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A NEW RICTULARIID (NEMATODA: SPIRURIDA) IN XENARTHTRANS FROM ARGENTINA AND NEW MORPHOLOGICAL DATA OF PTERYGODERMATITES (PAUCIPECTINES) CHAETOPHRACTI

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Abstract:	<p>Pterygodermatites is a cosmopolitan genus of nematodes from mammals and it is frequently encountered in the parasite fauna of armadillos (Mammalia, Xenarthra, Cingulata). In this work, a new species, Pterygodermatites (Paucipectines) argentinensis, is described and new morphometric data, new host records and the geographical distribution of Pterygodermatites (Paucipectines) chaetophracti are provided. We examined 109 hosts belonging to Chaetophractus vellerosus, Chaetophractus villosus, Cabassous chacoensis, Dasypus hybridus, Tolypeutes matacus, and Zaedyus pichiy, from several regions of Argentina. Pterygodermatites (Paucipectines) argentinensis can be distinguished from P. (P.) chaetophracti by the morphology and size of esophageal teeth of both sexes, by subequal and longer spicules, by having only 1 precloacal cuticular semicircular fan in males and a greater number of cuticular processes in females. Cabassous chacoensis and Zaedyus pichiy are new hosts for Pterygodermatites (P.) chaetophracti.</p>

1 RH: EZQUIAGA ET AL. – *PTERYGODERMATITES* IN XENARTHANS FROM
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4 **ARGENTINA AND NEW MORPHOLOGICAL DATA OF *PTERYGODERMATITES***
5 **(*PAUCIPECTINES*) *CHAETOPHRACTI***

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10 Abstract: *Pterygodermatites* is a cosmopolitan genus of nematodes from mammals
11 and it is frequently encountered in the parasite fauna of armadillos (Mammalia,
12 Xenarthra, Cingulata). In this work, a new species, *Pterygodermatites*
13 (*Paucipectines*) *argentinensis*, is described and new morphometric data, new host
14 records and the geographical distribution of *Pterygodermatites* (*Paucipectines*)
15 *chaetophracti* are provided. We examined 109 hosts belonging to *Chaetophractus*
16 *vellerosus*, *Chaetophractus villosus*, *Cabassous chacoensis*, *Dasyus hybridus*,
17 *Tolypeutes matacus*, and *Zaedyus pichiy*, from several regions of Argentina.
18 *Pterygodermatites* (*Paucipectines*) *argentinensis* can be distinguished from *P.* (*P.*)
19 *chaetophracti* by the morphology and size of esophageal teeth of both sexes, by
20 subequal and longer spicules, by having only 1 precloacal cuticular semicircular
21 fan in males and a greater number of cuticular processes in females. *Cabassous*
22 *chacoensis* and *Zaedyus pichiy* are new hosts for *Pterygodermatites* (*P.*)
23 *chaetophracti*.

24 Armadillos (Cingulata), anteaters, and sloths (Pilosa) constitute the Xenarthra, the
25 only group of mammals that originated in South America and whose history in the
26 continent dates back more than 60 million years (Scillato-Yané, 1976; Gibb et al.,
27 2016). In Argentina, there are representatives of 2 families, Dasypodidae (15
28 species), and Myrmecophagidae (2 species) (Vizcaíno et al., 2006; Abba et al.,
29 2012).

30 Parasites from 8 species of Dasypodidae from several regions of Argentina
31 have been studied in the last 30 yr, mainly nematodes (Aspidoderidae, Molineidae,
32 Onchocercidae, Rictulariidae, Spirocercidae, and Subuluridae) and cestodes
33 (Anoplocephalidae) (Navone, 1990; Ramírez et al., 1991; Notarnicola and Navone,
34 2003; Navone et al., 2010; Ezquiaga and Navone, 2013, 2014; Ezquiaga et al.,
35 2012, 2016).

36 Species of Rictulariidae are characterized by having 2 ventrolateral rows of
37 cuticular processes, an oral opening bordered by denticles, a well-chitinized buccal
38 capsule, with 1 to 3 esophageal teeth at its base; they parasitize bats, carnivores,
39 insectivores, marsupials, rodents and xenarthrans (Quentin, 1969; Navone, 1987).
40 The diagnostic traits of *Pterygodermatites* Wedl, 1861 comprise an apical or
41 slightly dorsal oral aperture, 3 esophageal teeth and 29-56 pairs of prevulvar
42 cuticular processes (Quentin, 1969). This genus includes 5 subgenera also
43 differentiated by the number of cuticular processes, the number and disposition of
44 cloacal papillae in males, and by the specificity for their vertebrate hosts (Quentin,
45 1969).

