet comprised of two contrasting character sets, only one of which should apply to your specimen/population. Choose the character set that most closely matches your specimen/population. If further questions must be answered before identification can be made, the character set will be followed by the number of the next couplet to which you should proceed. When identification has been made, the name of the species is given.

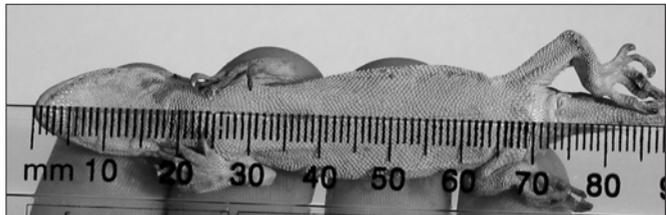
Occasionally, this process will break down. An atypical specimen may have a combination of traits from both character sets, or may have altogether different traits. When this happens, note each of the species that the key could potentially lead to from that point onwards, and check the descriptions and photographs for these species. If this still does not result in a clear identification, refer to the sections 'Other species that may occur in Otago' (pp. 50-54) and Appendix 2, 'When problems arise' (pp. 57-60).

MORPHOLOGY

Snout-to-vent length (SVL)

Geckos are measured along the under (abdominal) surface, from the tip of the upper jaw to the vent ('cloacal opening') between the hind limbs (Fig. 1). There are several methods for making this measurement, with varying degrees of accuracy. Because precise and standardised data are advantageous when keying out specimens using this guide, it is recommended that the 'peel on' technique be adopted, as follows: a clear plastic ruler of between 15 and 30 cm is ideal; first, the head of the gecko is pressed against the ruler so that the tip of the upper jaw is lined up with the 0-mm mark; then the upper and lower body are pressed down in turn as if being 'peeled on', until the vent is against the ruler and the measurement can be taken. The 'peel on' motion helps to overcome the tendency of a live gecko to kink its spine when being handled, which results in an inaccurate and often unrepeatable reading. Even with this method, the process may have to be repeated several times before the gecko relaxes sufficiently.

Figure 1.
Measuring the snout-vent length (SVL) of a gecko; this specimen has an SVL of 73 mm.



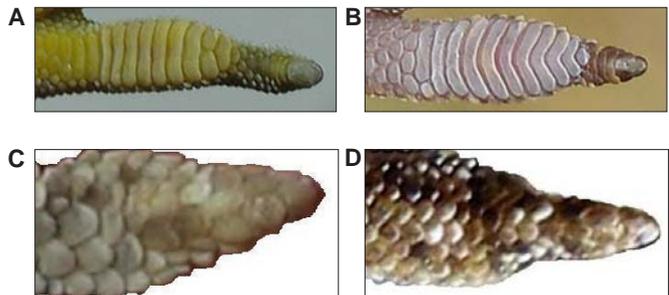
Lamellae and the distal phalange

The toe of a gecko is equipped with a claw, to grip rough surfaces, and a specialised pad (with microscopic structures), which can cling to smooth surfaces. The underside of the pad is divided into a series of soft scale-like plates called 'lamellae', each of which spans the width of the pad. In some species the lamellae are straight (Fig. 2A), whereas in others they are curved or V-shaped (hereafter 'curved'), creating a chevron pattern (Fig. 2B).

The 'distal phalange' is the portion of the toe that is not expanded to form the lamellar pad. It arises from the end of the pad, or sometimes from on top of the pad very near the end. It extends to the tip of the toe, from which the claw protrudes. In some species that have broad lamellar pads, the width of the distal phalange tapers gradually from pad to claw (Fig. 2C), while in others it narrows abruptly from the pad and remains narrow along its entire length (Fig. 2D). As a rule of thumb, it is best to use this trait for identification only when the pad is at least 2.5 times as broad as the distal half of the distal phalange.

When examining the toes of a gecko, always use the fourth (i.e. longest) toe of a hind foot. The lamellae are situated beneath the toe, but the distal phalange can be viewed from above or below.

Figure 2.
Morphological
features of
gecko toes.
A. Straight lamellae;
B. V-shaped
lamellae;
C. Distal phalange
that tapers
gradually from the
expanded pad;
and D. Distal
phalange that
narrows abruptly
from the
expanded pad.



