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A new species of *Homonota* (Reptilia: Squamata: Gekkota: Phyllodactylidae) from the Ventania mountain range, Southeastern Pampas, Buenos Aires Province, Argentina

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Abstract

A new species of lizard genus *Homonota* from southern Buenos Aires Province, Argentina is described. *Homonota williamsii* **sp. nov.** was previously considered as part of the *H. darwinii* species, but differs by a combination of characters from the nominal species and from other species of the genus. Its geographic distribution is restricted to an isolated mountain system not connected with other habitats suitable for *Homonota darwinii*

Key words: South America; Reptiles; Gecko, *Homonota darwinii*; new mountain species; Ventana Mountains.

Resumen

Se describe una nueva especie de lagartija del género *Homonota* del sur de la provincia de Buenos Aires, Argentina. *Homonota williamsii* **sp. nov.** fue considerada como parte de la especie *Homonota darwinii*, pero se diferencia de la especie nominal y de otras especies del género por una combinación de caracteres. Su distribución geográfica se limita a un sistema de montañas aisladas, no conectadas con otros hábitats adecuados para *Homonota darwinii*.

Palabras Claves: América del Sur; Reptiles; Gecko; *Homonota darwinii*; nueva especie de montaña; Sierra de la Ventana.

Introduction

New World lizards of the genus *Homonota* are endemic to South America, occurring throughout the Monte, Chaco, Espinal, Patagonian, Andes, and Pampa's biomes in Argentina, Bolivia, Brazil, Paraguay, and Uruguay (Kluge 1964; Peters & Donoso-Barros 1970; Cei 1986, 1993; Abdala 1997, 1998). Almost all *Homonota* species are nocturnal lizards found in a variety of habitats ranging from rocky environments, sedimentary river cliffs, Mediterranean or coastal dunes, shrubby flatlands to urban areas; all known species are oviparous and insectivorous (Cei 1986, 1993; Abdala 1997). At the present time (following Abdala 1997, Cacciali *et al*. 2007), the genus *Homonota* contains eight described species: *Homonota fasciata* Duméril and Bibron*; H. darwinii* Boulenger, *H. whitii* Boulenger, *H. borellii* Peracca, *H. uruguayensis* Vaz-Ferreira and Sierra de Soriano, *H. underwoodi* Kluge, *H. andicola* Cei, and *H. rupicola* Cacciali *et al*., and a still enigmatic subspecies of *H. darwinii (H. darwinii macrocephala*) described by Cei (1978b) from northern Argentina (Fig. 1). Only *Homonota uruguayensis* and *H. rupicola* are not found in Argentina. Here we describe a new species of *Homonota* from the Ventania mountain range of southern Buenos Aires Province, central Argentina, that was previously considered by different authors as an isolated population of *Homonota darwinii* (Boulenger 1885; Koslowsky 1898; Lieberman 1939; Kluge 1964) or *H. borellii* (Gallardo 1966; Peters & Donoso-Barros 1970; Williams 1991, Abdala 1997).

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FIGURE 1. Species of *Homonota* from Argentina: (A) *Homonota underwoodi*, (B) *H. whitii*, (C) *H. fasciata*, (D) *H. andicola*, (E) *H. borellii*, (F) *H. darwinii*.

Materials and methods

We studied specimens of the genus *Homonota* deposited in herpetological collections of the Monte L. Bean Museum, Brigham Young University (BYU); Museo de La Plata, Universidad Nacional de La Plata (MLP.S/R), and the LJAMM (Luciano Javier Avila Mariana Morando) of the Centro Nacional Patagónico (LJAMM-CNP), Puerto Madryn, Chubut, Argentina (Appendix I). Specimens of the new species were collected by hand, usually by

flipping rocks. In the laboratory specimens were sacrificed by a pericardial injection of sodium tiopenthotal Pentovet®, fixed in 10-20% formalin and later transferred to 70% ethanol. Measurements were taken with a dial caliper to the nearest 0.1 mm. Some character states were observed with the aid of a binocular stereomicroscope. Scale terminology follows Kluge (1964). Where numbers of paired scales are provided they are given as left-right. Descriptions of color in life are based on color photographs of recently captured animals (Table 1). Principal component analysis (PCA) and univariate tests were performed with INFOSTAT® 2009 (Di Rienzo *et al.* 2010). PCA was performed with meristic and continuous variables using only *H. borellii* and *H. darwinii*, which formerly were confused with this new taxon. We used ANCOVA on the continuous variables with snout-vent length as covariate to adjust all size-correlated characters, to test for statistically significant differences between the new and all the described species. When an ANCOVA p value was significant ($p <= 0.05$), multiple post hoc comparisons were performed using Tukey-Kramer method (Miller, 1981) for unequal sample size. Homoscedasticity and normality assumptions were checked with Levenne and Shapiro-Wilks tests. We performed nonparametric Kruskal-Wallis test on the meristic variables with multiple post hoc comparisons (Conover, 1999). Based on the *Homonota darwinii* results reported by Ibargüengoytía and Casalins (2007) and that extreme sexual dimorphism has not been reported in any gekkotan species (Fitch 1981), we assumed that there is no sexual dimorphism for the statistical analyses performed in this study. The following measurements were taken with a digital caliper (to the nearest 0.1 mm): Snout-Vent Length (SVL; from tip of snout to vent), Trunk Length (TrL; distance from axilla to groin from posterior edge of forelimb insertion to anterior edge of hindlimb insertion), Foot Length (FL; from tip of claws of the 4th toe to heel), Tibial Length (TL; greatest length of tibia, from knee to heel), Arm Length (AL; from tip of claws of the 3rd toe to elbow), Head Length (HL; distance between anterior edge of auditory meatus and snout tip), Head Width (HW; taken from the temporal regions), Head Height (HH; maximum height of head, from parietal area to throat), Eye-Nostril Distance (END; eye to nostril distance), Eye-Snout Distance (ESD; eye to snout distance), Eye-Meatus Distance (EMD; eye to ear distance), Interorbital Distance (ID; Inter orbital shortest distance), and Inter-nostrils Distance (IND; inter nostrils distance). Scale characters were taken: scales around midbody (SAM), dorsal scales (DS), ventral scales (VS), supralabial scales (SL), infralabial scales (IF), fourth toe lamellae (4TL), third finger lamellae (3FL). Additionally, morphological data to compare with the new species were taken from original descriptions of the other *Homonota* species (Peracca 1897; Vaz-Ferreira & Sierra de Soriano 1961; Kluge 1964; Cei 1978a, 1978b; Cacciali *et al*. 2007).

Results

Quantitative analyses of morphological traits revealed significant differences between the new taxon from the Ventania mountain range and other described *Homonota* species. Since the Ventania range population was previously considered as *H. darwinii* or *H. borellii* we emphasize here the differences with these species and complete results are shown in Tables 1-4. Principal component analysis performed with all morphological traits on individuals of *Homonota darwinii*, *H. borellii* and *H. williamsii* **sp. nov.**, indicated that 82.4 % of global variation could be explained by the first 3 components (Table 2, Fig. 2). The first principal component axis (PC 1) accounts for most variance (67.8%), with high loads for SAM, VS, IF and SVL, TrL, HW, AL, TL, ESD, EMD, ID for meristic and continuous variables respectively (Table 2). The second principal component axis (PC 2) show high loads for SAM, IF, SVL and TL variables and the third component axis (PC 3) presents high loads for DS, VS and ID (Table 2). The other axes account for much less variance in the data and cannot be used to distinguish *H. williamsii* **sp. nov.** from the other taxa included in the analysis. Significant differences results from the univariate test between the species are summarized and detailed in crosstab tables (Tables 3 and 4). Analysis of variation in meristic traits with multiple post hoc comparisons of Kruskal-Wallis test for *H. williamsii* **sp. nov.** (N = 11), revealed significant differences ($p <= 0.05$) for two variables with *H. andicola* (N = 7), four with *H. borellii* (N = 7), five with *H. fasciata* (N = 12), two with *H. uruguayensis* (N = 20), one with *H. whitii* (N = 5), four with *H. underwoodi* (N = 10) and three with *H. darwinii* (N = 31); (Table 1). The ANCOVA of continuous characters with multiple post hoc comparisons for *H. williamsii* **sp. nov.** (N = 11) indicated significant differences ($p <= 0.05$) for two variables with *H. andicola* (N = 7), three with *H. borellii* (N = 11), eight with *H. fasciata* (N = 12), one with *H. uruguayensis* (N = 20), three with *H. whitii* (N = 5), three with *H. underwoodi* (N = 10) and one with *H. darwinii* (N = 31); (Table 3).

