

REVIEW

Open Access



The identity of Fuegian and Patagonian “dogs” among indigenous peoples in southernmost South America

Fabian M. Jaksic^{1,2*}  and Sergio A. Castro^{2,3}

Abstract

Background By using a historical approach we attempt to answer the question of whether the “dogs” of Fuegian and Patagonian peoples are a domesticated dog (*Canis lupus familiaris*) or a tamed or domesticated Culpeo “fox” (*Lycalopex culpaeus*), or a cross breed.

Methods and results We reviewed historical chronicles and current scientific papers, and clarified several rather confusing concepts, providing disambiguation for terms such as Magellanic region, Patagonia, and Tierra del Fuego; Fuegian and Patagonian peoples; and Fuegian and Patagonian dogs. We conclude that these dogs belong to two different canid varieties: The smaller domestic dog typical of the “canoe-indians” (Chonos, Kawesqar, and Yahgan peoples) and the larger tamed or domesticated Culpeo “fox” typical of the “foot Indians” (Aonikenk, Manek’enk, and Selk’nam peoples, thus proposing the use of Fuegian and Patagonian dog, respectively.

Discussion We think that the original Fuegian dog was indeed a *Canis lupus familiaris* brought along by the natives after the Bering’s crossing and that the Patagonian dog was a tame Culpeo fox *Lycalopex culpaeus*, which was progressively replaced by the more gregarious, human friendly, and colorful domestic dogs brought by European explorers, adventurers, colonizers, and settlers of Patagonia and Tierra del Fuego during the mid to late 1800s. The possibility that the Patagonian dog was a cross between domestic dog and Culpeo “fox” cannot be ruled out, but the only specimen genetically analyzed was closest to being the latter and not a hybrid.

Keywords Aonikenk, *Canis lupus familiaris*, Chonos, Kawesqar, *Lycalopex culpaeus*, Magallanes, Manek’enk, Patagonia, Selk’nam, Tierra del Fuego, Yahgan

Background

Evolutionarily and systematically speaking, there are no foxes in all of South America [1–3]. In addition, those in the southern part of the continent are more closely related to wolves (*Canis spp*) than to foxes (*Vulpes spp*). Indeed, one of the original names of South American “foxes” in the diverse genus *Lycalopex* was *Dusicyon*, meaning “almost a dog.” Whatever their phylogeny, those “foxes” have had a long history of interactions with humans [4–7], but not to the point of becoming domesticated [8, 9], although possibly of being tamed and even trained as hunting aids [1], and moved around in canoes by humans [4, 5, 10]. Perhaps the first hint

*Correspondence:

Fabian M. Jaksic

fjaksic@bio.puc.cl

¹ Departamento de Ecología, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Santiago, Chile

² Center of Applied Ecology and Sustainability (CAPES), 8331150 Santiago, Chile

³ Laboratorio de Ecología y Biodiversidad, Universidad de Santiago de Chile, Santiago, Chile



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

that “foxes” may have contributed to the Fuegian dog was from Señoret [11], who put forth that the dog of the Selk’nam people was a mixed breed of domestic dog (*Canis lupus familiaris*) and Culpeo fox (*Lycalopex culpaeus*), posing a still unresolved scientific problem.

Further marring the subject raised is a general confusion about What is Patagonia: Only continental southern South America or including the lands beyond the Strait of Magellan? [10], What is Tierra del Fuego: An island or an archipelago? [12–15]. Who are the Patagonian or Fuegian peoples: Are they the same? [16–18]. Did they bring their dogs from the Bering Strait all along, or crossed them with some local “fox”? [4–6, 19, 20]. We attempt to answer our central question by reviewing historical chronicles and current scientific papers, which reveal the possibility of at least the “foot indians” (Aonikenk, Manek’enk, and Selk’nam peoples) having tamed, if not domesticated, the Culpeo “fox” in Patagonia and Tierra del Fuego.