46 In the Neotropical region, there are 11 species included in
47 *Pterygodermatites* (*Paucipectines*), 4 of them parasitize cricetid rodents (Quentin,

48 1967; Sutton, 1979, 1984; Lynggaard et al., 2014), 2 in bats (Travassos, 1928;
49 Cardia et al., 2015), 4 in marsupials (Lent and Freitas, 1935; Chabaud and Bain,
50 1981; Navone, 1989; Navone and Suriano, 1992; Lopes Torres et al., 2007;
51 Jiménez and Patterson, 2012) and only 1 in xenarthrans, *Pterygodermatites*
52 (*Paucipectines*) *chaetophracti* (Navone and Lombardero, 1980). This species
53 parasitizes *Chaetophractus villosus* (Desmarest, 1804), *Chaetophractus vellerosus*
54 (Gray, 1865), *Dasypus hybridus* (Desmarest, 1804), *Tolypeutes matacus*
55 (Desmarest, 1804) and *Chlamyphorus truncatus* Harlan, 1825 (Dasypodidae) in
56 Argentina (Navone and Lombardero, 1980; Navone, 1987, 1990).

57 As part of a project to describe the diversity of helminths in some species of
58 xenarthrans in several biogeographical regions of Argentina, we studied numerous
59 specimens of *Pterygodermatites* and observed that they belong to 2 species, one
60 of them yet undescribed. The main goal of this study is to describe the new species
61 and to provide new morphometric data for *P. (P.) chaetophracti*, adding new
62 geographic and host records for this rictulariid species.

63 **MATERIALS AND METHODS**

64 A total of 109 xenarthran hosts belonging to 6 species were examined from
65 different ecoregions from Argentina (Fig. 4). Ecoregions were based on Brown and
66 Pacheco (2006) but both Monte ecoregions (Monte of hills and valleys and Monte
67 of plains and plateaus) were analyzed together. Forty-one specimens of *C.*
68 *vellerosus* (from the provinces of Buenos Aires and San Luis, ecoregion Pampa -
69 EP-; Córdoba and La Rioja, ecoregion Chaco -ECh-; Mendoza and San Juan,
70 ecoregion Monte -EM-); 22 *C. villosus* (from Buenos Aires, EP; Chubut, ecoregion
71 Patagonian steppe -Eps- and La Pampa, ecoregion Espinal -EE-); 3 *Cabassous*

72 *chacoensis* (from Córdoba and Santiago del Estero, ECh), 9 *D. hybridus* (from
73 Buenos Aires, EP), 12 *T. matacus* (from La Rioja, ECh), and 22 *Zaedyus pichiy*
74 (from Mendoza, EM; Río Negro and Chubut, EPs), in Argentina, were reviewed.
75 Specimens analyzed came from mammal collections (Museo Argentino de
76 Ciencias Naturales Bernardino Rivadavia and Facultad de Ciencias Naturales e
77 Instituto Miguel Lillo), collected (permission 10/08 Ministerio de Asuntos Agrarios,
78 provincia de Buenos Aires, Argentina), and donated by T. Rogel and A. Agüero
79 (Universidad Nacional de La Rioja, Sede Chamental, Transit guide N° 000057-
80 000058). Due to logistic reasons and that the most of the specimens came from
81 different sources (i.e. mammal collections, collected by colleagues, collected by us
82 in different localities), digestive tracts of the collected mammalian hosts were fixed
83 in 10% formaldehyde in situ, and then dissected in the laboratory. The nematodes
84 found and specimens from collections did not show noticeable morphological
85 alterations and consequently were included in this study.

