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A new species of *Phyllurus* leaf-tailed gecko (Lacertilia: Carphodactylidae) from Scawfell Island, mid-east Queensland, Australia

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Abstract

A recent targeted reptile survey of Scawfell Island, in the South Cumberland Group, revealed a species of *Phyllurus* gecko that could not be morphologically assigned to any described species. Here I describe this as a new species, *Phyllurus fimbriatus* **sp. nov.**, based on differences in a number of morphometric and scalation traits from congeners. *Phyllurus fimbriatus* **sp. nov.** is restricted to deeply-piled boulder habitat under rainforest canopy on Scawfell Island, approximately 50 km offshore from Mackay in mid-east Queensland. A survey in rocky, rainforest habitat on nearby Carlisle Island failed to find the species, and other nearby islands appear to lack sufficiently deep rock outcropping to support the species. *Phyllurus fimbriatus* **sp. nov.** is known from two small patches of habitat on Scawfell Island, but it is common within these, and is likely to be found in other suitable habitat patches on the island. Based on assessment of imagery, the total area of habitat occupied may be < 1 km^2. The island is protected within South Cumberland National Park, but fire encroachment from adjacent dry sclerophyll habitats, climate change, competition from introduced Asian House Geckos (*Hemidactylus frenatus* Duméril & Bibron, 1836), and poaching are potential threats.

Key words: *Phyllurus fimbriatus* **sp. nov.**, leaf-tailed gecko, rainforest, boulder-field

Introduction

Leaf-tailed geckos of the genera *Phyllurus*, *Saltuarius* and *Orraya* are restricted to the east coast of Australia, from Cape York in the north to the Sydney region in the south (Couper *et al.* 1993, 2000, 2008; Hoskin *et al.* 2003, 2019; Hoskin & Couper 2013). Of the 18 leaf-tailed gecko species, 10 belong to the genus *Phyllurus*. These ten species have small distributions in the coastal ranges of Queensland, with the exception of *P. platurus* (White, 1790) in sandstone habitats of the Sydney region. All the Queensland species are found in rainforest and most occur in areas of layered rock, probably due to the long-term buffering effect of these 'litho-refugia' in otherwise hot, dry, fire-prone landscapes (Couper & Hoskin 2008; Hoskin *et al.* 2019). *Phyllurus caudiannulatus* Covacevich, 1975 was the first Queensland species described, from Bulburin in south-eastern Queensland and the Eungella region in mid-east Queensland. The Eungella population was subsequently described as *P. nepthys* Couper, Covacevich & Moritz, 1993, along with two additional species from nearby rainforest areas of mid-east Queensland: *P. ossa* Couper, Covacevich & Moritz, 1993, and *P. isis* Couper, Covacevich & Moritz, 1993 (Fig. 1).

The number of described species has doubled since the year 2000, with *P. championae* Schneider, Couper, Hoskin & Covacevich, 2000 described from mid-east Queensland (Fig. 1), *P. kabikabi* Couper, Hamley & Hoskin, 2008 described from Oakview National Park in the south-east, and three species described from the Townsville region in north-east Queensland: *P. amnicola* Hoskin, Couper, Schneider & Covacevich, 2000, *P. gulbaru* Hoskin, Couper & Schneider, 2003, and *P. pinnaclensis* Hoskin, Bertola & Higgie, 2019. Additionally, *P. ossa* was split into three subspecies: *P. ossa ossa* Couper & Hoskin, 2013 in the low ranges east and north of Eungella, *P. ossa hobsoni* Couper & Hoskin, 2013 in the Conway Range/Mt Dryander area, and *P. ossa tamoya* Couper & Hoskin, 2013 on Whitsunday Island (Fig. 1). These discoveries have not only increased knowledge on the distribution and biogeographic history of the genus, but have highlighted threats to biota of the isolated remnants of 'dry rainforest' along the Queensland coast (e.g., Couper *et. al.* 2000; Hoskin *et al.*, 2003, 2019; Bertola *et al.* 2018).

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Here I describe a new species found during a reptile survey of Scawfell Island, 50 km north-east of Mackay, on the 16–19 November 2021. The survey specifically targeted *Phyllurus* and other lizard species typically associated with deeply layered rock habitat under rainforest canopy. The new population of *Phyllurus* differs obviously in morphology, scalation, and colour pattern from all described species.