Methods

Literature search

We back-tracked references from current to older sources, using mainstream journals, monographs, and books, and relevant grey literature. Some new sources emerged when engine-searching the internet without time or language constraints for key words such as dog, Fuegian dog, perro, or perro fueguino. We distinguished between first-hand information and secondary use of literature sources to avoid redundancies. In directly quoting authors, we did not correct grammar or taxonomic mistakes, nor did we feel obligated to list among our references those citations made by any quoting author. We quoted text exactly as spelled out in a given page of an edition of a given book. We used two levels of quotation –double (“) and single (‘)—the latter for quotations within quotations. This generally worked well except in the case of Allen [4], who often quoted authors who already used quotations. We respected the original language of the version examined and translated to English freely, based on our language skills and shared disciplinary parlance. Gross misspellings (e.g., Yaghan in Lonnerberg [21] or Hush in Skottsberg [10] were reaffirmed by *sic*). We italicized the names of vessels, to highlight their fancy names conducive to confusion: e.g., *Adventure*, *Beagle*, *Delphin*, *Estrella*, *Romanche*, et cetera. This literature search was undeniably non-systematic (e.g., the grey literature is not usually archived electronically) and relied on the authority and expert judgment of the authors of this paper (ORCID 0000–0003–0098–0291 and 0000–0001–7632–9599, respectively).

Geographical disambiguation

Patagonia is a rather imprecise geographical term than nonetheless is attributed to lands in the southern section of the Andes Mountains, in both Argentina and Chile, with lakes, fjords, temperate rainforests, and glaciers in the west and deserts, tablelands, and steppes to the east. Patagonia is bounded by the Pacific Ocean on the west, the Atlantic Ocean to the east, and bodies of seawater that connect them, including the Strait of Magellan, the Beagle Channel, and the Drake Passage to the south. The Colorado and Barrancas rivers, which run from the Andes Mountains to the Atlantic Ocean, are commonly considered the northern limit of Argentine Patagonia while the northern limit of Chilean Patagonia is at Huinacul Fault, in Araucanía Region. The archipelago of Tierra del Fuego, south of the Strait of Magellan is sometimes included as part of Patagonia. But summing up, the European hare may be considered to have populated the country from both northern and central Argentina (the Pampean geographical region, <https://en.wikipedia.org/wiki/Pampas>) and from the southern part (the Patagonian geographical region, <https://en.wikipedia.org/wiki/Patagonia>). Even more obscure is the denomination of Magellanic region or province, which nonetheless may be understood geographically as the forests and moorlands of eastern Chile from latitude southwards, encompassing the southern portion of Tierra del Fuego Island and surrounding archipelago, whose northern part belongs to the Patagonian region or province, characterized by steppes [22, 23].

Tierra del Fuego is also an ambiguous geographic term: It may refer to the archipelago (Archipiélago de Tierra del Fuego or Archipiélago fueguino) or to the island proper (Tierra del Fuego Island, or Fuegia, or Fireland, or Feuerland, or Isla Grande de Tierra del Fuego). The Fuegian archipelago contains the large Tierra del Fuego Island (ca. 48,000 km²), seven medium-sized islands (Hoste, Santa Ines, Navarino, Dawson, Aracena, Clarence, and Staten, ranging from 4,100 to 500 km² in the same sequence), and ca. 3,000 smaller islands and islets, the best-known being, alphabetically, Cape Horn, Lennox, Nueva, Picton, and Riesco. Most of these smaller islands are located to the southwest of Tierra del Fuego Island, separated by the Strait of Magellan and the Beagle Channel. The large island is split east–west between Argentina and Chile (40:60), respectively, at meridian 68°34’W, and most other islands (Staten Island excepted, 54°47’S, 64°15’W) are in Chilean territory. Tierra del Fuego Island is the largest island in South America, ranks 29 in size worldwide, and amounts to ca. 70% of the area of Tasmania in southernmost Australia. Further details

may be found in https://en.wikipedia.org/wiki/Tierra_del_Fuego.