TABLE 1. Morphometric, meristic, and chromatic characteristics in species of *Homonota*. *Homonota rupicola* data are from Cacciali *et al*. (2007). SAM = Scales Around Midbody, DS = Dorsal Scales, VS = Ventral Scales, 4TL = Fourth Toe Lamellae, SL = Supralabial Scales, IF = Infralabial Scales, SVL = Snouth-Vent Length, PCh = Presence of Chromatophores, MA = Auditory Meatus Shape, SCS = Subcaudal Scale Shape, and DSS = Dorsal Scales Shape.

	Homonota williamsii **sp. nov.** N=11	*H. darwinii* N=31	*H. uruguayensis* N=20	*H. whitii* N=5	*H. andicola* N=7	*H. underwoodi* N=10	*H. borellii* N=7	*H. rupicola* N=4	*H. fasciata* N=12
SAM	53.36±3.26 (48-60)	56.95±2.55 (53-62)	51.60±2.37 (46-56)	56.60±1.67 (55-59)	46.85±1.06 (45-48)	56.50±1.71 (53-58)	47.81±2.04 (45-50)	60.00±4.08 (54-63)	50.83±3.85 (43-58)
DS	153.27±5.42 (146-161)	120.58±8.18 (101-136)	148.15±4.39 (142-158)	108.80±2.28 (105-111)	102.57±3.04 (99-107)	147.20±9.89 (128-159)	130.27±3.97 (126-139)	98.75±4.99 (92-104)	99.75±4.97 (90-106)
VS	89.09±3.91 (80-94)	91.95±4.00 (84-98)	77.75±3.49 (73-85)	85.60±2.96 (81-89)	81.71±2.69 (78-85)	105.20±3.64 (100-110)	80.18±4.06 (75-88)	84-90-88	96.75±4.47 (91-103)
4TL	17.90±1.22 (16-20)	17.96±1.19 (16-21)	17.25±1.01 (15-19)	17.00±1.22 (15-18)	17.85±0.69 (17-19)	21.40±1.64 (20-25)	16.27±1.27 (14-17)	14-15	20.25±1.21 (18-22)
3FL	12.81±1.25 (11-14)	13.64±1.22 (12-16)	12.75±1.01 (11-15)	13.60±0.89 (12-14)	13.71±0.48 (13-14)	15.50±0.70 (15-17)	12.00±0.77 (10-13)	10-12	15.00±1.47 (13-17)
SL	7.18±0.60 (6-8)	6.77±0.56 (6-8)	7.40±0.68 (6-9)	7.60±0.54 (7-8)	7.28±0.95 (6-8)	8.30±0.94 (7-10)	7.36±0.50 (7-8)	7-8	8.00±0.85 (7-9)
IF	5.45±0.52 (5-6)	5.00±0.51 (4-7)	4.95±0.22 (4-5)	5.00±0.00 (5)	5.28±0.48 (5-6)	6.20±0.63 (5-7)	5.00±0.44 (4-6)	6-6	6.16±0.71 (5-7)
SVL	41.97±4.44 (33.3-48.1)	46.55±3.43 (37.4-53.3)	40.44±2.56 (34.49-46.24)	36.54±2.31 (34.70-40.15)	36.09±1.33 (34.6-37.9)	45.59±7.00 (28.89-54.23)	31.65±3.40 (22.86-35.40)	26.50-36.00	52.95±2.44 (48.10-56.80)
PCh	Yes	Yes	Yes	Yes	Yes	No	Yes	-	Yes
MA	Oblique and serrated edge	Oblique and serrated edge	Oblique and granular edge	Oblique and serrated edge	Oblique and serrated edge	Oblique and serrated edge	Small and round	Small and round	Oblique and serrated edge
SCS	enlarged, rectangular elongated longitudinally in contact with two scales, alternating with a rounded in contact with two scales	enlarged, rhombic and scalloped at the top in contact with three scales, alternating with a slightly smaller in contact with two scale	enlarged, rectangular, elongated transversely and in contact with two scale alternating in contact with three scales	enlarged, rectangular elongated longitudinally in contact with two scales, alternating with a rhombic smaller in contact with two scales	enlarged, rectangular elongated longitudinally in contact with two scales, alternating with a rhombic significantly smaller in contact with two scales	enlarged, rectangular elongated longitudinally in contact with two scales, alternating with a rhombic smaller in contact with two scales	enlarged, rectangular, elongated transversely and in contact with two scale	-	enlarged, rectangular elongated longitudinally in contact with two scales, alternating with a rhombic smaller in contact with two scales
DSS	Series moderately keeled along the back, imbricate	Few series weakly keeled on the posterior half of dorsum or smooth, imbricate.	Series strongly keeled along the back, imbricate	Smooth	Smooth	Smooth	Series moderately keeled along the back, juxtaposed	Series keeled along the back	Series strongly keeled along the back, juxtaposed