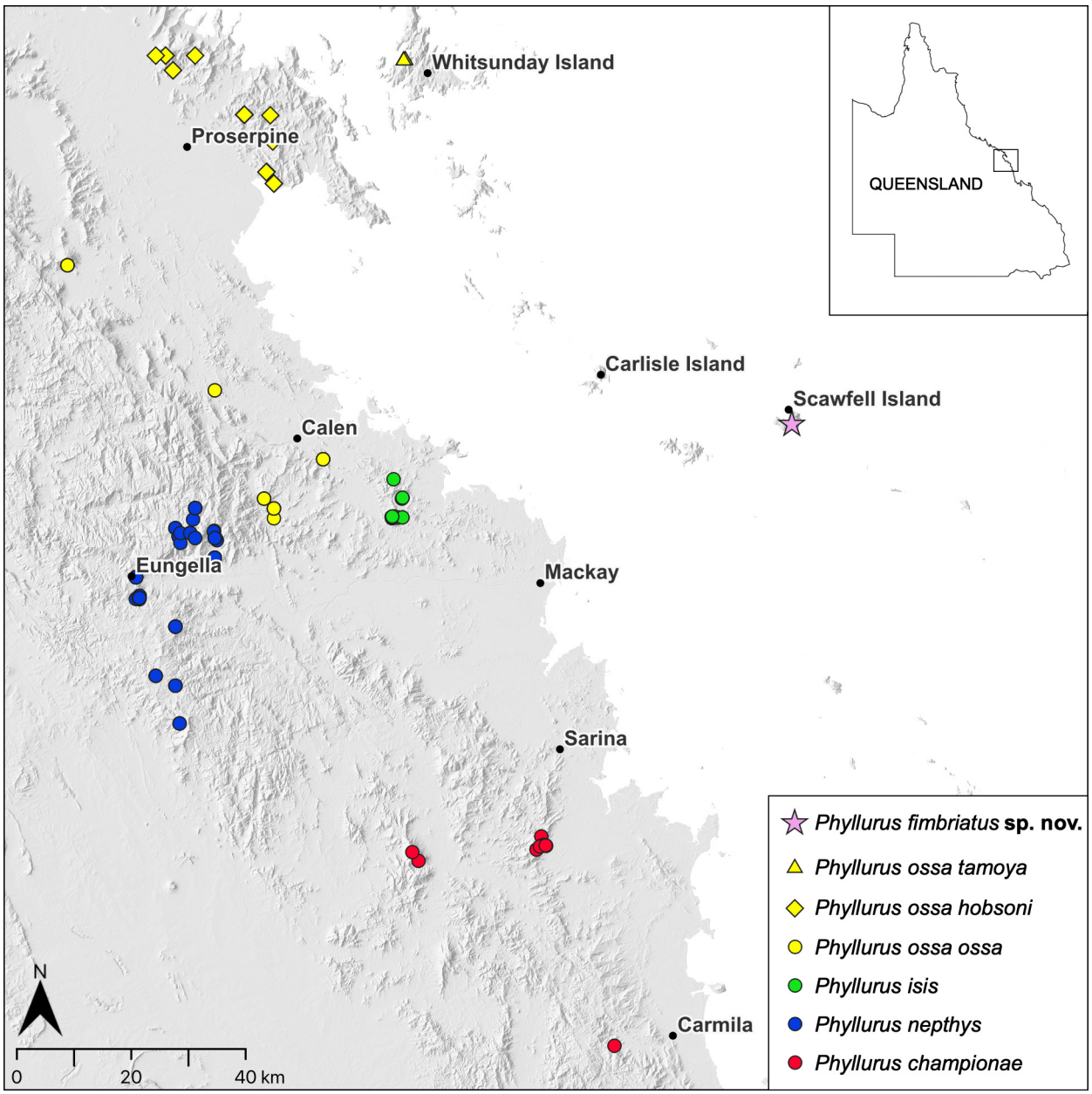

FIGURE 1. Map showing the distributions of *Phyllurus* species and subspecies in mid-east Queensland.

Methods

Detailed morphology and scale data was taken on the four collected individuals, after preservation. Data was recorded for additional individuals in the field, including sex, reproductive status of females (as determined by external inspection for eggs visible through the body wall), snout to vent length, and tail length and condition (original versus regenerated). Photos were also taken to describe colour pattern in life.

Morphometric and scale count definitions. Snout to vent length (SVL), tip of snout to anterior margin of cloaca with body straightened; tail length (T), from posterior margin of cloaca to tip of tail; attenuated tail tip length (TT), from end of flared section to tail tip; tail width (TW), measured at widest point near base; tail depth (TD), measured at same point as TW; interlimb length, measured as axilla to groin (AG) with body straightened; total

length of forelimb (L1) and hindlimb (L2), insertion to tip of longest digit (claw included), with limb stretched straight perpendicular to body; forearm length (FL), from elbow to 'heel' of palm (i.e., radioulna length); lower hindlimb length (LHL), from knee to heel (i.e., tibiofibula length); neck length (NL), axilla to mid posterior margin of ear; neck width (NW), measured at narrowest point of neck; head length (HL), mid anterior margin of ear to tip of snout; head width (HW), widest point across back of skull, corresponding with anterior upper margin of ear openings; head depth (HD), lower jaw to top of head, between eyes; snout length (SL), tip of snout to anterior margin of orbit; eye diameter (ED), measured horizontally across eye; internasal scales, count of scales along the upper (posterior) edge of the rostral scale from naris to naris; supralabial and infralabial scales, counts start immediately behind the rostral and mental scales, respectively, and terminate posteriorly when the labials cease to be twice the size of adjacent scales; subdigital lamellae, enlarged series of scales beneath each digit, counted from (and including) the claw sheath and continuing onto the palm or foot to the point where the scales cease being twice the size of adjacent granular scales.

Systematics

The new species is assigned to *Phyllurus* based on the following character states: postmental scales not enlarged; tail tip finely attenuated; tail terminating in a small knob; nostril not in contact with rostral shield; axilla deeply invaginated; males without preanal pores (Bauer 1990; Couper *et al.* 1993).

Phyllurus fimbriatus sp. nov.

Scawfell Island Leaf-tailed Gecko
(Figures 2, 3)

Material examined. Holotype. QM J97578, adult female, original tail, Scawfell Island (20.8743°S, 149.6102°E; 200 m a.s.l.), 18 November 2021, C. J. Hoskin, E. Carmichael & E. Evans; Figure 2. **Paratypes.** QM J97576, subadult female, original tail; QM J97577 adult male, regenerated tail; QM J97579, adult female, regenerated tail; collection details same as holotype.