Fuegian and Patagonian peoples disambiguation

The Fuegian archipelago hosted until the twentieth century four different peoples [12, 15, 16, 18, 24]: Kawesqar or Alacalufe, Manek'enk or Haush, Selk'nam or Ona, and Yahgan or Yamana; the former denominations being more favored. The Selk'nam branched out from the "Patagones" (= Aonikenk or Tehuelche people) on the South American mainland, and migrated across the Strait of Magellan to the large Tierra del Fuego Island [18, 25], where they concentrated on the northeastern area of the island (ca. 54°S, 68°W), although they sporadically reached southward to the Beagle channel (ca. 55°S, 68°W). The Manek'enk lived on the Mitre peninsula (54°46'S, 65°46'W) in southeastern Tierra del Fuego Island, and were culturally and linguistically related to the more northerly Selk'nam. Unlike the three previous peoples ("foot Indians"), the next three were nomadic seafaring, or "canoe Indians." The Chonos were found in the archipelagos of Chiloé, Guaitecas, and Chonos, roughly spanning from Calbuco (41°46'S, 73°08'W) and southernmost Chiloé Island (43°06'S, 73°44'W) to Taitao peninsula (46°30'S, 74°25'W). The Kawesqar concentrated mostly on islands to the south of the Gulf of Penas (47°22'S, 74°50'W), around Wellington (49°20'S, 74°40'W), Desolación (53°06'S, 73°54'W), and Santa Inés (53°45'S, 72°45'W) islands, and around Brunswick peninsula (53°30'S, 71°25'W). The Yahgan traditional territory included the islands south of the Strait of Magellan (which follows a northwest to southeast course encompassing ca. 52–54°S, 68–75°W) and the Beagle Channel (54°52'S, 68°08'W), extending their presence into Cape Horn (55°59'S, 67°17'W), making them the world's southernmost human population. All these peoples overlapped geographically to some extent and traded goods among them. Further details may be found in <https://en.wikipedia.org/wiki/Fuegians>.

Fuegian and Patagonian dog disambiguation

Apparently, all Patagonian and Fuegian peoples had "dogs," but not necessarily the domestic variety *Canis lupus familiaris* [19, 20]. Indeed, the descriptions, illustrations, and photographs available show an immense variety of shapes, sizes, colors, and coloration patterns of those dogs, with perhaps a defining cleavage being that the Yahgan's dog was smaller than the Selk'nam's dog. Portraits of Yahgan's dogs may be found in [26] (pp. 75, 81, 82); they appear small, pointy-snouted, prick-eared and of homogeneous coloration. Instead, the drawing in [12] (p. 199) shows Selk'nam people with a rather large,

short-haired white dog with darker (brownish, greyish?) spots on the back behind the shoulder blades, before and after the hip and base of the tail, the rest of it being white. Silva Rochefort and Root-Bernstein [19] reproduced Gallardo's [12] drawing, which is free of copyright and accessible at <http://www.memoriachilena.gob.cl/602/w3-article-8403.html>. Also, the grey photograph of a Selk'nam's dog in [27] is of homogeneously brown and short fur. This specimen is deposited in the Museo Histórico y de Ciencias Naturales Monseñor Fagnano in Río Grande city, Argentina. Another specimen in Museo Salesiano Maggiorino Borgatello, in Punta Arenas, Chile, is a brown animal with white face, upper neck, underparts (throat, chest and abdomen), and tip of tail. Its legs have white carpus and metacarpus, and white tarsus and metatarsus, toes are whitish. Its fur appears longer and thicker than in the Río Grande specimen. Whether these two dog types are of domestic *Canis lupus familiaris* or of *Lycalopex culpaeus* stock, or a mixed breed, is still unresolved. As of now, the balance tips toward the Selk'nam's dog being a "fox" (see Results). With respect to information in https://en.wikipedia.org/wiki/Fuegian_dog we take issue with it equating Fuegian dog only to Yahgan dog, but contrary to us, stating that it is a form of Culpeo "fox," which we attribute only to the dog of the "foot Indians."