86 The nematodes found were stored in 70% ethanol, cleared with Amman's
87 lactophenol, mounted on a slide under a cover slip and studied using a compound
88 microscope. A cross section of the anterior end was made to obtain an *en face*
89 view. Slight distortion could be caused by temporary mounts of the anterior end.
90 Tails of the males were drawn in lateral position. The spicules measurements were
91 taken from cleared specimens. Drawings were made with a drawing tube attached
92 to an Olympus BX51 microscope (Olympus Corporation, Tokyo, Japan). Some
93 specimens were dehydrated in a graded ethanol series, dried with the critical point
94 method and photographed using a JEOL/SET 100® Scanning Electron Microscope
95 (SEM) (JEOL Ltd., Tokyo, Japan). Measurements are given in micrometers, unless

96 otherwise stated; with measurements of types followed by those from paratypes.
97 The measurements of paratypes are expressed as the mean \pm SD between
98 parentheses and are followed by the range (minimum and maximum). Nematode
99 specimens were deposited at the Colección de Helmintos Museo de La Plata
100 (MLP-He) (MLP-He 7333, 7364 to 7391). Prevalence, mean intensity and mean
101 abundance were calculated for each host species in each ecoregion in which
102 parasites were found. These ecological descriptors follow Bush et al. (1997).

103 For comparative purposes, specimens of *Pterygodermatites* (*Paucipectines*)
104 *chaetophracti* (Navone and Lombardero, 1980) MLP-He 6452 deposited in the
105 collection of Museo de La Plata, Argentina, were studied.

106 **DESCRIPTION**

107 ***Pterygodermatites* (*Paucipectines*) *argentinensis* n. sp.**

108 (Figs. 1-2)

109 *Diagnosis:* Whitish and medium-sized nematodes, with thick cuticle; body
110 widened at posterior end. Oral opening apical surrounded by 4 cephalic papillae, 4
111 labial papillae and 2 lateral amphids (Figs. 1A, 2A). Triangular oral opening with
112 thick margins surrounded by 18-19 denticles (11-12 denticles on ventrolateral
113 margins and 7 denticles on dorsal margin) (Figs. 1A, 2A); 3 internal esophageal
114 teeth at bottom of buccal capsule, 1 dorsal and 2 overlapped ventrolateral,
115 triangular and slightly rounded (Fig. 1C). Two subventral rows of cuticular
116 processes along the body, starting at the level of the end of buccal capsule in both
117 sexes and ending at at anal opening level in females and at level of ventral fans in
118 males (Figs. 1B, 2B). A single type of cuticular process (comb only) in males,

119 combs and spines in females. Esophagus divided into short muscular and long
120 glandular portions (Fig. 1B).

121 *Males (based on holotype and 5 paratypes unless otherwise indicated):*

122 Body length 3.10 (3.20 ± 0.81, 2.02-4.10) mm, maximum width 290 (289 ± 119,
123 125-405). Forty-two (39-43) pairs of subventral cuticular processes and 1 unpaired
124 fan (Fig. 2D). Cuticular process at esophago-intestinal junction 73 (75 ± 31, 46-
125 120) long. Buccal capsule 27 (25 ± 7, 15-32) long and 30 (31 ± 6, 25-40) wide.
126 Esophageal teeth 11 (9 ± 2, 7-12, n = 4) long, esophageal teeth length/buccal
127 capsule length 0.30, esophagus length 770 (883 ± 201, 575-1,090), muscular
128 portion 235 (196 ± 27, 160-230), glandular portion 535 (660 ± 163, 415-860).
129 Nerve ring and deirids situated at 170 (167 ± 23, 130-186) and 316 (350 ± 63, 299-
130 420, n = 3) from anterior end, respectively. Excretory pore not observed. Ventral
131 surface of tail with 10 pairs of papillae, 1 unpaired precloacal papilla and 1 pair of
132 phasmids anterior to the tip of the tail (Figs. 1D, 2C). Pericloacal region with
133 cuticular longitudinal striations (Fig. 2C). Spicules subequal, left 360 (338 ± 56,
134 270-410), right 330 (309 ± 61, 235-400). Gubernaculum small, 27 (31 ± 1, 30-32)
135 long by 8 (9 ± 2, 7-12) wide (Fig. 1D).