Diagnosis. Distinguished from congeners by the following characters: large size (SVL to 113 mm); obviously flared original and regenerated tail; rostral scale partially divided by a single groove; body and tail surfaces with small tubercles, with larger spinose tubercles largely restricted to margins of original tail; anterior-most white band on original tail V-shaped or notched, and spanning full width of tail; ventral surfaces immaculate.

Etymology. The species name *fimbriatus* is Latin for 'fringed', referring to the restriction of spines on the original tail to a fringe along the outer edge.

Measurements and scale counts. All measurements and scale counts for the holotype and paratypes are presented in Table 1. ***Description of type series.*** SVL = average 101.7 mm (90.7–110.7). Proportions (average, followed by range in brackets): AG/SVL = 0.47 (0.45–0.48), FL/SVL = 0.20 (0.19–0.20), LHL/SVL = 0.23 (0.22–0.24), L1/SVL = 0.46 (0.44–0.48), L2/SVL = 0.53 (0.51–0.54), NL/SVL = 0.19 (0.19–0.20), NW/SVL = 0.11 (0.10–0.12), HL/SVL = 0.27 (0.27–0.28), HW/SVL = 0.22 (0.22–0.23), HD/SVL = 0.110 (0.107–0.115), SL/SVL = 0.124 (0.118–0.131), ED/SVL = 0.061 (0.057–0.064), TL/SVL (original) = 0.77 (0.76–0.78), TT/SVL (original) = 0.41 (0.41–0.42), TW/SVL (original) = 0.20 (0.18–0.21), TD/SVL (original) = 0.066 (0.059–0.073), TL/SVL (regenerated) = 0.49 (0.47–0.50), TT/SVL (regenerated) = 0.24 (0.22–0.25), TW/SVL (regenerated) = 0.23 (0.21–0.25), TD/SVL (regenerated) = 0.079 (0.077–0.082). Scale counts (average, followed by range in brackets): internasals = 6.8 (6–7), supralabials = 15.0 (14–16), infralabials = 14.5 (13–16), subdigital lamellae under 4th finger = 16.3 (15–18), subdigital lamellae under 4th toe = 19.0 (18–20). ***Head.*** Large, depressed, triangular; covered in very small granules with scattered larger, pale, conical tubercles on sides of head; top of snout and canthul region have fine granular scales and no enlarged tubercles; canthul region moderately steep, with a moderately defined bony ridge extending forward from upper anterior margin of each eye towards naris; skin of head co-ossified with skull; deep, vertical groove partially (20–50%) dividing rostral scale (Table 1); rostral not in contact with nostril; 6–7 scales along the upper margin of rostral shield (i.e., internasals); first supralabial scale taller than wide, remaining supralabials broad and steadily decreasing in size; first infralabial scale taller than wide, remaining infralabials broad and steadily decreasing in size; granular scales of chin and throat homogenously minute granules, with the exception of larger scales along the edge of the mental and infralabials (par-

ticularly abutting infralabials 1–3); ear opening conspicuous, vertical, much less than half as large as eye. ***Neck.*** Fairly broad; covered in small granules that are intermixed with evenly scattered larger pale conical tubercles the sides and top. ***Body.*** Depressed, covered in small granules; flanks and back evenly covered in scattered, small, conical tubercles; those on the back and side evenly small and scattered (as for neck); all ventral surfaces (even under limbs) covered in even, smooth, fine granules, with no enlarged tubercles; single male has a large post-cloacal bulge, with conspicuous cloacal 'spurs', consisting of a cluster of white triangular scales, on the anterior-lateral margin; no pre-cloacal pores on any individuals; axilla deeply invaginated. ***Limbs.*** Long and very slender, covered in small granular scales and with scattered, small, pointed tubercles dorsally; lacking tubercles on ventral surface; digits strongly compressed distally; dorsal surface of hands, feet and digits without enlarged conical tubercles. ***Original tail*** (Fig. 2). Anterior half flared and leaf-shaped, then tapers abruptly into a long attenuated tip (tip 54% of total tail length for both specimens; Table 1); flared section strongly flattened; distal section rounded, terminating with a minute, rounded, white 'knob'; dorsal surface covered in minute granules, with sparsely scattered enlarged spinose tubercles; margin of flared portion of tail undulating, with the 'peaks' each having several obvious, large spinose tubercles, making the tail distinctly spiny on the edge but smooth on the top; ventral surface smooth with a mosaic of small rounded to square or hexagonal scales. ***Regenerated tail.*** Disc-like, rounded shape, with thin, tapering distal portion (tip 47% and 50% of total tail length in the two specimens; Table 1); dorsal and lateral surfaces of disc and attenuated portion covered in fine, pointed granules; small, rounded knob on the end; ventral surface covered in mosaic of block like scales. ***Colour pattern in spirit*** (e.g., Fig. 2). Dorsal base colour grey to tan, with irregular large dark brown blotches on neck and body, and smaller, dark brown blotches on head and limbs; dark blotches on neck and back connected to be arranged as irregular, dark, transverse bars; dark, longitudinal markings extend from above hips to base of tail; top of head and snout has less pattern but W-shaped mark across top of snout, connecting the anterior margin of the eyes; diffuse pale band from lower anterior margin of eye diagonally to midway along jaw, and more obvious similar pale band from lower posterior margin of eye diagonally to just behind jaw; white 'spot' (from cluster of minute tubercles) above the ear; all dorsal and lateral surface of neck, body and limbs covered in fine white flecks (that are generally the small conical tubercles); ventral surfaces of chin, throat, chest, abdomen and limbs fairly even cream colour, except for dark smudging under the knees, feet and hands; original tail has pale grey-brown background with extensive dark brown-black mottling, and white bands; the white bands consist of a band at the base of the flared portion that is distinctly V-shaped, and unbroken across the width of the tail, then a very thin white band three-quarters of the way along the flared portion, then a thick white band at the start of the attenuated section, then two white bands along the attenuated section, and a white tip at the end of the tail; underside of flared portion of original tail has a pale background, with heavy, dark brown flecked and scattered white spots; ventral surface of attenuated portion of original tail starting with V-shaped white marking, then dark brown and white corresponding to stripes on dorsal surface; dorsal surface of regenerated tail dark brown with a few irregular pale markings (QM J97579) or light brown background with fairly even dark mottling (QM J97577); ventral surfaces have a pale background that is heavily (QM J97579) or moderately covered in dark brown mottling (QM J97577). ***Colour pattern of type series in life.*** As above but base colour of body generally lighter (whitish grey), white and black markings (e.g., particularly on original tail) more contrasting, and ventral surfaces immaculate white.