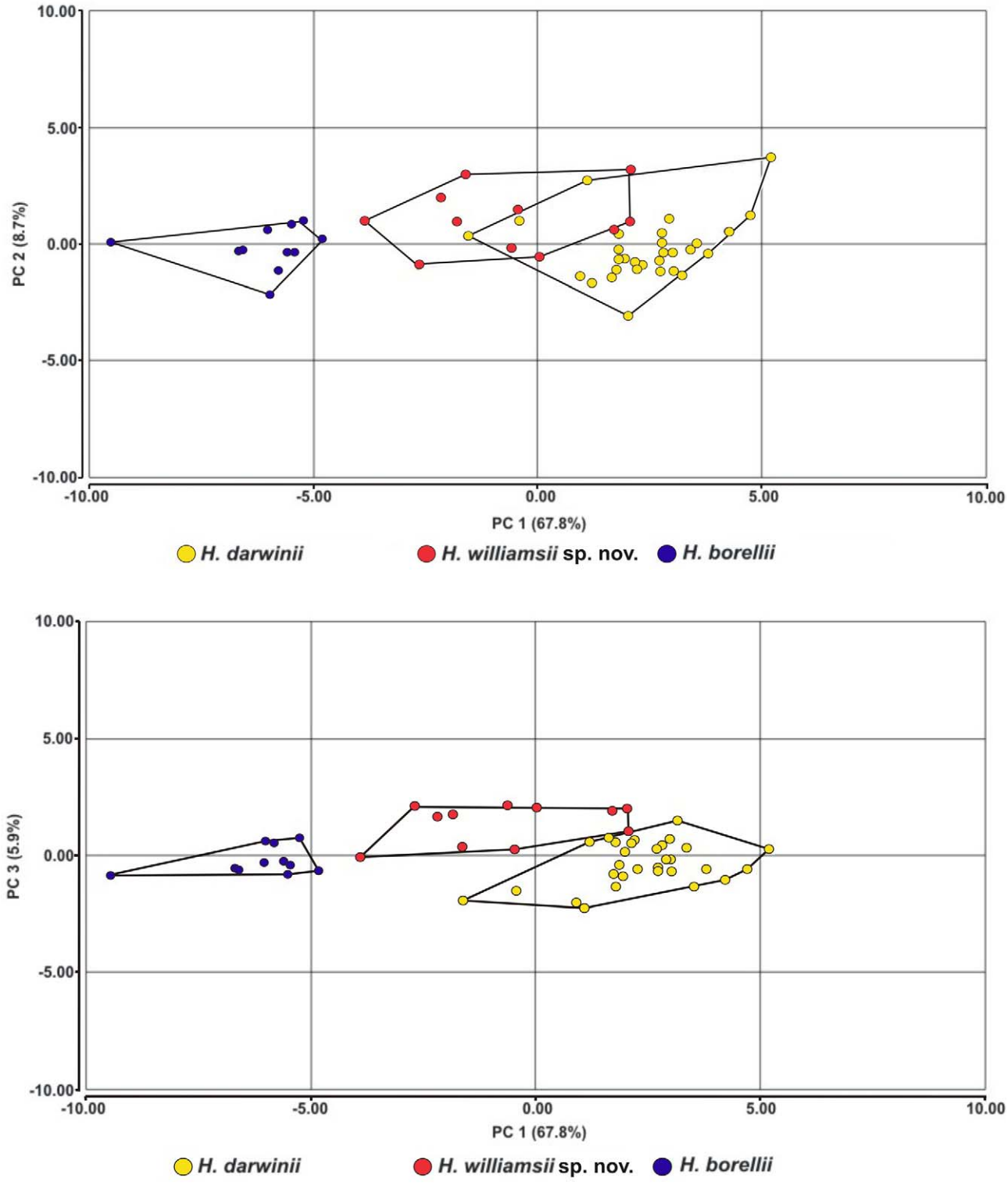

FIGURE 2. PCA scatter plots of individual scores of the first three principal components of variation in continuous and meristic traits for *H. williamsii* **sp. nov**. and the species with which it was previously confused. See Table 1 for the most highly (+, positively; -, negatively) contributing variables.

TABLE 2. Eigenvectors and eigenvalues between the first three principal components axes and initial variables as obtained from the principal components analysis (PCA) applied to the continuous and meristic characters for *Homonota darwinii*, *H. borellii* and *H. williamsii sp. nov.*

Variables	PC 1	PC 2	PC 3
SAM	**0.22**	**-0.12**	-0.14
DS	-0.08	0.23	**0.67**
VS	**0.21**	0.14	**-0.0024**
SL	-0.1	0.49	0.02
IF	**-0.0035**	**0.54**	0.29
4TL	0.14	0.44	-0.29
3FL	0.14	0.4	-0.52
SVL	**0.26**	**0.01**	0.11
TrL	**0.26**	0.05	0.08
HL	0.25	-0.03	0.14
HW	**0.26**	-0.03	0.12
HH	0.25	-0.05	-0.01
AL	**0.26**	-0.03	0.06
FL	0.25	-0.04	0.04
TL	**0.26**	**-0.09**	0.1
END	0.25	0.06	0.1
ESD	**0.26**	0.01	0.01
EMD	**0.26**	0.05	0.04
IND	0.25	-0.03	0.02
ID	**0.26**	-0.11	**-0.04**
Exp %	67.8	8.7	5.9
Cum. %	67.8	76.5	82.4

Abbreviations: SAM, scales around midbody; DS, dorsal scales; VS, ventral scales; SL, supralabial scales; IF, infralabial scales; 4TL, fourth toe lamellae; 3FL, third finger lamellae; SVL, snouth-vent length; TrL, trunk length; HL, head length; HW, head width; HH, head height; AL, arm length; FL, foot length; TL, tibial length; END, eye-nostril distance; ESD, eye-snout distance; EMD, eye-meatus distance; IND, inter nostrils distance; ID, inter orbital distance; Exp. %, the cumulative percentage of variation explained by each axis; Cum. %, the cumulative percentage of variation explained. The most highly contributing variables are set in bold.

Species account

Homonota williamsii sp. nov.

Fig. 3, 4

Gymnodactylus gaudichaudii, Bell, 1843. In: C. Darwin, *The Zoology of the Voyage of H.M.S. Beagle*, *Reptiles*, London 5, 26, Plate 13, Fig. 1.

Homonota guidichaudi (in error), Gray, 1845. *Catalogue of the Specimens of Lizards in the Collection of the British Museum*, London, 171.

Homonota darwini, Boulenger, G.A., 1885, *Catalogue of the Lizards in the British Museum* 1, 21, Plate 3, Fig. 7.

Homonota darwini, Koslowsky, J., 1898, *Revista de Museo de La Plata*, 8, 165.

Homonota darwini, Liebermann, L., 1939, *Physis*, 16, 63.

Homonota darwinii, Kluge, A.G., 1964, *American Museum Novitates*, 2193, 22.

Homonota borelli, Gallardo, J.M. 1966, *Neotropica*, 12, 16.
Homonota borellii, Peters, J.A. and Donoso-Barros, R., 1970, *Bulletin of the United States National Museum*, 297, 146.
Homonota borellii, Williams, J.D., 1991, *Situación Ambiental Provincia de Buenos Aires, Recursos y Rasgos Naturales Evaluación Ambiental*, 1, 13.
Homonota borellii, Abdala, V., 1997, *Serie Monografias Didácticas, Facultad de Ciencias Naturales, Universidad. Nacional de Tucumán* 29, 17.

Holotype.—MLP.S 2630, an adult male from Sierra de la Ventana, camino a Cerro Tres Picos por Estancia Funke (38º08'10"S, 61º59'10"W, 601 m), Tornquist Department, Buenos Aires Province, Argentina, collected by C. H. F. Perez and P. F. Petracci, 25 June 2006.

Paratypes.—LJAMM-CNP 6517, an adult male same locality as the holotype. LJAMM-CNP 11834-11835 adult males from Bahia Blanca hill (38º04'07"S, 61º59'02"W, 723 m), Sierra de la Ventana, Tornquist Department, Buenos Aires Province, Argentina, collected by C. H. F. Perez, 7 October 1999. LJAMM-CNP 11837, an adult male from Curamalal hill (37º43'17"S, 62º13'59"W, 915 m), Tornquist Department, Buenos Aires Province, Argentina, collected by C. H. F. Perez, 7 October 1999. LJAMM-CNP 11838, an adult female from Curamalal hill (37º43'17"S, 62º13'59"W, 915 m), Tornquist Department, Buenos Aires Province, Argentina, collected by C. H. F. Perez, 7 October 1999. LJAMM-CNP 11836, an adult male from Abra de Los Vascos (38º15'34"S, 61º54'37"W, 454 m), Sierra de la Ventana, Tornquist Department, Buenos Aires Province, Argentina, collected by C.H.F. Perez, 7 October 1999. BYU 47931, BYU 47933-47934, adult females from near Parque Provincial Ernesto Tornquist (38º03'18.6"S, 62º00'51.6"W, 848 m) Tornquist Department, Buenos Aires Province, Argentina, collected by C.H.F. Perez, 5 March 2002. BYU 47932, an adult male from near Parque Provincial Ernesto Tornquist (38º03'18.6"S, 62º00'51.6"W, 848 m) Tornquist Department, Buenos Aires Province, Argentina, collected by C.H.F. Perez, 5 March 2002.

Diagnosis.—*Homonota williamsii* **sp. nov.** is a medium-sized species of *Homonota* (maximum SVL = 48 mm) and can be distinguished from the other species of the group by the following combination of characters: a dorsal reticulate dark brown pattern on a grayish background speckled with small white spots, white belly with dark spots, keeled dorsal scales, subcaudal scales rounded, alternating in size, oblique auditory meatus with a posterior serrate edge and different average number of dorsal scales and scales around midbody than all the other species of the genus.