Body colour

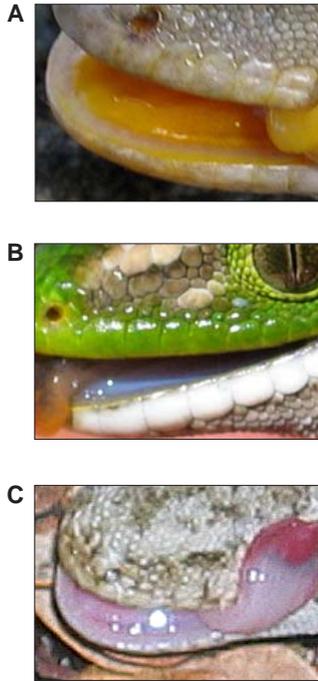
All gecko species have a range of different, though often subtle, colours on their upper (dorsal) surfaces. When determining the basic colour of a gecko, try not to focus on the individual markings but on the upper surface as a whole, including the areas between the markings. Look at the colouring along the back and upper sides, not the lower sides or underside, unless the keys specifically instruct otherwise.

Most geckos can alter their colour to some degree, and usually become distinctly paler/brighter at night. Some specimens become very dull in colour, even a ghostly-white, when they are about to shed their skin. The descriptions of colour, and most of the photographs, depict specimens in their normal day-time colour phase; this should be kept in mind if examining specimens after dark.

Most Otago geckos can change their colour to some degree. The jewelled gecko (*Naultinus gemmeus*) is the only exception. An extreme example is the Dunstan Mountains form of the Roys Peak gecko (*H.* sp. 'Roys Peak'), which is generally dark pinkish-brown when encountered in the field; those parts of the animal that are held between warm fingers can fade to pale grey in only a few minutes.

On rare occasions, individuals with under-developed (e.g. albino or leucistic) pigment have been found in Otago. Specimens that are bright yellow or white, or unusually translucent, should be identified by traits other than colour.

Figure 3. Variation in the colour of the mouth lining in geckos. A. Orange; B. Blue; and C. Pink.



Mouth colour

Some gecko species have bright colours inside the mouth. In Otago, these can be vivid orange (Fig. 3A), deep blue/purple (Fig. 3B) or grey. Others lack pigmentation in the mouth, which appears pink (Fig. 3C). For the purpose of this guide, the colours inside the mouth are divided into two characters: the skin lining the lower jaw, and the tongue. Each of these is used separately. The skin lining the upper jaw and the throat is not used. Geckos have very strong jaw muscles, so that any attempt to prise

open the mouth of a live gecko may inflict a serious injury on the individual. To view the mouth colour you must wait for the gecko to open its mouth. Wild geckos will often bite when initially picked up, and this is an ideal opportunity to observe the mouth colour. Otherwise, wait for the specimen to lick its lips or eyes, or encourage licking by smearing a drop of water or honey on the eye.

Adult specimens

There are three basic ways to determine whether a specimen is adult. Firstly, adult males have several features that separate them from juveniles, including prominent pores in the scales just in front of the vent (see below), a noticeable swelling under the base of the tail, and one or more greatly enlarged and protruding scales ('cloacal spurs') on either side of the swelling (Fig. 4A & B). Females seldom differ externally from juveniles (Fig. 4C), although some may have small pores similar to those of males. However, females are often pregnant when encountered, especially in summer, in which case adulthood is confirmed. Heavily pregnant specimens may have an obviously distended abdomen (Fig. 4D). Smaller embryos or yolk sacs can sometimes be detected by palpating the lower abdomen—gently roll your thumb across the lower belly feeling for 1-2 rounded lumps. The third method is to sample a series of specimens from a population to observe the upper size limit. By doing so, it should soon become evident which specimens can be regarded as 'adult' in size. Just be aware of the possibility that two different-sized species may be living together!

Precloacal pores

Adult male geckos have a series of pores situated on the underside of the body, just in front of the vent (Fig. 4A & B). There is a single pore per scale and the pore series is roughly triangular in shape, extending onto the base of the hind limbs. The pores may be open or filled with a pale yellow or orange, wax-like substance.