136 *Females (based on allotype and 12 paratypes unless otherwise indicated):*

137 Body length 8.70 (7.9 ± 2.1, 4.55-10.75) mm, maximum width 575 (427 ± 157, 225-
138 650). Two subventral rows with 66 (67 ± 3.5, 61-73, n = 11) pairs of cuticular
139 processes, 47 (47 ± 1.9, 44-49, n=5) combs, 19 (19 ± 1.14, 17-20, n = 5) spines.
140 The first 40 (40 ± 0.8, 39-41, n = 10) pairs of combs prevulvar (Fig. 1B). First
141 cuticular process at 92 (70 ± 17, 41-110) from anterior end, 70 (43 ± 8, 28-60) long.
142 Cuticular process at esophago- intestinal junction 120 (103 ± 10, 85-111, n = 6)

143 long, at level of vulva 61 (80 ± 6 , 68-87, $n = 7$) long. Buccal capsule 45 (35 ± 7 , 25-
144 47) long and 47 (37 ± 8 , 28-48) wide (Fig. 1C). Esophageal teeth 21 (14 ± 3 , 10-
145 21), esophageal teeth length/buccal capsule length 0.40, esophagus length 2.30
146 (2.09 ± 0.4 , 1.50-2.87) mm, muscular portion 0.35 (0.34 ± 0.3 , 0.31-0.39, $n = 7$)
147 mm, glandular portion 1.94 (1.74 ± 0.3 , 1.29-2.44, $n = 7$) mm (Fig. 1B). Nerve ring
148 and deirids situated at 225 (198 ± 31 , 153-247) and 479 (397 ± 69 , 291-508) from
149 anterior end, respectively. Excretory pore not observed. Vulva inconspicuous, 2.98
150 (2.96 ± 0.4 , 2.35-3.60, $n = 11$) mm from anterior extremity and at 682 (823 ± 154 ,
151 650-1227, $n = 11$) from the esophago-intestinal junction (Figs. 1B, E, 2B). Tail 185
152 (258 ± 85 , 171-430) (Fig. 1F). Eggs embryonated *in utero*, 34 ± 7 (16-40) by 24 ± 5
153 (13-30) ($n = 39$) (Fig. 1G).

154 **Taxonomic Summary**

155 *Type host: Tolypeutes matacus* (Desmarest, 1804).

156 *Type locality:* Departamento Chamental, La Rioja ($30^{\circ}9'4''S$, $66^{\circ}1'47''W$), Argentina.

157 Collected on: 4 July 2009.

158 *Other hosts: Cabassous chacoensis* Wetzel, 1980; *Chaetophractus vellerosus*

159 (Gray, 1865); *Zaedyus pichiy* (Desmarest, 1804).

160 *Other localities:* Pipinas (Buenos Aires) (*C. vellerosus*), Paso La Vaca (Chubut) (*Z.*

161 *pichiy*), Cruz del Eje (Córdoba) (*C. vellerosus*), Somuncurá plateau (Río Negro) (*Z.*

162 *pichiy*), Quimilí (Santiago del Estero) (*Ca. chacoensis*), Usno (San Juan) (*C.*

163 *vellerosus*).

164 *Site of infection:* Small intestine.

165 *Specimens deposited:* Holotype MLP-He 7376; allotype MLP-He 7377; paratypes
166 MLP-He 7378, 7379, 7380, 7381, 7382, 7383, 7384, 7385, 7386, 7387, 7388,
167 7389, 7390, 7391.

168 *Prevalence, mean intensity and mean abundance:* 66%, 5, 3.3 (*T. matacus*, ECh);
169 33%, 3, 1 (*Ca. chacoensis*, ECh); 50%, 4.7, 2.4 (*C. vellerosus*, ECh); 25%, 10.6,
170 2.6 (*C. vellerosus*, EP): 16%, 1, 0.2 (*C. vellerosus*, EM); 9%, 1.5, 0.14 (*Z. pichiy*,
171 EPs).

172 *Etymology:* The species name refers to Argentina, the country in which it was
173 found.