FIGURE 3. *Homonota williamsii* **sp. nov.**, adult from Sierra de la Ventana, Tornquist Department, Buenos Aires province, Argentina. (not the holotype).

FIGURE 4. *Homonota williamsii* **sp. nov.**, holotype adult male in dorsal and ventral view (MLP.S 2630), from Sierra de la Ventana, Tornquist Department, Buenos Aires province, Argentina.

Description of the holotype.—Body long, 5.1 times the head length. Head sub-triangular, neck well defined, with a blunt snout and very broad head. Eyes moderately large with vertical scalloped-edged pupil. Tail broken, incomplete. SVL 42.1 mm, TrunkL 18.7 mm, HL 6.9 mm, HW 7.8 mm, HH 4.8 mm, ESD 4.2 mm, END

3.2 mm, EMD 3.3 mm, IND 1.2 mm, horizontal diameter of the eye 2.4 mm, AL 10.6 mm, TL 7.1 mm, FL 8.9 mm. Dorsal surface of head covered by smaller granular scales increasing in size toward the anterior region of snout. Rostral pentagonal, wider than high (1.6 x 1.1 mm), with marked rostral crease. Six supralabial scales on each side. Five infralabial scales on each side. Nostril bordered by the first supralabial, rostral, supranasal and two postnasals. Orbit edged by cycloid supraciliary scales on its anterodorsal side. Parietal and temporal regions covered by almost equal-sized granular scales. Auditory meatus small, elongated and oblique with serrated borders, higher than wide (1.45 x 0.25 mm), 15–16 scales around auditory meatus. Mental pentagonal, elongated, 1.8 mm long, widest in the anterior region (2.1 mm) than in the posterior (1.4 mm). Two postmentals. Scales of the gular and throat region imbricate, of equal size and cycloid in shape. Along the vertebral line are rows of cycloid scales, juxtaposed on the anterior half and imbricate on the posterior. Dorsal surface with series of strongly keeled scales. Fifty-four scales around midbody. One hundred fifty-two dorsal scales. Fifteen series of keeled scales on the dorsal region of the midbody. First two longitudinal keeled series on each side of the vertebral line separated by three smooth and smaller cycloid scale series. Laterally, scales smooth and imbricate. Axillary and inguinal zones covered with small granular scales. Ventral scales cycloid, with posterior edge 4–5 lobed. Eighty-five ventral scales. Scales on the anterior region of the arm and forearm imbricate, cycloid, smooth and 3–7 lobed. Scales on the posterior and inner region of the arms very small and granular. Scales on hindlimb imbricate, cycloid, enlarged, smooth and 3–4 lobed. Subdigital lamellae of the manus imbricate, smooth, numbering: I:7; II:11; III:12; IV:12; V:11. Subdigital lamellae of foot imbricate, smooth, numbering I:8, II:11, III:15, IV:17, V:12. Dorsal and lateral regions of the tail covered with imbricate, smooth cycloid scales. Subcaudal scales imbricate, cycloid or quadrangular, lateral margin bordered by two smaller scales. Three conical postcloacal scales are present laterally at the base of the tail.

TABLE 3. Results of multiple Kruskal-Wallis post hoc comparisons among *Homonota* species. Only significant differences (p<= 0.05) between meristic variables are shown. Abbreviations: SAM, scales around midbody; DS, dorsal scales; VS, ventral scales; SL, supralabial scales; IF, infralabial scales; 4TL, fourth toe lamellae; 3FL, third finger lamellae.

	Meristic traits							
	H. andicola	*H. borellii*	*H. fasciata*	*H. uruguayensis*	*H. williamsii sp. nov.*	*H. whitii*	*H. underwoodi*	*H. darwinii*
H. andicola	-	DS, 4TL, 3FL	VS, IF, 4TL	SAM, DS	SAM, DS	SAM	SAM, DS, VS, IF, 4TL, 3FL	SAM, DS, VS
H. borellii	DS, 4TL, 3FL	-	DS, VS, IF, 4TL, 3FL	SAM	SAM, DS, VS, 4TL	SAM, DS, 3FL	SAM, VS, IF, 4TL, 3FL	SAM, VS, SL, 4TL, 3FL
H. fasciata	VS, IF, 4TL	DS, VS, IF, 4TL, 3FL	-	DS, VS, IF, 4TL, 3FL	DS, VS, SL, 4TL, 3FL	SAM, VS, IF, 4TL	SAM, DS	SAM, DS, SL, IF, 4TL, 3FL
H. uruguayensis	SAM, DS	SAM	DS, VS, IF, 4TL, 3FL	-	VS, IF	SAM, DS	SAM, VS, IF, 4TL, 3FL	SAM, DS, VS, SL
H. williamsii sp. nov.	SAM, DS	SAM, DS, VS, 4TL	DS, VS, SL, 4TL, 3FL	VS, IF	-	DS	VS, SL, 4TL, 3FL	SAM, DS, IF
H. whitii	SAM	SAM, DS, 3FL	SAM, VS, IF, 4TL	SAM, DS	DS	-	DS, VS, IF, 4TL, 3FL	SL
H. underwoodi	SAM, DS, VS, IF, 4TL, 3FL	SAM, VS, IF, 4TL, 3FL	SAM, DS	SAM, VS, IF, 4TL, 3FL	VS, SL, 4TL, 3FL	DS, VS, IF, 4TL, 3FL	-	DS, VS, SL, IF, 4TL, 3FL
H. darwinii	SAM, DS, VS	SAM, VS, SL, 4TL, 3FL	SAM, DS, SL, IF, 4TL, 3FL	SAM, DS, VS, SL	SAM, DS, IF	SL	DS, VS, SL, IF, 4TL, 3FL	-

TABLE 4. Results of multiple ANCOVA post hoc comparisons among *Homonota* species. Only significant differences ($p <= 0.05$) between continuous variables are shown. Abbreviations: TrL, trunk length; FL, foot length; TL, tibial length; AL, arm length; HL, head length; HW, head width; HH, head height; END, eye-nostril distance; ESD, eye-snout distance; EMD, eye-meatus distance; ID, interorbital distance; IND, inter-nostrils distance.

	Continuous traits							
	H. andicola	*H. borellii*	*H. fasciata*	*H. uruguayensis*	*H. williamsii sp. nov.*	*H. whitii*	*H. underwoodi*	*H. darwinii*
H. andicola	-	AL, FL, TL, IND	HL, HW, HH, TL, ESD, EMD, ID		TL, EMD	TL	HL, FL	HH, FL, EMD, ID
H. borellii	AL, FL, TL, IND	-	HL, HW, HH, AL, FL, TL, END, ESD, EMD, IND, ID	AL, FL	AL, FL, EMD	HW	HL, AL, FL, TL	HH, AL, FL, EMD, IND, ID
H. fasciata	HL, HW, HH, TL, ESD, EMD, ID	HL, HW, HH, AL, FL, TL, END, ESD, EMD, IND, ID	-	TrL, HL, HH, AL, TL, END, ESD, EMD, ID	TrL, HL, HW, AL, TL, END, ESD, ID	HL, HH, AL, FL, TL, END, ESD, ID	TrL, HL, HW, HH, TL, END, ESD, ID	TrL, HL, TL, END, ESD
H. uruguayensis		AL, FL	TrL, HL, HH, AL, TL, END, ESD, EMD, ID	-	EMD	TL, EMD	HL, AL, FL, TL, EMD	HH, FL, EMD, ID
H. williamsii sp. nov.	TL, EMD	AL, FL, EMD	TrL, HL, HW, AL, TL, END, ESD, ID	EMD	-	HH, FL, ID	HL, AL, TL	ID
H. whitii	TL	HW	HL, HH, AL, FL, TL, END, ESD, ID	TL, EMD	HH, FL, ID	-	HL, AL, FL, TL, ID	HH, AL, FL, TL, IND, ID
H. underwoodi	HL, FL	HL, AL, FL, TL	TrL, HL, HW, HH, TL, END, ESD, ID	HL, AL, FL, TL, EMD	HL, AL, TL	HL, AL, FL, TL, ID	-	HL, HH, TL, ID
H. darwinii	HH, FL, EMD, ID	HH, AL, FL, EMD, IND, ID	TrL, HL, TL, END, ESD	HH, FL, EMD, ID	ID	HH, AL, FL, TL, IND, ID	HL, HH, TL, ID	-