Results

Historical account

The first European to describe the Aonikenk or Tehuelche was Pigafetta [28] during his circumnavigation of the world in 1519–1522 [29]. He called "Patagones" the tall people he observed in San Julian Bay (49°18'S, 67°42'W, currently in Argentina) but he did not mention the presence of dogs around these likely Aonikenk people. He did report the presence of "foxes," though (likely *Lycalopex* spp). de Bougainville [30] also circumnavigated the world and in Tomo I, p. 168–169 referred to the presence of "Patagones" (Aonikenk, by the physical description made) in Boucault Bay (52°50'S, 69°50'W). According to him, the Aonikenk "Tenían también perros pequeños y feos, los cuales, así como sus caballos, bebían agua de mar; el agua dulce era muy rara en esta costa y lo mismo en el interior." That is, they had small and ugly dogs that drunk water from the sea.

Byron [31] (p. 240) described that "Hallandose el *Delphin* diez, ó doce leguas internado en el Estrecho de Magallanes, la gente, que estaba en el combés, descubrió en la costa del continente treinta, ó quarenta personas de estatura extraordinaria," who (p. 262) "Trahian tambien consigo algunos perros, cuyo hocico acababa en punta como el de un Zorro, y eran casi tan grandes como nuestros perros de presa regulares." That

is, the Aonikenk had pointy-snouted dogs of a size similar to hunting dogs in England. The same Byron [32] (p. 84) reported that “Estos perros son de una ralea de animales de mui mal aspecto, pero mui sagaces i fáciles de adiestrar para este trabajo, que en apariencia es una clase de ejercicio poco agradable. Sin embargo, se aficionan a él mui pronto; parecen divertirse mucho i espresan su contento ladrando cada vez que sacan la cabeza a flor de agua para respirar. Dos indias se meten al agua tendiendo la red; entónces los perros, tomando una gran distancia, se sumerjen en busca de los peces i los corren hacia la red; pero, solo hai ciertos sitios donde se puede tomar el pescado de esta manera.” A briefer and free translation would be that such dogs were ill-looking but shrewd and easy to train for fishing, which apparently they liked, expressed by barking when they stuck their head out of the water to breathe. The native women laid their net in the water, then the dogs dove in search of fish, and run them into the net. In this paragraph, it is unclear if the natives were Aonikenk, Kawesqar or Yahgan. Darwin [33] described the presence of dogs in several passages of his journey to South America, but noted nothing particular about them around the Beagle channel (which was named after the ship carrying Darwin, not after a dog).

Milne Edwards [34] (pp. A14-A15) when referring to the sea otter *Lontra chilensis* stated that “It is very common in the innumerable channels of the Chonos archipelago where Darwin observed it; it is no less abundant in the Magellanic region, and its skin generally constitutes the clothing of the Fuegians. *Romanche* officers observed it at Orange Bay, Grévy Island, Banner Cove (Beagle Channel) and Terre des Etats. The specimens brought back to the Museum were killed at Sea-Gull Bay, north of Wollaston. This Otter feeds on fish and crustaceans that it swims or picks up on the shore. The natives hunt it with ardor and with the help of their dogs. As soon as they see the head of an Otter above the seaweed, they chase it in a canoe until it takes refuge under the stones on the shore. The dogs then set off after her and seek to seize her; if it flees, the men placed at the entrance to the holes spear it as it passes. Sometimes the dogs return cruelly torn, but they nevertheless attack their enemy with fury; if he manages to escape, the hunt begins again in a canoe until the exhausted Otter succumbs. It is skinned and the skin is stretched until it is dry and can be used as clothing.” Notice that, on account of the location, he was likely referring to the dog of the Kawesqar or Yahgan peoples, not of the Manek’enk or Selk’nam. Señoret [11] (p. 11) when referring to the territory of Tierra del Fuego Island, reported that “En cambio abunda hasta ahiora i es un auxiliar de los indigenas el perro fueguino, cuyo orijen, al parecer, mezcla de perro y zorro, es un problema

cientifico interesante i aun no resuelto.” That is, the Fuegian dog of the Selk’nam is a mixed breed of dog and “fox,” posing an interesting scientific problem.