Field data. ***Body size and maturity.*** SVL and tail data were collected from 23 individuals in the field, and these individuals were photographed to assess consistency in colour pattern traits. The majority of individuals observed were subadults of approximately 65 mm SVL. The smallest male with a pronounced post-cloacal bulge was 96 mm SVL. Individuals deemed male below that SVL (up to 85 mm) did not have a pronounced post-cloacal bulge. Male sexual maturity was therefore taken to be 96 mm SVL for the field data and, for the eight males that were this size and above, the average SVL was 102 mm (with a range between 96–105 mm; Table 1). The smallest female with eggs visible through the body wall of the abdomen was 103 mm SVL. None of the females inspected below that size (up to 96 mm SVL) had visible eggs, whereas six of the eight females inspected above 103 mm SVL had visible eggs. Female sexual maturity was therefore taken to be 103 mm SVL for the field data and, for the eight females that were this size and above, the average SVL was 109 mm (with a range between 103–113 mm; Table 1). ***Original tail*** (e.g., Figs 2, 3A, 3B). Of the 23 individuals for which tail status was recorded in the field, 8 (i.e., 35%) had an original tail. However, there was a clear relationship with body size: all 7 individuals < 96 mm SVL had an original tail, whereas only 1 out of 16 individuals (i.e., 6%) that were 96 mm or longer had an original tail. Average TL/SVL for the 8 individuals with an original tail was 0.77 (range 0.74–0.81). Shape as described for type specimens. Tail colouration as described but with the following variation. The white band halfway along the flared portion varies from thin but distinct in some individuals to a single, central white dot in others. The white band at the end of the flared portion is often V-shaped, or sometimes a diagonal line, rather than straight and transverse. The degree of dark brown mottling on the flared portion

of the tail varies from light to heavy. ***Regenerated tail*** (e.g., Figs 3C, 3D). Average TL/SVL for three individuals that appeared to have a full regenerated tail was 0.53 (range 0.46–0.60). Shape as described for type specimens, but varying in the degree to which the tail has regenerated, with the attenuated portion appearing to get relatively longer with tail size. Colour also appears to vary as the tail regenerates, with freshly regenerating tails being almost black and those more fully regenerated being paler and more similar to the background colouration of the body. ***Colour pattern.*** As described for the type series, noting the following variation. Base colour varies from light grey to brown, giving some individuals a much darker appearance (e.g., Fig. 3C). One individual (Fig. 3D) was obviously different in colour pattern, being an even, soft brown colour with four longitudinal lines of dark blotches down the vertebral zone and a dorsolateral line of enlarged, pale tubercles.