Coloration.—Coloration is similar between live and preserved specimens, but the general coloration darkens in preserved specimens. General background body coloration grayish. Trunk with a uniform and fine reticulate dark brown dorsal pattern, speckled white spots, one scale in size, spots extending onto the sides of the trunk and reaching the insertion of the forelimb. Dorsal reticulated pattern forming a clear vertebral midline, from the occiput region to the pelvic girdle. Lateral areas at the forelimb insertion and belly predominantly grayish, with irregular brown spots on each scale. Dorsal background of the head brown, faintly reticulated, with some areas dark brown. Head with a transverse grayish band, semicircular, faintly extended to the posterior edge of the eye. A band 3–4 scales wide continuous from the front of the eyes to the nostrils. Dorsal limb surfaces with a grayish background,

reticulated with darker lines. Surface of the chest and belly whitish. Gular and ventral region of the tail dark gray but variable according to the degree of development of the chromatophores.

Variation.—Based on six adult males and one adult female (Table 5): SVL 38.4–44.4 mm. Axilla groin distance 17.8–20.3 mm. Foot length 7.2–9.3 mm. Tibial length 5.5–7.1 mm. Arm length 9.3–10.9 mm. Head length 6.4–7.7 mm. Head width 6.7–7.8 mm. Head Height 4.1–5.5 mm. Midbody scales 50–56. Dorsal midbody keeled scale series 13-17. Dorsal scales 146–161. Ventral scales 80–94. Supralabials 6–8. Infralabials 5–6. Third finger lamellae 11–14. Fourth toe lamellae 16–20.

TABLE 5. Morphometric and meristic variation in *Homonota williamsii* **sp. nov.** type series. Means and standard deviations (SD) of the main morphometric and meristic characters. Measures in mm and scales in numbers. Abbreviations: SVL, snouth-vent length; TrL, trunk length; HL, head length; HW, head width; HH, head height; FL, foot length; TL, tibial length; AL, arm length; SAM, scales around midbody; DS, dorsal scales; VS, ventral scales; 4TL, fourth toe lamellae; SL, supralabial scales; IF, infralabial scales.

	Males (N=7)			Females (N=4)		
	Mean	SD	Range	Mean	SD	Range
SVL	41.9	2.9	38.4–46.6	42.0	6.9	33.3–48.1
TrL	19.5	1.2	18.6–22.0	20.8	3.8	17.4–24.9
HL	6.8	0.4	6.4–7.7	6.7	0.9	5.2–7.3
HW	7.4	0.8	6.7–8.9	7.7	1.3	6.3–9.0
HH	4.7	0.4	4.1–5.5	4.6	0.7	3.6–5.3
FL	8.4	0.9	7.2–9.7	8.6	1.1	7.7–9.9
TL	6.5	0.7	5.5–7.8	6.5	0.9	5.6–7.5
AL	10.2	0.6	9.3–11.0	10.2	1.6	8.4–11.7
SAM	54.7	2.9	51–60	51.0	2.5	48–54
DS	152.5	5.5	146–161	154.5	5.8	146–159
VS	88.7	4.8	80–94	89.7	1.7	88–92
4TL	17.8	1.4	16–20	18.0	0.8	17–19
SL	7.1	0.6	6–8	7.2	0.5	7–8
IF	5.4	0.5	5–6	5.5	0.5	5–6

Dorsal background varies between individuals, from finely reticulated to a pattern of transverse bands, but always less well-developed than in *Homonota darwinii*; the clear longitudinal vertebral band gets wider and obvious in some specimens. In two specimens the reticulation is finer than in the holotype, so this vertebral band is not noticeable. In four specimens the dorsal white spots are not prominent, probably due to the action of the preservative. In specimens with the most developed transverse bands, the occipital semicircular band is wider and very evident. The venter is white or dark gray and varies with the degree of chromatophore development.

Etymology.—Dedicated to Jorge Daniel Williams, Argentinean herpetologist from the La Plata Museum, Buenos Aires Province. He is in charge of the herpetological collection of the La Plata Museum, and his work is mainly focused on the herpetofauna of Buenos Aires Province. He was one of the founders of the Asociación Herpetólogica Argentina (AHA), president for a decade, and always an enthusiastic advocate.

Comparison with other taxa.—(see Table 1, Figs. 5, 6, 7). *Homonota williamsii* **sp. nov.** differs from *H. andicola* by its larger size (maximum SVL=48 vs. 38 mm), higher number of dorsal scales (146–161 vs 99–107) and scales around midbody (48–60 vs 45–48), and presence of keeled dorsal scales. It differs from *H. borellii* by its larger size (maximum SVL=48 vs. 35 mm), higher average number of scales around midbody (53.3 vs 47.8), different shape and size in the subcaudal scales, and in having an oblique and serrate auditory meatus. The new species differs from *H. darwinii* in its smaller size (maximum SVL=48 vs. 53 mm), keeled dorsal scales, small number of scales around midbody (53.3 vs 56.9), larger dorsal scale count (146-161 vs 101-136), and different shape and size in subcaudal scales. *Homonota williamsii* **sp. nov.** differs from *H. fasciata* because its smaller size

(maximum SVL=48 vs. 56 mm), higher average number of scales around midbody (53.3 vs 50.8), higher number of dorsal scales (146–161 vs 90–106) and a very different coloration pattern. *Homonota williamsii* **sp. nov.** differs from *H. rupicola* by its larger size (maximum SVL=48 vs. 36 mm), shape and size of its auditory meatus and different color pattern. It differs from *H. underwoodi* in its smaller size (maximum SVL=48 vs. 54 mm), presence of ventral chromatophores, keeled dorsal scales, smaller average number of scales around midbody (53.3 vs 56.5), higher average number of dorsal scales (153.2 vs 147.2), and lighter coloration. *Homonota williamsii* **sp. nov.** differs from *H. uruguayensis* by its larger size (maximum SVL=48 vs. 43 mm), higher average number of scales around midbody (53.3 vs 51.6), higher average number of dorsal scales (153.2 vs 148.1) and different color pattern. Finally, the new species differs from *H. whitii* by it larger size (maximum SVL = 48 mm vs. 40 mm); presence of keeled dorsal scales; and fewer dorsal scales at midbody (146-161 vs. 105-111).