174 **Remarks**

175 The new species belongs to the subgenus *Pterygodermatites*
176 (*Paucipectines*) because the oral opening is subterminal, however, the specimens
177 described have 39-41 pairs of prevulvar cuticular processes and differ from the
178 range described (29-39) by Quentin (1969). Other species belonging to this
179 subgenus (*P. (P.) kozeki* (Chabaud and Bain, 1981), *P. (P.) jagerskioldi* (Lent and
180 Freitas, 1935), *P. (P.) dipodomis* (Tiner, 1948), *P. (P.) baiomydis* Lynggaard et al.,
181 2014) possess more than 39 prevulvar cuticular processes. These variations
182 reported for the subgenus *Paucipectines* suggest the need to amend the diagnosis
183 of this subgenus. To date, 11 species of this subgenus have been described in the
184 Neotropics (Travassos, 1928, Lent and Freitas, 1935; Quentin, 1967; Sutton, 1979,
185 1984; Navone and Lombardero, 1980; Chabaud and Bain, 1981; Navone, 1987;
186 1989; Navone and Suriano, 1992; Lopes Torres et al., 2007; Jiménez and
187 Patterson, 2012; Lynggaard et al., 2014; Cardia et al., 2015); the new species
188 differs from *P. (P.) elegans* (Travassos, 1928), *P. (P.) zygodontomis* (Quentin,

189 1967), *P. (P.) azarai* Sutton, 1984, *P. (P.) spinicaudatis* Navone and Suriano, 1992,
190 *P. (P.) hymanae* Jiménez and Patterson, 2012, and *P. (P.) baiomydis* Lynggaard et
191 al., 2014, in showing spicules nearly equal in size (vs. unequal in size in the
192 aforementioned species) and only 1 cuticular semicircular fan on the ventral
193 surface of the male posterior end, whereas in the other species, the number of fans
194 varies from 3 to 4, excepting *P. elegans*, which lacks fans.

195 *Pterygodermatites (P.) andyraicola* Cardia et al. (2015) and *P. (P.) kozeki*
196 (Chabaud and Bain, 1981) are similar to the new species by having a semicircular
197 cuticular fan on the ventral surface of the body; however, females of *P. (P.)*
198 *andyraicola* have a greater number of cuticular processes (78 vs. 67), and males
199 have a narrow caudal ala and their first pair of precloacal papillae is pedunculated
200 (Cardia et al., 2015). *Pterygodermatites (P.) kozeki* differs of *P. (P.) argentinensis*
201 by having asymmetrical deirids and three plates (in addition to the esophageal
202 teeth) with serrated edges in the buccal capsule (Navone, 1989).

203 According to Lent and Freitas (1935) and Lopes Torres et al. (2007), *P. (P.)*
204 *jagerskioldi* is larger than the new species (26.40-48.02 mm vs. 4.55-10.75.), with a
205 greater number of cuticular processes in females (80 vs. 67 pairs) and the vulva
206 opens anterior to the posterior end of the esophagus meanwhile in *P. (P.)*
207 *argentinensis* the vulva is posterior to the esophago-intestinal junction.

208 *Pterygodermatites (P.) argentinensis* n. sp. can be distinguished from *P. (P.)*
209 *massoiai* (Sutton, 1979) by having fewer cuticular processes in females (67 vs. 76
210 pairs) and 3 small esophageal teeth, instead of 4 (Sutton, 1979).

211 *Pterygodermatites (P.) argentinensis* n. sp. resembles *P. (P.) chaetophracti* in body
212 size and general appearance of both sexes, as well as number of cuticular

213 processes and presence of gubernaculum in males, and number of prevulvar
214 cuticular processes in females. However, the new species can be differentiated of
215 *P. (P.) chaetophracti* by having subequal and longer spicules and only 1 cuticular
216 semicircular fan on the ventral surface of the male posterior end instead of three as
217 in *P. (P.) chaetophracti*. Moreover, the morphology of esophageal teeth (triangular
218 and slightly rounded in *P. (P.) argentinensis* vs. jagged-edged in *P. (P.)*
219 *chaetophracti*) for both sexes is different and the esophageal teeth are smaller in
220 *P. (P.) argentinensis* (14 vs. 21 μm in females; 9 vs. 11 in males).

221 In addition, females of the species described herein have a greater number
222 of cuticular processes than *P. (P.) chaetophracti* (67 vs. 64 pairs) (Navone and
223 Lombardero, 1980).

224 **REDESCRIPTION**

225 ***Pterygodermatites (Paucipectines) chaetophracti* (Navone & Lombardero,**
226 **1980)**
227 (Fig. 3)

228 *Diagnosis:* Nematodes with 2 subventral rows of cuticular processes along
229 body, starting at end of buccal capsule in both sexes and ending at level of ventral
230 fans in males and near the anus in females. A single type of cuticular process
231 (comb) in males, combs become spines towards the posterior region in females.