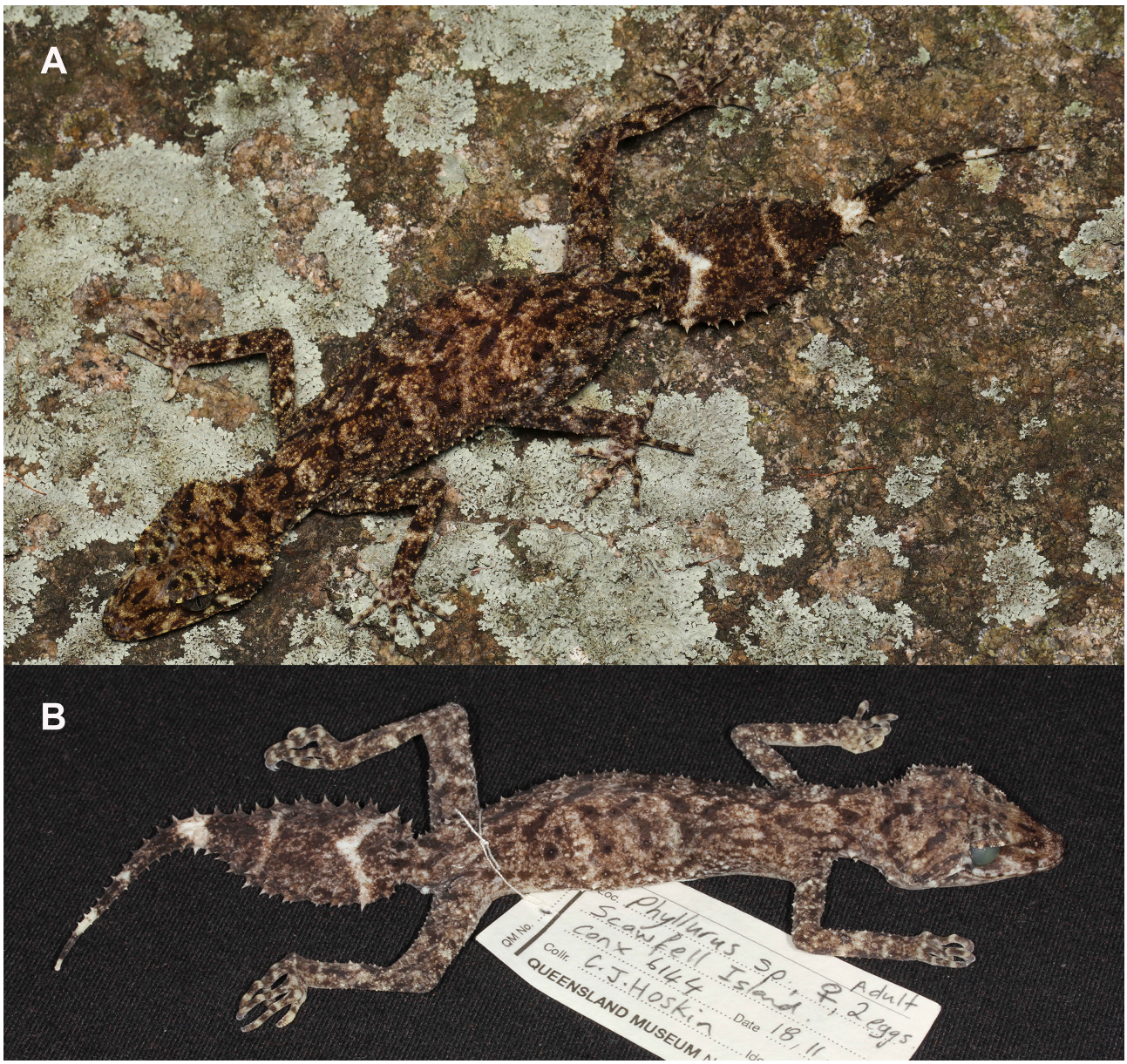

FIGURE 2. Holotype of *P. fimbriatus* **sp. nov.** (QM J97578). Photos: (A) Edward Evans; (B) Conrad Hoskin.

Comparisons. *Phyllurus fimbriatus* **sp. nov.** could only be confused with congeners. The obviously flared original and regenerated tail readily distinguishes it from the following congeners that have a cylindrical, tapering tail: *P. caudiannulatus P. kabikabi*, *P. gulbaru* and *P. pinnaclensis*. *Phyllurus fimbriatus* **sp. nov.** differs from congeners with flared tails in the following ways (comparative data from Bauer 1990; Couper *et al.* 1993, 2000; Couper & Hoskin 2013). The V-shaped anterior-most white band on the original tail separates it from all other species. Large body size (av. SVL 105 mm, max. 113 mm; including field measurements) readily separates it from *P. championae* (av. 62 mm, max. 81 mm), *P. isis* (av. 69 mm, max. 76 mm), *P. ossa* (av. 74 mm, max. 89 mm), *P. platurus* (av. 80

mm, max. 99 mm), partially from *P. nepthys* (av. 91 mm, max. 103 mm), but not from *P. amnicola* (av. 97 mm, max. 113 mm; including field data). Neck, body, and dorsal surface of original tail relatively smooth, versus moderately to extremely spinose in *P. championae*, *P. ossa* and *P. nepthys*. Single groove partially dividing the rostral scale separates it from *P. championae* (single groove completely divides rostral) and *P. ossa* (typically three, sometimes two, partial grooves). Further differs from *P. isis* and *P. ossa* in having 6 or 7 scales along posterior margin of rostral scale (i.e., internasals) (*P. isis* 9–11; *P. ossa* 8–11).