The precloacal pores are defined in two ways. The depth of the pore series is counted length-wise, along

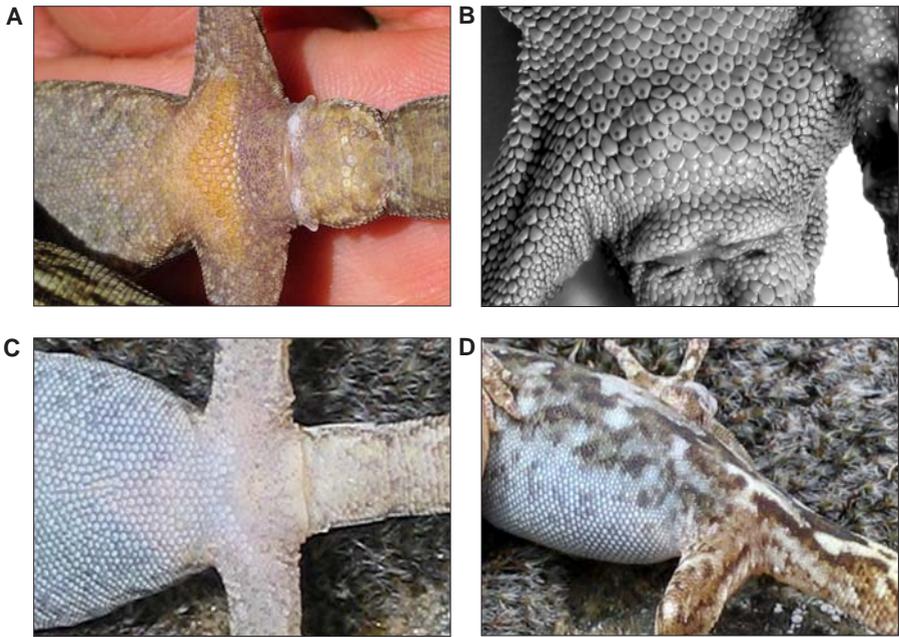


Figure 4. Morphology of adult and juvenile geckos. A. Cloacal area of an adult male gecko, illustrating cloacal swelling, cloacal spurs and precloacal pore series (orange patch); B. Close-up of precloacal pores of an adult male gecko; C. Appearance of the cloacal area of a juvenile, or adult female gecko; and D. A heavily gravid female gecko, with obviously distended abdomen.

the mid-line of the body (or just to one side of the mid-line), and usually comprises 2-8 rows of pores. The width is counted from side-to-side, along the anterior edge of the pore series, and may number between about 17 and 37 pores. These counts are often expressed as a formula, e.g. '3 × 25', but in this guide the depth and width are used independently.

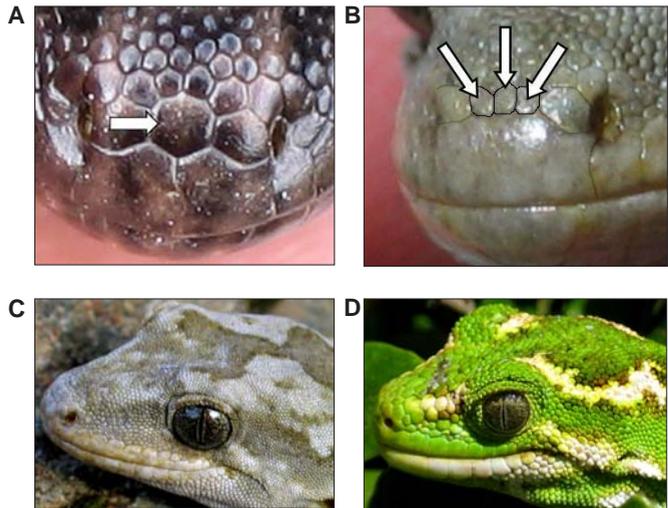
Internasals and other head/snout scales

On the tip of the upper jaw is a broad scale extending from the mouth to (or almost to) the nostrils; this is called the 'rostral scale'. To either side of the rostral scale, also touching the mouth and the nostril, are the '1st upper labial scales'. All other scales that touch the nostril are called 'nasal scales'. The 'internasal scales' are the scales that are enclosed in the area between the two sets of nasal scales, and are touching the rostral scale. Depending on species, the internasals may number from one to three (see Fig. 5A & B).

The size of the scales along the top and sides of the snout (but excluding those bordering the mouth and nostrils) varies between species. In many species, these scales are almost as small as the normal body scales (Fig. 5C), but in some they are greatly enlarged (Fig. 5D).

In this guide, the series of small, often pointed (even barb-like) scales that protrude from the outer-most fringe of the 'eye-brows' is referred to as 'supraciliary scales'.

Figure 5. Variation in internasal and snout scales in geckos. A. A single large internasal scale (indicated by arrow); B. Three small internasal scales (indicated by arrows); C. Very small snout scales; and D. Greatly enlarged snout scales.



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