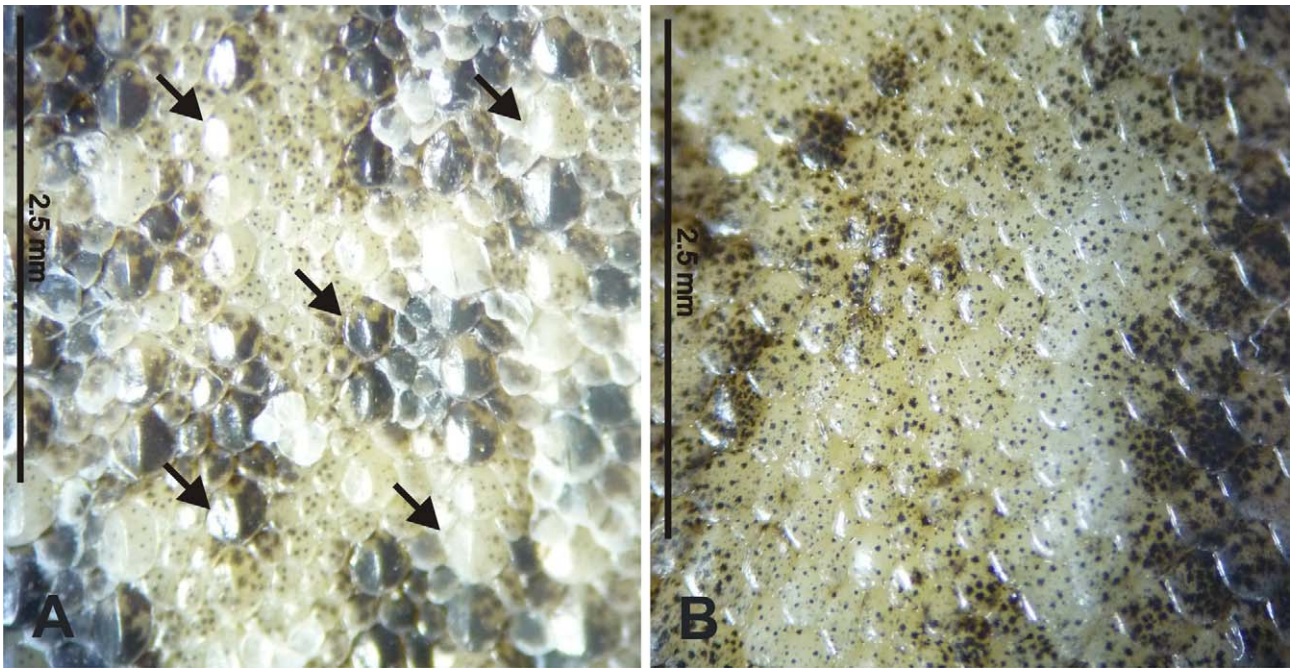

FIGURE 5. Midbody dorsal scales of: (A) *Homonota williamsii* **sp. nov.** (MLP.S 2630), moderately keeled series along the dorsum; (B) *H. darwinii* (LJAMM-CNP 9789), smooth scales series.

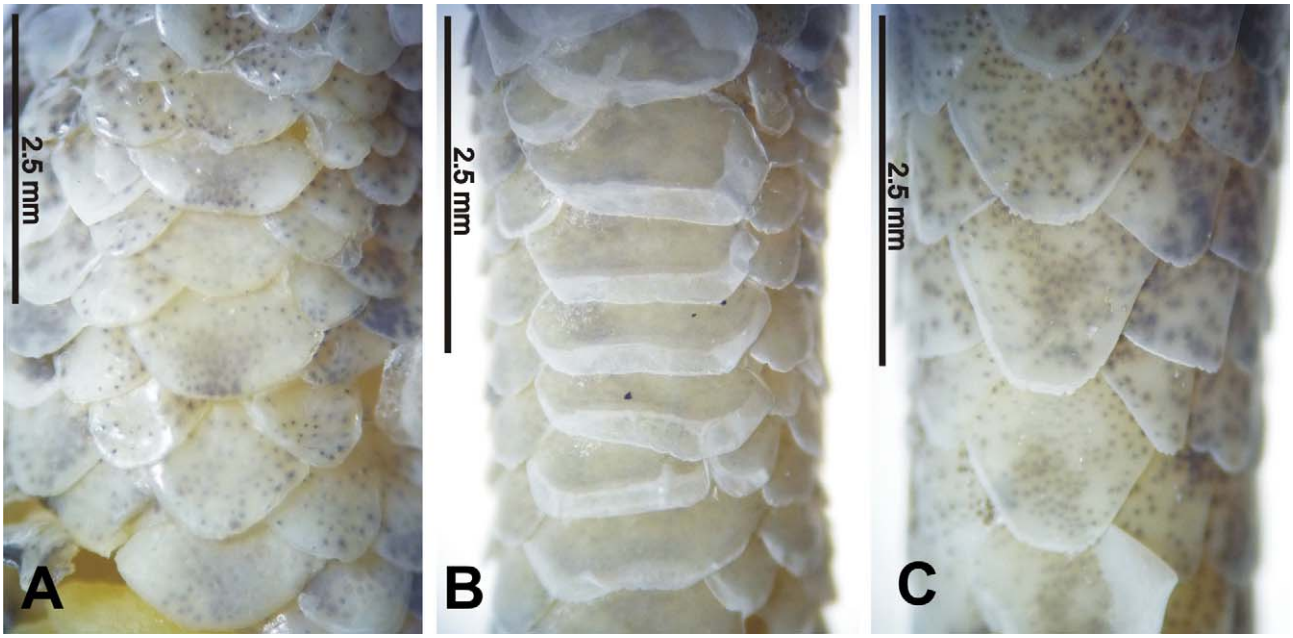

FIGURE 6. Subcaudal scales of: (A) *Homonota williamsii* **sp. nov.** (MLP.S 2630), enlarged, rounded and rectangular longitudinally elongated; (B) *H. borellii* (LJAMM-CNP 14378), enlarged, elongated and transversely rectangular; (C) *H. darwinii* (LJAMM-CNP 9789), enlarged, rhombic and scalloped.