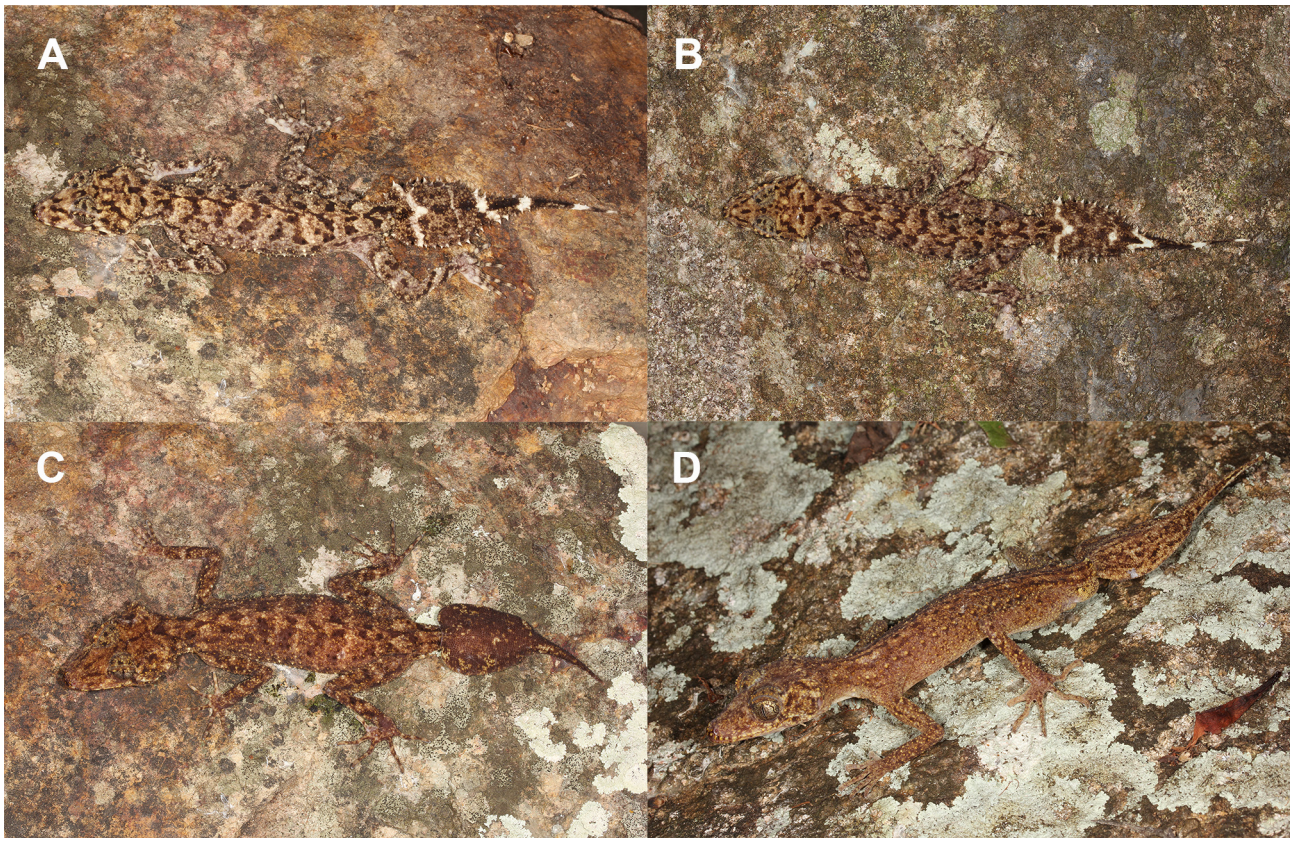

FIGURE 3. *Phyllurus fimbriatus* **sp. nov.** in life: (A) adult female with original tail; (B) juvenile with original tail; (C) adult female with regenerated tail; (D) adult male of unusual colouration, with regenerated tail. Photos: Conrad Hoskin.

Broadly, most similar to *P. amnicola* (Figs 4A, 4B) and *P. nepthys* (Figs 4C, 4D), due to large body size and partial division of rostral scale. Differs from *P. amnicola* in having a wider (HW/SVL = 0.217–0.232 vs. 0.207–0.214) and shorter head (HL/SVL = 0.266–0.276 vs. 0.277–0.291); a shorter neck (NL/SVL = 0.188–0.203 vs. 0.207–0.233); a less flared original tail; a V-shaped, unbroken anterior-most white band on the original tail (vs. straight and usually not continuous); and by the restriction of prominent spines on the original tail to the outer margin (vs. prominent spines also on anterior one-third of the dorsal surface of the tail in *P. amnicola*). *Phyllurus fimbriatus* **sp. nov.** differs from *P. nepthys* by larger body size (SVL av. 105 mm, max. 113 mm vs. av. 91 mm, max. 103 mm); more flared original and regenerated tail; V-shaped anterior-most white band on the original tail (vs. straight); much less spinose dorsal surfaces of head, body and limbs (vs. extremely spinose); spines restricted to margin of flared portion of original tail (vs. prominent spines over dorsal and marginal surfaces); no spines on regenerated tail (vs. covered in spines); and immaculate white ventral surfaces (vs. ventral surfaces 'peppered' with brown).

Distribution. Appears to be restricted to Scawfell Island, approximately 50 km north-east of Mackay in mid-eastern Queensland (Fig. 1). On Scawfell Island, known from deeply-piled boulders in two gullies but other areas of similar habitat on the island have not been surveyed.

Habitat and habits. Deeply layered rock with associated rainforest vegetation. Both known sites consist of deeply-piled granite boulders in a gully (Fig. 5). The boulders are covered in ferns (e.g., *Asplenium*) and vines (e.g., *Hoya*) and have a canopy of *Ficus* and other rainforest trees (Fig. 5). *Phyllurus fimbriatus* **sp. nov.** was restricted to areas with deeply-piled boulders—surveys in adjacent areas, including other areas of rainforest vegetation along the gullies and slopes did not find the species. Individuals were found on rock surfaces at night, and presumably retreat deep among the boulders during the day.

TABLE 1. Morphological measurements, proportions, and scale counts for the type specimens, and SVL data from individuals measured in the field. All measurements are in mm. Field data is only for individuals deemed to be mature adults (see text), is split by sex, and is presented as average followed by range in brackets.

	QM J97578 Holotype Female	**QM J97576** Paratype Female	**QM J97577** Paratype Male	**QM J97579** Paratype Female	**Field data** Adult females	**Field data** Adult males
Measurements					N = 8	N = 8
Snout to vent (SVL)	104.2	90.7	101.4	110.7	109 (103–113)	102 (96–105)
Interlimb length (AG)	50.3	42.7	45.4	51.0		
Forearm length (FL)	20.7	18.3	20.2	21.2		
Lower hindlimb (LHL)	23.2	21.4	23.1	24.8		
Full forelimb (L1)	46.5	43.3	44.2	51.9		
Full hindlimb (L2)	55.4	48.8	51.9	58.5		
Neck length (NL)	19.5	18.1	20.6	20.9		
Neck width (NW)	10.7	10.1	12.1	11.5		
Head length (HL)	27.7	25.1	27.4	30.0		
Head width (HW)	22.6	21.0	23.4	24.3		
Head depth (HD)	11.3	10.4	11.1	11.9		
Snout length (SL)	12.9	11.3	12.0	14.5		
Eye diameter (ED)	6.1	5.8	6.5	6.3		
Original Tail						
Tail Length (TL)	78.9	70.8				
Tail tip length (TT)	42.3	38.1				
Tail Width (TW)	18.6	19.4				
Tail Depth (TD)	6.2	6.6				
Regenerated Tail						
Tail Length (TL)			50.5	52.4		
Tail tip length (TT)			25.4	24.9		
Tail Width (TW)			25.0	23.4		
Tail Depth (TD)			8.3	8.5		
Scale counts						
Rostral groove %	50	20	40	40		
Internasals	7	6	7	7		
Supralabials	15	14	16	15		
Infralabials	16	13	14	15		
1st finger lamellae	12	12	12	13		
2nd finger lamellae	15	17	15	16		
3rd finger lamellae	16	18	16	18		
4th finger lamellae	15	18	15	17		
5th finger lamellae	18	15	14	16		
1st toe lamellae	12	12	12	12		
2nd toe lamellae	17	17	17	17		
3rd toe lamellae	18	18	18	20		
4th toe lamellae	18	19	20	19		
5th toe lamellae	20	19	18	19		