Gallardo [12] provided the fullest account of the Selk’nam’s dog up to now. He started by stating that (p. 71) “De los carnívoros existen, en primer lugar, una especie de perro, *Canis (Pseudalopex) lycoides*, especie típica de la Tierra del Fuego y que solo se halla en la isla grande. Este perro ha sido domesticado por los indios y, como lo veremos más adelante, se ha convertido en un valioso auxiliar.” That is, the Selk’nam’s dog is indeed a domesticated local “fox.” Later on the text (pp. 197–198) he reported that “Es el perro fueguino un animal de aspecto salvaje, no muy grande, como se verá más adelante. Algunos de ellos conservan un parecido tal con sus antecesores, que fácilmente se les confunde con un zorro grande, pero no todos son así y por el contrario admira ver la variedad enorme de colores que existe en la raza canina, para cada uno de los cuales el ona tiene un nombre. Los hay de color gris amarillento, de fondo claro, casi blanco y con tintes oscuros del negro al amarillo ceniciento. Tienen la frente ancha, las orejas derechas, puntiagudas y bastante largas, los ojos son algo oblicuos, el hocico es alargado y hasta puntiagudo, el pescuezo es corto y las patas se hacen notar por tener muy desarrolladas las membranas que unen los dedos; la cola es larga, de pelos también muy largos como los que cubren el cuerpo. Es un animal fuerte y ágil, y de apariencia hipócrita y desconfiado. Su altura, en las espaldas, es como máximo de 50 centímetros, pero varía mucho, encontrándose algunos que solo tienen 40 centímetros. Midiéndolo desde la punta del hocico al punto que nace la cola, tiene unos 80 centímetros. Siempre es más bajo de la espalda que del anca. La cabeza tiene hasta 25 centímetros de largo.” Briefly, the Fuegian dog resembles a large “fox,” but is more variedly colored, even spotted or striped. It has a broad forehead, long and pointy ears, slanted eyes, long and pointed muzzle, and short neck. Its toes are fully webbed, the tail is long, and has long hairs all over the body; several measurements were provided. It is puzzling the assertion that the Fuegian dog’s shoulder girdle is lower than the pelvic girdle; this is exactly the opposite of the Yahgan’s dog, which according to Bridges [13, 14] resembled an “Alsatian police dog” (German shepherd dog, in correct parlance), characterized for its lower hips. Gallardo [12] (pp. 198–201) proceeded then to describe the care, taming, and hunting training delivered by the Selk’nam to their dogs. Indeed, he stated that “El perro fueguino no es muy inteligente, y su carácter indómito es un inconveniente gravísimo para obtener obediencia. Sin embargo, bien adiestrado, por su propia conveniencia se hace excelente cazador. Su amo lo castiga a menudo

y mucho, llegando hasta la crueldad.” Meaning that the Fuegian dog is unruly, but once made obedient (with some cruelty) it becomes an excellent hunter. Interestingly, “El perro, generalmente, no caza sino guanacos, pero hay algunos que llegan hasta a cazar zorros, siendo entonces un precioso auxiliar del hombre. Si el perro es bueno y la suerte lo favorece alcanza al zorro en la carrera, pero generalmente se limita a acorrallar el animal, a entretenerlo hasta que llega el indio y lo mata.” That is, Fuegian dogs chiefly hunt guanacos (*Lama guanicoe*) but some of them may even hunt local “foxes” (their supposedly own kin), but they only corral them and do not kill them. This part of the book ends with the statement “Terminaré este capítulo diciendo que el oná jamás trata de domesticar a ninguno de los animales que lo rodean, excepto el perro.” That is, the Selk’nam have only attempted to domesticate this Fuegian dog and no other animal at all.