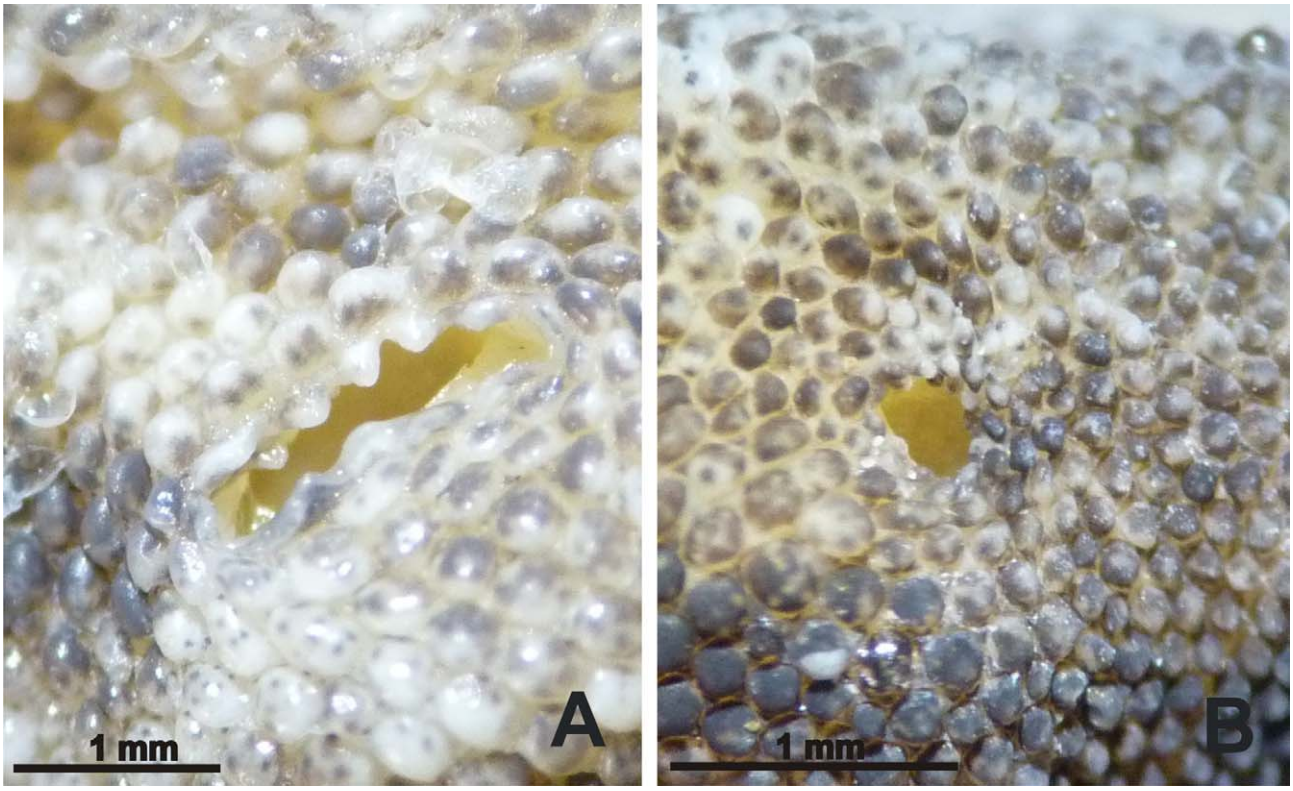

FIGURE 7. Meatus auditory on: (A) *Homonota williamsii* **sp. nov.** (MLP.S 2630), large, oval, oblique and serrated; (B) *H. borellii* (LJAMM-CNP 14378), round, small and not serrated.

Geographic distribution.—*Homonota williamsii* **sp. nov.** was collected only in rocky outcrops from an elevation of 454 to 915 m in the Ventania System, Buenos Aires Province, Argentina (Figs. 8, 9). Its distribution probably extends to other neighboring mountain systems such as the Tandilia system where other *Homonota* populations assigned to *Homonota borellii* have been cited (Vega & Bellagamba 1990; Williams 1991).

Natural history.—Little information is available about natural history and biology of this new species. *Homonota williamsii* **sp. nov.** was always found under stones and crevices in rocky outcrops above 400 m (Fig. 9), usually surrounded by mountain grassland, characteristic of the Pampeano Austral Phytogeographic District. This system includes grass species such as *Briza subaristata*, *Piptochaetium napostaense*, *Poa bonariensis*, and several endemic species of grasses and shrubs as *Festuca ventanicola*, *Stipa pampeana*, *S. ventanicola*, *Plantago bismarkii*, *Senecio ventanicola* and *Grindelia ventanensis* (Cabrera 1971; Frangi & Bottino 1995). *Homonota williamsii* **sp. nov.** is sympatric with an endemic lizard, *Pristidactylus casuhatiensis*, and others lizard species such as *Cnemidophorus lacertoides*, *Cercosaura schreibersii*, *Anops kingii*, *Tupinambis merianae*, and *Ophiodes vertebralis*, as well as the amphisbaenid *Amphisbaena darwinii*. *Homonota williamsii* **sp. nov.** shares the general habitat with several species of amphibians and snakes, some of them endemic to the sierras. Among the amphibians we observed *Melanophryniscus* sp., an endemic undescribed taxon, and *Hypsiboas pulchellus*. Snakes observed in the area were *Oxyrhopus rhombifer*, *Philodryas agassizi*, *P. patagoniensis*, *Clelia rustica*, *Xenodon dorbigni*, *Rhinocerophis alternatus* and *Liophis elegantissimus* (an endemic taxon), all potential predators of *Homonota williamsii*. The new species usually occupies the microhabitat in the rocky outcrops, while the other species were found in rocky patches or open substrate. No data about reproduction, diet or other biological characteristics are available, but as in other related species of *Homonota*, *H. williamsii* **sp. nov.** is probably oviparous and feeds on arthropods.

Remarks.—Ventania and Tandilia are the only two mountain ranges located in the grassy steppe called "pampas" in Argentina. Both systems are known to have a particular diversity of taxa, with high levels of endemism, and this particular characteristic has led to the consideration that these areas have functioned as "orographic islands" (Crisci *et al.* 2001; Kristensen & Frangi 1995). The Ventania range is a discontinuous chain of mountains, hillocks and mounds named Sierras de Puan, Pigüe, Bravard, Curamalal, La Ventana, Las Tunas and

Pillahuinco (Fig. 8). It is completely unconnected with other mountain ranges, and was originally surrounded by grasslands belonging to the Pampa Phytogeographic Province, Pampeano Austral District on the north, and an ecotone of three phytogeographic provinces: Pampa, Espinal and Monte scrublands to the south (Cabrera 1971; Frangi & Bottino 1995). It is the most important outcrop on the South American Plate of what formerly was a continuous basin fringing the south-western margin of Gondwana during Palaeozoic times. The highest peak in this system reaches 1,239 m above sea level and the system extends about 180 km from NW to SE, with a width of 50–70 km in its central part. A number of endemic species of plants and other animals have been described from this mountain system (Frangi & Bottino 1995). Several endemic lizard species are known from these highland islands (Ventania and Tandilia), including *Pristidactylus casuhatiensis* from the Ventania range and *Liolaemus tandiliensis* from the Tandilia mountain range, 145 km to the East. Land use for agriculture (mainly soy and maize crops) and cattle grazing in the last 120 years has almost completely destroyed the natural environments surrounding these ranges, reinforcing their character as biogeographic islands. Only rocky areas escape from agricultural activities but not from cattle grazing, stone exploitation, and pine plantation; additionally, feral horses and exotic deer and goats introduced for hunting activities survive in some areas. At this time we cannot analyze the conservation status of this new species, but the type locality is protected by a provincial conservation unit.