232 First half of body of females narrower than posterior half; males smaller than
233 females. Oral opening apical, trapezoidal surrounded by 18 denticles (11 denticles
234 on ventrolateral margins and 7 denticles on dorsal margin), 2 pairs of papillae and
235 2 lateral amphids (Fig. 3B). Buccal capsule with 3 jagged-edged esophageal teeth,

236 2 ventrolateral and 1 dorsal (Fig. 3A). Esophagus divided into short muscular and
237 long glandular portions (Fig. 3C).

238 *Males (based on 4 specimens unless otherwise indicated):* Body length 2.51
239 ± 0.89 (1.75-3.45) mm, maximum width 200 ± 94 (120-300), buccal capsule 19 ± 3
240 (16-23) long and 23 ± 6 (18-29) wide. Esophageal teeth 11 ± 2 (10-13, n = 3) long,
241 esophageal teeth length/buccal capsule length 0.59. Esophagus length 826 ± 299
242 (530-1,200), muscular portion 192 ± 59 (150-260), glandular portion 602 ± 297
243 (380-940). Nerve ring 157 ± 37 (121-202) from anterior end. Deirids 308 ± 73 (253-
244 407) from anterior end. Excretory pore not observed. Forty (39-41) pairs of
245 subventral cuticular processes, 3 unpaired fans (Fig. 3D). Cuticular process at
246 esophago-intestinal junction 38 ± 11 , 26-49 long. Pericloacal region with 2 pairs of
247 precloacal papillae, 1 unpaired papilla, 7 pairs of postcloacal papillae. Spicules
248 unequal, left 139 ± 10 (125-148), right 75 ± 16 (52-85). Gubernaculum small, $36 \pm$
249 6 (28-40) long, 9 ± 1 (7-10) wide (Fig. 3D).

250 *Females (based on 29 specimens unless otherwise indicated):* Body length
251 8.58 ± 2.31 (3.40-11.60) mm, maximum width 510 ± 181 (130-730). Two subventral
252 rows with 64 ± 3 (58-71, n = 23) pairs of cuticular processes, 44 ± 2 (40-48) of
253 them combs, 21 ± 4 (12-25) spines. Vulva at level of the cuticular process $40 \pm$
254 1 (39-42, n = 16). First cuticular process at 74 ± 10 (45-90, n = 28) from anterior
255 end, 47 ± 8 (30-65) long. Cuticular process at esophago- intestinal junction $102 \pm$
256 21 (73-146, n = 9) long, at level of vulva 98 ± 20 (75-132, n = 8) long. Buccal
257 capsule 33 ± 7 (22-52) long and 40 ± 7 (25-51) wide. Esophageal teeth 21 ± 4 (11-
258 29) long, esophageal teeth length/buccal capsule length 0.64. Esophagus length
259 2.29 ± 0.5 (1.12-3.10), muscular portion 302 ± 58 (190-360, n = 9), glandular

260 portion 1945 ± 381 (1,140-2,349, n = 9) (Fig. 3C). Nerve ring 205 ± 26 (147-245, n
261 = 28) from anterior end. Deirids 403 ± 55 (284-492, n = 16) from anterior end.
262 Excretory pore not observed. Vulva inconspicuous 3.24 ± 0.5 (2.13-4.28, n = 25)
263 mm from anterior end, distance from esophagus to vulva 878 ± 211 (430-1,300, n =
264 25) (Fig 3E). Tail 284 ± 93 (75-450) (Fig. 3F). Eggs embryonated *in utero*, 36 ± 2
265 (32-41) by 25 ± 2 (20-30) (n = 26) (Fig. 3G).

266 **Taxonomic Summary**

267 *Hosts:* *Cabassous chacoensis* Wetzel, 1980, *Chaetophractus vellerosus* (Gray,
268 1865), *Chaetophractus villosus* (Desmarest, 1804), *Tolypeutes matacus*
269 (Desmarest, 1804), *Zaedyus pichiy* (Desmarest, 1804).