Skottsberg [10] (p. 308), reporting from the Beagle channel near Harberton station (a sheep ranch at 54°52’S, 67°19’W) in southernmost Tierra del Fuego Island stated that “A few years ago the Onas were the absolute masters of Tierra del Fuego, where they had vast hunting grounds. Most certainly they are a branch of the Tehuelche people—but prolonged isolation and the lack of boats in which to cross the Strait have gradually changed their habits and language. Their tall forms and good-looking faces remind one much of the Tehuelches of Patagonia.” And in pp. 307–308, that “Among the interesting information I got from Mr. Bridges there is one thing especially worthy of notice. This was the story of a fourth Indian tribe, hitherto not known to me. It was called Hush (*sic*), and lived along the Strait of Le Maire. Probably it was a branch of the Ona people, perhaps originally a mixture of Ona and Yahgan, but had a language different from either of theirs and lived mainly on shell-fish and seal, wandering along the beach. Canoes were not used. There is no pure Hush (*sic*) left. In Harberton I saw an old man looking more like a Yahgan; his mother was of the Yahgan tribe. He had been married to a Hush (*sic*) woman, the last of her race, and was a widower; he had two unmarried daughters. They are the last of a small people that disappears without leaving any traces behind. We know nothing of their habits or of their language. Probably the Fuegians Darwin found in Good Success Bay belonged to this people.” Mr. Bridges must be the reverend Thomas L. Bridges; Hush (*sic*) are Haush or Manek’enk, Onas are Selk’nam, and Tehuelches are Aonikenk; and the Fuegians met by Charles R. Darwin were definitely Yamana or Yahgan. Dogs are mentioned throughout Skottsberg’s narrative, but no remarkable mention is made of them.

Lonnberg [21] (p. 10) examined a dog obtained directly from Yahgans by Otto Nordenskjöld during his expedition to Tierra del Fuego in 1895–1896, who stated that “The dog is probably of as unmixed origin as the dogs of these Indians on the whole are. The settlements of the Europeans in those parts were at that time not old, so that it will appear, that the dogs of the Indians were not mixed with imported blood, although the opposite possibility is not excluded.” He [21] (p. 11) added that “It would then lie rather near at hand to suspect that the Yaghan (*sic*) Indian, or their ancestors should have tamed a South American wild dog to use as hunting companion.” And then he provided cranial measurements of the skull and discussed (p. 12) “A comparison between the skull of the Yaghan (*sic*) dog and skulls of *Pseudalopex lycoides* Phil. proves, however, at the first look, that there is no affinity between these two animals, and the Yaghan dog has thus been imported to Tierra del Fuego. The cranial dimensions of the Yaghan dog are found on the adjoined table of measurements. From the same is to be seen, that the dog skull is very much smaller than that of *Ps. lycoides*, and even somewhat smaller than *Ps. magellanicus*, with shorter and broader snout.” Lonnberg went on to report numerous other cranial and dental features differentiating the Yahgan dog from Culpeo “foxes” and stated (p. 14) “From this it is quite clear that the Yaghan (*sic*) dog cannot be regarded as a tamed *Pseudalopex*, nor as a domesticated member of any other kind of South American Canidae, as far as my knowledge goes.” Finally, in p. 18 he finalized “...it appears also most probable that the ancestors of the Yaghan (*sic*) Indians brought dogs with them from the north when they invaded the southern parts of the continent and finally found their way to Tierra del Fuego.”