FIGURE 4. *Phyllurus amnicola* with original (A) and regenerated tail (B), and *P. nepthys* with original (C) and regenerated tail (D). Photos: (A, B) Conrad Hoskin; (C, D) Anders Zimny.

FIGURE 5. Habitat of *P. fimbriatus* **sp. nov.** on Scawfell Island. Photo: Conrad Hoskin.

Density was high within suitable habitat, with at least fifteen individuals found within approximately three hours search time at each of the two sites. During the survey period (16–19th November 2021), at least half of all individuals found were subadults of small size (approximately 65 mm). Of 16 adults inspected in the hand, 8 were males and 8 were females. Six of the eight adult females had two large eggs visible through the skin on the body wall, and two had no eggs visible. For estimates of size at sexual maturity for each sex, and data on original versus regenerated tail status in subadults and adults, see the Field Data section above.

Other gecko species observed at the two sites were *Amalosia rhombifer* (Gray, 1845) and *Heteronotia binoei* (Gray, 1845). The introduced Asian House Gecko (*Hemidactylus frenatus*) was seen on granite rocks and trees within 1 km of both sites.

Discussion

The description of *P. fimbriatus* **sp. nov.** brings the number of described *Phyllurus* species to 11. Ten of these species have highly localised distributions along coastal ranges of the Queensland coast, with a cluster of five species in the Mackay region of mid-east Queensland (Fig. 1). *Phyllurus fimbriatus* **sp. nov.** is the first species found to be restricted to an offshore island, although a subspecies of *P. ossa* is currently only known from Whitsunday Island (Fig. 1; Couper & Hoskin 2013). Phylogenetic data is required to assess the relationships of *P. fimbriatus* **sp. nov.** and to estimate its period of isolation on Scawfell Island. Based on morphology and geography, it is sensible to assume it will be allied to the mid-east Queensland clade of *Phyllurus* (i.e., those species in Figure 1), rather than with the highly divergent lineage of *P. amnicola* in the Townsville region (Couper *et al.* 2000; Hoskin *et al.* 2003; Skipwith *et al.* 2019).

Targeted surveys of nearby islands are required to establish whether *P. fimbriatus* **sp. nov.** is endemic to Scawfell Island. No *Phyllurus* geckos were found during a targeted survey of nearby Carlisle Island (13–16th November 2021) immediately prior to the survey of Scawfell Island, and none were found there during an earlier reptile survey by Leggett (1988). Rocky, rainforest gullies on nearby St Bees and Keswick Islands require surveying. None of these islands appear to have sufficient deeply-piled rocky habitat to support populations of *Phyllurus* but the ability of species to survive in very small areas (e.g., *P. gulbaru* and *P. pinnacelensis*; Bertola *et al.* 2018, Hoskin *et al.* 2019) suggests surveys are warranted. Additional surveys are required across the gullies of Scawfell Island to map out the distribution of *P. fimbriatus* **sp. nov.** in detail. There are extensive areas of rocky habitat, with rainforest, on the southern side of the island, and these should be targeted for further surveys. Based on assessment of imagery, the total area of habitat occupied may be < 1 km^2.

Assessment of potential threats is also required. Threats identified for other *Phyllurus* species with equally small distributions, and similar habitat requirements, include fire, climate change, poaching, and competition from invasive Asian House Geckos (*Hemidactylus frenatus*). Scawfell Island is completely protected within South Cumberland National Park; however, all these potential threats could still operate. Fire deserves particular attention because an increase in heatwaves and/or droughts with climate change could result in a change in fire frequency or intensity on Scawfell Island, which could reduce the area and connectivity of rainforest patches (Bertola *et al.* 2018; Hoskin *et al.* 2019). Fire and other potential threats need to be assessed and managed accordingly. The presence of *H. frenatus* in natural habitats on the island is of concern, given it can achieve very high densities in natural habitats in coastal north Queensland (Barnett *et al.* 2017, 2018) and has been implicated in declines of native species globally and in Australia, particularly on islands (Cole *et al.* 2005; Hoskin 2011). *Hemidactylus frenatus* was not recorded during a reptile survey of Scawfell Island in 1994 (Hines & Leggett 1996); a survey that included the coastal scrub and rocks where the species is now present. Monitoring for *H. frenatus* invasion of *P. fimbriatus* **sp. nov.** sites is required in order to assess the potential competitive threat and possible management actions.