270 *Localities:* Castelli, Laprida, Pellegrini, Punta Indio (Buenos Aires) (*C. vellerosus*,
271 *C. villosus*), Paso la Vaca (Chubut) (*Z. pichiy*), Cruz del Eje (Córdoba) (*C.*
272 *vellerosus*), Loventué (La Pampa) (*C. villosus*), Chamental (La Rioja) (*C. vellerosus*,
273 *T. matacus*), Lavalle (Mendoza) (*C. vellerosus*), Somuncurá plateau (Río Negro)
274 (*Z. pichiy*), Usno (San Juan) (*C. vellerosus*), unknown locality (*Ca. chacoensis*).

275 *Site of infection:* Small intestine.

276 *Specimens deposited:* Voucher specimens at Colección de Helminthos del Museo
277 de La Plata (MLP-He 7333, 7364, 7365, 7366, 7367, 7368, 7369, 7370, 7371,
278 7372, 7373, 7374, 7375).

279 *Prevalence, mean intensity, and mean abundance:* 33%, 1, 0.3 (*Ca. chacoensis*,
280 ECh); 50%, 7, 3.5 (*C. vellerosus*, ECh); 15%, 16, 2.4 (*C. vellerosus*, EP); 33%, 1,
281 0.3 (*C. vellerosus*, EM); 5%, 12, 0.6 (*C. villosus*, EP), 50%, 9, 4.5 (*C. villosus*, EE);
282 83%, 4.5, 3.7 (*T. matacus*, ECh); 18%, 3, 0.5 (*Z. pichiy*, EPs).

283 **Remarks**

284 *Pterygodermatites (P.) chaetophracti* was described based exclusively on
285 females (Navone and Lombardero, 1980) and later, males were described by
286 Navone (1987). In the original description of this species, the nerve ring and the
287 deirids were not observed, and Navone and Lombardero (1980) considered that it
288 lacks a gubernaculum. In this work, we studied material from collection and new
289 specimens and we established for the first time the position of nerve ring and
290 deirids and the presence of gubernaculum for *P. (P.) chaetophracti*. We also
291 observed 2 pairs of precloacal papillae and 1 unpaired papilla, where Navone
292 (1987) had observed only 1 pair of precloacal papillae.

293 *Pterygodermatites (P.) chaetophracti* is reported for the first time in *Z. pichiy*
294 and in *Ca. chacoensis*, which extends their geographical distribution to the
295 provinces of Chubut, Mendoza, Río Negro, La Rioja and San Juan.

296 **DISCUSSION**

297 Quentin (1969) separated the genus *Pterygodermatites* into five subgenera based
298 on the position of the oral opening, the number of cuticular projections in males
299 and females, number of prevulvar cuticular projections in females and the
300 geographical and host distributions: *Pterygodermatites (Paucipectines)*,
301 *Pterygodermatites (Neopaucipectines)* Quentin, 1969, *Pterygodermatites*
302 (*Pterygodermatites*) Quentin, 1969, *Pterygodermatites (Mesopectines)* Quentin,
303 1969, and *Pterygodermatites (Multipectines)*, in a hypothesized phylogenetic order.
304 This author suggested that *Pterygodermatites (Paucipectines)* was the most
305 primitive in the genus. Our new finding is consistent with that hypothesis in that the
306 subgenus *Paucipectines* is associated to the oldest groups of mammals, and this
307 association supports the proposition that *Pterygodermatites* arrived in South

308 America with the marsupials and that xenarthrans acquired this parasite later
309 (Chabaud and Bain, 1981; Navone, 1989).

310 To date, 6 species of this genus have been cited as occurring in Argentina.
311 The first rictulariid mentioned for the country was described by Sutton (1979) as
312 *Rictularia massoi*, a parasite of *Graomys griseoflavus* (Rodentia, Cricetidae).
313 Subsequently, Navone and Lombardero (1980) described *Pterygodermatites*
314 *chaetophracti* parasitizing *C. villosus* and *D. hybridus*. Sutton (1984) transferred
315 both species to the subgenus *Paucipectines* and described a new species from
316 *Akodon azarae* (Rodentia, Cricetidae), *P. (P.) azarai*. In 1989, Navone described
317 the male of *P. kozeki* and synonymized the genus *Quentius* with
318 *Pterygodermatites*. Later, Navone and Suriano (1992) described a new species, *P.*
319 *(P.) spinicaudatis*, parasitizing *Dromiciops gliroides* (Microbiotheria,
320 Microbiotheriidae). In 2005, Beldomenico et al. found, for the first time in South
321 America, *P. (Multipectines) cahirensis* Quentin, 1969, in *Oncifelis geoffroyi*
322 (Carnivora, Felidae). Since then, there has been only one update of host
323 distribution for *P. (P.) kozeki* in Argentina (Ramallo and Claps, 2007). Recently, a
324 checklist of records of parasites in Patagonian wild mammals was published by
325 Fugassa (2015) and includes the presence of species of *Pterygodermatites* in
326 rodents, xenarthrans, marsupials and carnivores.