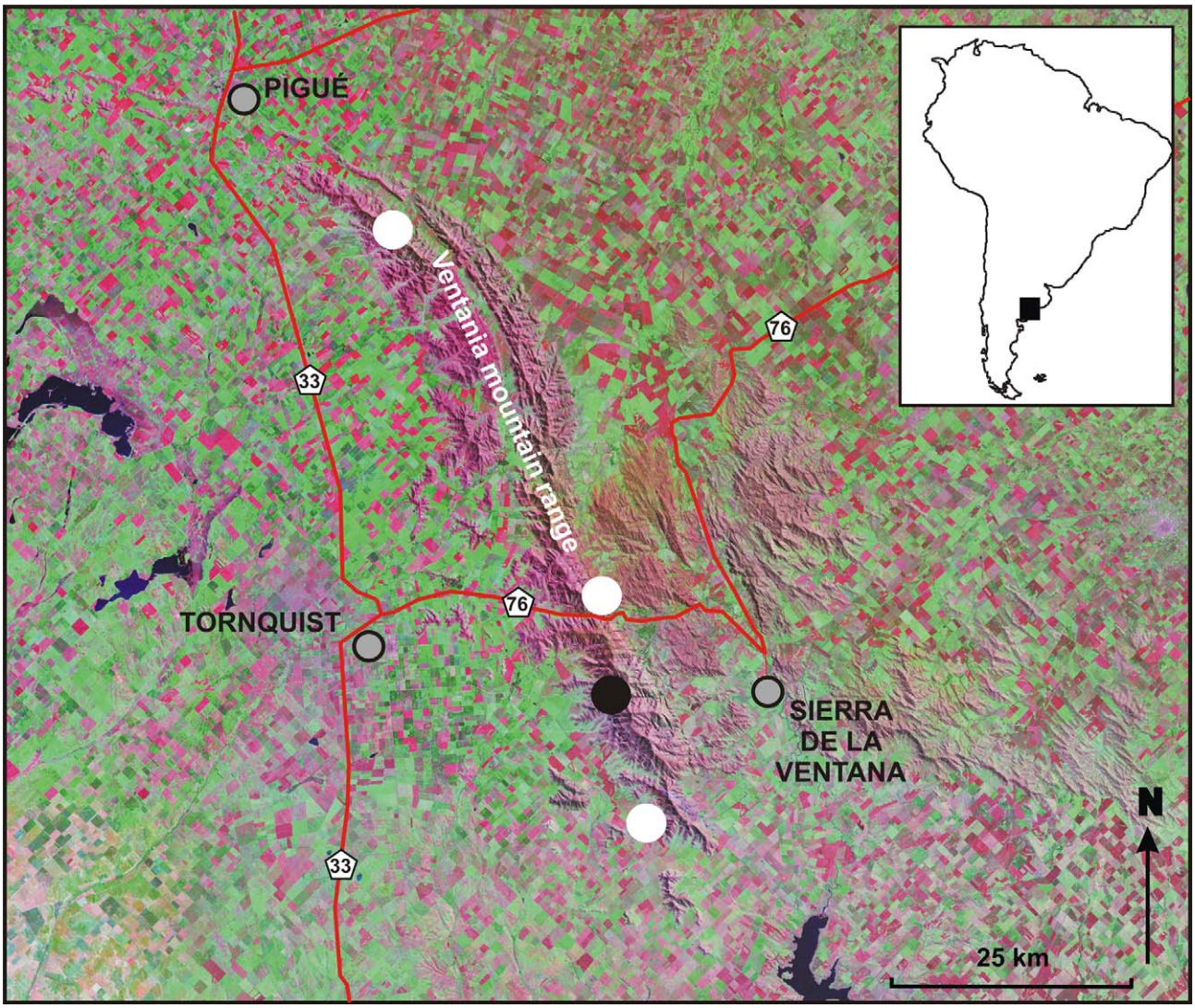

FIGURE 8. Map of southern Buenos Aires region showing the complex landscape of the Ventania mountain range. The black circle marks the *Homonota williamsii* **sp. nov.** type locality and white circles paratype localities. Main mountain ranges, rivers, and roads are marked. Gray circles: cities. Inset: Region in South America.

FIGURE 9. Type locality of *Homonota williamsii* **sp. nov.**. Above: general view of the area. Below: close view of the common outcrops where lizards were collected.

Homonota darwinii was described by Boulenger in 1885 for Puerto Deseado, Santa Cruz Province, and is distributed over a wide range from the province of Mendoza to Santa Cruz throughout the Patagonian phytogeographic province. In the original description, Boulenger (1885) identified Eastern Patagonia, Buenos Aires and Uruguay as likely parts of the natural distribution of *Homonota darwinii*. Koslowsky (1898) identified *Homonota darwinii* for the provinces of Chubut and Santa Cruz in Patagonia, in Sierras de la Ventana, Tandil and Balcarce in the eastern part of Buenos Aires Province and in the easter Republic of Uruguay, near Montevideo. Gallardo (1966) based on the dorsal keeled scales, rostral crease or posterior groove, scale and color of the ventral region, regarded *Homonota darwinii* of the Sierras de la Ventana, Balcarce and Tandil as *Homonota borellii*. Since these studies, no comprehensive studies of species limits in *Homonota* have been carried out, but several studies have focused on the study of phylogenetic affinities of described species (Abdala 1992a, b, 1997, 1998; Abdala & Moro 1996). This work, with a detailed morphological comparison between populations of *H. darwinii* from Southern Argentina and this isolated population in Ventania, reveals its diagnosibility as a new species, and molecular data (mitochondrial and nuclear genes) indicates its closer phylogenetic relationship with *H. darwinii* than with *H. borellii* (Morando *et al.* unpublished data).

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APPENDIX I

***Homonota williamsii* sp. nov. (11):** Sierra de la Ventana, camino a Cerro Tres Picos por Estancia Funke (38º08'10" S, 61º59'10" W, 601 m), Tornquist, Buenos Aires Province, Argentina: MLP.S 2630 (holotype) and LJAMM-CNP 6517. Cerro Bahía Blanca (38º04'07" S, 61º59'02" W, 723 m), Sierra de la Ventana, Tornquist Department, Buenos Aires Province, Argentina: LJAMM-CNP 11834-5. Cerro Curamalal (37º43'17" S, 62º13'59" W, 915 m), Tornquist Department, Buenos Aires Province, Argentina: LJAMM-CNP 11837-8. Abra de Los Vascos (38º15'34" S, 61º54'37" W, 454 m), Sierra de la Ventana, Tornquist Department, Buenos Aires Province, Argentina: LJAMM-CNP 11836. Provincial Park Ernesto Tornquist (38º03'18.6" S, 62º00'51.6" W, 848 m) Tornquist Department, Buenos Aires Province, Argentina: BYU 47931-4.

***Homonota darwinii* (31):** 5.5 km N Puerto Deseado (47º42'53.9" S, 65º50´21.1" W, 14 m), Deseado Department, Santa Cruz Province, Argentina: LJAMM-CNP 7445-6, 9779, 9781-9784, 9786, 9788-9, 9791-3, 9796, 9800-2, 9804-6, 9813.

***Homonota whitii* (5):** Road from Villa Ojo de Agua to Lomitas Blancas, Sierra de Ambargasta, 34.8 km W Villa Ojo de Agua, 14.8 km W Amiman (29º21'29.4" S, 63º56'59.2" W, 429 m), Ojo de Agua Department, Santiago del Estero Province, Argentina: LJAMM-CNP 12109-1.

***Homonota andicola* (7):** Provincial Road 39, from Uspallata to Barreal, 3 km S Mendoza-San Juan border, in front of Estancia El Yalguaraz (32º05'53.6" S, 69º22'17.1" W, 2217 m), Las Heras Department, Mendoza Province, Argentina: LJAMM-CNP 12490-3, 12495-12496.

***Homonota underwoodi* (6):** Villa Regina (39º05'24.1" S, 67º04'50.0" W, 284 m), General Roca Department, Río Negro Province, Argentina: MLP.S 2575, 2585, LJAMM-CNP 6534. Chelforó (39º04'24.2" S, 66º31'36.2" W, 217 m), Avellaneda Department, Río Negro Province, Argentina: LJAMM-CNP 17, 22. Chimpay (39°09'13.8" S, 66°09'01.9" W, 181 m), Avellaneda Department, Río Negro Province, Argentina: LJAMM-CNP 29, 7675.

***Homonota borellii* (7):** Anillaco (28º48'53.0" S, 66º55'58.8" W, 1362 m), Castro Barros Department, La Rioja Province, Argentina: LJAMM-CNP 1963-4, 11830-3. Sierra de Mazan and Provincial Road 9 (28º51'00.0" S, 66º38'00.0" W), Capital Department, Rioja Province, Argentina: LJAMM-CNP 294.

***Homonota fasciata* (12):** Villa Regina (39º05'24.1" S, 67º04'50.0" W, 284 m), General Roca Department, Río Negro Province, Argentina: LJAMM-CNP 6519-20, 6523, 6526-33, 6535.

***Homonota uruguayensis* (20):** Yuqueri, Artigas Department, Uruguay: ZVC-R 1268. Arroyo Pintado, Artigas Department, Uruguay: ZVC-R 4834. Estancia "Becker", Arroyo Catalán Grande, Segunda Seccion, Artigas Department, Uruguay: ZVC-R 5126. Potrero "La Invernada" de Castro "El Tapado", Arerunguá, Salto Department, Uruguay: ZVC-R 4654-4655, 4672, 4676-4678, 4755-4756. Ruta 31, Km 109, Salto Department, Uruguay: ZVC-R 5444. Puntas del Arroyo Lunarejo, Rivero Department, Uruguay: ZVC-R 5112, 5225, 5275, 5277. Pozo Hondo, Ruta 26, Km 200, Tacuarembó Department, Uruguay: ZVC-R 5243-5244. Ruta 26, Km 147, Arroyo Laureles y Arroyo Perdido, Paysandú Department, Uruguay: ZVC-R 5364-5365.