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References

Barnett, L.K., Phillips, B.L. & Hoskin, C.J. (2017) Going feral: Time and propagule pressure determine range expansion of Asian house geckos into natural environments. *Austral Ecology*, 42, 165–175.
https://doi.org/10.1111/aec.12416

Barnett, L.K., Phillips, B.L., Heath, A.C.G., Coates, A. & Hoskin, C.J. (2018) The impact of parasites during range expansion of an invasive gecko. *Parasitology*, 145, 1400–1409.
https://doi.org/10.1017/S003118201800015X

Bauer, A.M. (1990) Phylogenetic systematics and biogeography of the Carphodactylini (Reptilia: Gekkonidae). *Bonner Zoologische Monographien*, 30, 1–217.

Bertola, L.V., Higgie, M. & Hoskin, C.J. (2018) Resolving distribution and population fragmentation in two leaf-tailed gecko species of north-east Australia: key steps in the conservation of microendemic species. *Australian Journal of Zoology*, 66, 152–166.
https://doi.org/10.1071/ZO18036

Cole, N.C., Jones, C.G, & Harris, S. (2005) The need for enemy-free space: the impact of an invasive gecko on island endemics. *Biological Conservation*, 125, 467–474.
https://doi:10.1016/j.biocon.2005.04.017

Couper, P.J., Covacevich, J.A. & Moritz, C. (1993) A review of the leaf-tailed geckos endemic to eastern Australia: a new genus, four new species, and other new data. *Memoirs of the Queensland Museum*, 34, 95–124.

Couper, P.J., Hamley, B. & Hoskin, C.J. (2008) A new species of *Phyllurus* (Lacertilia: Gekkonidae) from the Kilkivan district of south-eastern Queensland. *Memoirs of the Queensland Museum*, 52, 139–147.

Couper, P.J. & Hoskin, C.J. (2008) Litho-refugia: the importance of rock landscapes for the long-term persistence of Australian rainforest fauna. *Australian Zoologist*, 34, 554–560.
https://doi.org/10.7882/AZ.2008.032

Couper, P. & Hoskin, C.J. (2013) Two new subspecies of the leaf-tailed gecko *Phyllurus ossa* (Lacertilia: Carphodactylidae) from mid-eastern Queensland, Australia. *Zootaxa*, 3664 (4), 537–553.
https://doi.org/10.11646/zootaxa.3664.4.7

Couper, P.J., Schneider, C.J., Hoskin, C.J. & Covacevich, J.A. (2000) Australian leaf-tailed geckos: phylogeny, a new genus, two new species and other new data. *Memoirs of the Queensland Museum*, 45, 253–265.

Covacevich, J. (1975) A review of the genus *Phyllurus* (Lacertilia: Gekkonidae). *Memoirs of the Queensland Museum*, 17, 293–303.

Duméril, A.M.C. & Bibron, G. (1836) *Erpétologie Genérale ou Histoire Naturelle Complète des Reptiles. Vol. 3*. Librarie Enclyclopedique de Roret, Paris, 528 pp.

Gray, J.E. (1845) *Catalogue of the Specimens of Lizards in the Collection of the British Museum*. British Museum, London, xxviii + 289 pp.

Hines, H.B. & Leggett, R. (1996) Herpetofauna of Scawfell Island, with a review of museum specimens from the Cumberland Group of islands. *The Queensland Naturalist*, 34, 1–8.

Hoskin, C.J. (2011) The invasion and potential impact of the Asian House Gecko (*Hemidactylus frenatus*) in Australia. *Austral Ecology*, 36, 240–251.
https://doi.org/10.1111/j.1442-9993.2010.02143.x

Hoskin, C.J., Bertola, L.V. & Higgie, M. (2019) A new species of *Phyllurus* (Lacertilia: Carphodactylidae) from the Pinnacles, north-east Australia. *Zootaxa*, 4576 (1), 127–139.
https://doi.org/10.11646/zootaxa.4576.1.6

Hoskin, C.J., Couper, P.J., Schneider, C.J. & Covacevich, J.A. (2000) s.n. *In*: Couper *et al.* (2000), Australian leaf-tailed geckos: phylogeny, a new genus, two new species and other new data. *Memoirs of the Queensland Museum*, 45, pp. 255–258

Hoskin, C.J., Couper, P.J. & Schneider, C.J. (2003) A new species of *Phyllurus* (Lacertilia: Gekkonidae) and a revised phylogeny and key for the Australian Leaf-tailed geckos. *Australian Journal of Zoology*, 51, 153–164.
https://doi.org/10.1071/ZO02072

Hoskin, C.J. & Couper, P.J. (2013) A spectacular new leaf-tailed gecko (Carphodactylidae: *Saltuarius*) from the Melville Range, north-east Australia. *Zootaxa*, 3717 (4), 543–558.
https://doi.org/10.11646/zootaxa.3717.4.6

Leggett, R. (1988) Reptiles of Carlisle Island, December 1986. *The Queensland Naturalist*, 29, 13–14.

Schneider, C.J., Couper, P.J., Hoskin, C.J. & Covacevich, J.A. (2000) pp. 258–262 *in* Couper *et al.* (2000). Australian leaf-tailed geckos: phylogeny, a new genus, two new species and other new data. *Memoirs of the Queensland Museum*, 45, 253–265.
Skipwith, P.L., Bi, K. & Oliver, P.M. (2019) Relicts and radiations: Phylogenomics of an Australasian lizard clade with east Gondwanan origins (Gekkota: Diplodactyloidea). *Molecular Phylogenetics and Evolution Biology*, 140, 106589. https://doi.org/10.1016/j.ympev.2019.106589
White, J. (1790) *Journal of a Voyage to New South Wales.* Debrett, London, 299 pp.