327 In this study, we expand the number of known species in Argentina, 2 of
328 which are from xenarthrans, *P. (P.) argentinensis* n. sp. and *P. (P.) chaetophracti*.
329 In addition, we contribute to the records of host distribution of rictulariids in
330 xenarthrans from Argentina with infection parameters (prevalence, mean intensity
331 and mean abundance). Both *P. chaetophracti* and *P. argentinensis* n. sp. were

332 found in several species of armadillos (*Ca. chacoensis*, *C. vellerosus*, *C. villosus*,
333 *T. matacus* and *Z. pichiy*) and in different ecoregions (Chaco, Espinal, Pampa,
334 Monte of hills and valleys, Monte of plains and plateaus and Patagonian steppe)
335 (Fig. 4). In this regard, the presence of these rictulariids in dasypodids is
336 associated with host species exploiting the same food niche and overlapping their
337 geographic ranges. Rictulariids use insects (orthopterans, dermapterans,
338 coleopterans) as intermediate hosts (Anderson, 2000). Thus, it is expected that
339 other xenarthrans like *Dasypus* spp., which feed on these insects, will be suitable
340 hosts of both *Pterygodermatites* species. However, previous studies of several
341 species of armadillos from Brazil and Paraguay have not found *P. chaetophracti*
342 (Fujita et al., 1995; Hoppe and do Nascimento, 2007; Hoppe et al., 2009).
343 Biogeographic regions that comprise the study sites in Brazil, Bolivia and Paraguay
344 correspond to areas characterized by high humidity, that contrasts with ecoregions
345 of the Monte, Espinal, dry Chaco, and Patagonian steppe, with low humidity and
346 sandy soils, that could favor presence of intermediate hosts and infective states of
347 rictulariids. Parasitological studies in dasypodids carried out in the humid Chaco of
348 Argentina found no *Pterygodermatites* (Navone, 1990). To clarify the geographical
349 and host distribution of rictulariids in xenarthrans new sampling will be necessary,
350 as suggested Notarnicola and Navone (2003) for *Orihelia* (Filaroidea,
351 Onchocercidae). In this sense, further investigations into the remaining species of
352 these mammals are necessary in order to know the parasitological fauna
353 associated with the Xenarthra.

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483

484 FIGURE 1. *Pterygodermatites (Paucipectines) argentinensis* n. sp. (A) Anterior
485 end, apical view. (B) Female, anterior extremity, ventral view. (C) Esophageal
486 teeth. (D) Male, posterior end, left lateral view. Caudal papillae numbered. U
487 indicates unpaired precloacal papilla. (E) Female, vulva. (F) Female, posterior end.
488 (G) Egg.

489 FIGURE 2. (A) Female, anterior end. (B) Female, vulvar region, arrow showing
490 vulva. (C) Male, posterior end, arrow showing phasmids. (D) Male, cuticular fan.

491 FIGURE 3. *Pterygodermatites (Paucipectines) chaetophracti*. (A) Female,
492 esophageal teeth, left lateral view. (B) Anterior end, apical view. (C) Female,

493 anterior extremity, ventral view. **(D)** Male, posterior end, left lateral view. Caudal
494 papillae numbered. U indicates unpaired precloacal papilla. **(E)** Female, vulva, left
495 lateral view. **(F)** Female, posterior end. **(G)** Egg.

496 **FIGURE 4.** Political map of Argentina showing the limits of ecoregions (modified
497 from Brown and Pacheco, 2006, 1- Chaco, 2- Monte of hills and valleys, 3- Monte
498 of plains and plateaus, 4- Pampa, 5- Espinal, 6- Patagonian steppe) and the
499 presence of *Pterygodermatites (P.) chaetophracti* and *P. (P.) argentinensis* in
500 armadillo species. Full forms denote both species, empty forms denote only the
501 presence of *P. (P.) chaetophracti*.



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