Allen [4] was apparently the first to describe scientifically the morphology and distribution of what he called the Patagonian Dog (pp. 476–477): “Characters. A medium-sized dog, as big as a large Foxhound, coat usually short and wiry, or longer and of softer texture; ears short and erect; color dark, more or less uniform, rarely spotted; dark brownish black, dark tan, or occasionally black; tail bushy. General appearance like a small Wolf. Distribution. Found among the Foot Indians of the eastern parts of Tierra del Fuego, northward into Patagonia, the northwestward limits of distribution not clearly known. Remarks. Hamilton Smith (1840, p. 213) quotes a letter from Captain Fitzroy (*sic*) of the Beagle, that the Patagonian Dog is strong, about the size of a large Foxhound, coat short and wiry, though sometimes soft and long, like that of a Newfoundland Dog. In color it is dark, nearly uniform, rarely spotted. It is wolfish in appearance, somewhat resembles the Shepherd Dog, will growl and bark loudly. It is doubtless a dog of this breed

that is meant by Furlong in his statement that of the two types of dogs found among the Onas of Tierra del Fuego, one is like a Wolf. Cunningham [35] (p. 307) mentioned that while near Gente Grande Bay, Sandy Point, in the Strait of Magellan, three dogs wandered about in the neighborhood of his landing party, barking and howling dismally. The first was very much like a fox in size and general appearance, and of a reddish-gray colour; the second had a piebald smooth coat, with drooping ears; while the third was clothed with long dark brownish-black hair, had erect ears, and presented a marked resemblance to a small wolf. The first was probably a Fuegian Dog, obtained through intercourse with tribes of the western part of the Magellanic Archipelago; the second was possibly a mongrel European dog; the last perhaps a Patagonian Dog. Of this animal, Spegazzini (1882, p. 176) writes that it differs greatly from the Fuegian Dogs of the Canoe Indians, ‘y para mi serían o cruza o descendientes directos del lobo-colorado o gran zorro-colorado.’ It is difficult, however, to see any ground for deriving it from the peculiar Pampean Wolf. It is much larger than the Fuegian Dog, and is described by Spegazzini as tall, slenderly built, with fierce eyes; long-haired and bushy-tailed; the color prevailing dark tan, but occasionally black; rather silent, not barking though giving voice to melancholy howls. Fitzroy (see Hamilton Smith, 1840, p. 215) particularly describes a dog seen near the Strait of LeMaire. No temptation would induce its master to part with it. It was the size of a large setter, with a wolfish appearance about the head, and looked extremely savage. Behind the shoulders it was quite smooth and short-haired, but from the shoulders forward it had thick rough hair, giving it a lion-like appearance, of a dark grey colour, lighter beneath, and white on the belly and breast; the ears were short but pointed, the tail, smooth and tapering; the fore quarters very strong but the hinder appearing weaker. The short-haired tail seems unnatural for a Patagonian Dog, and may have been evidence of a strain of blood from a European source. The eastern Fuegians or Onas, are considered by ethnologists to be derivatives of the Patagonians, and no doubt originally had these dogs from their mainland relatives, or brought them at the time when they colonized the Fuegian country.” End of this long quote. Thus, Allen [4] recognized the existence of a large dog with wolfish appearance among the Onas (= Selk’nam) people. Notice the equation lobo-colorado=gran zorro-colorado, obviously ascribable to *Lycalopex culpaeus*. In Spanish, “colorado” refers to red, not to colored.

Allen [4] also described what he called the Fuegian dog: He went like this (pp. 492–493) “Characters. Size small, as large as a terrier, muzzle slender, ears large, delicate, and erect, body and limbs well-proportioned, shoulders

higher than rump; tail long, drooping, slightly recurved at the tip and well-fringed; feet webbed; color uniform grayish tan, or often with patches of black or tan, and areas of white; inside of the mouth dark-pigmented. Distribution. Found chiefly among the ‘Canoe Indians’—Yahgans and Alacalufs— of the Fuegian Archipelago, from Cape Horn to Beagle Channel, and northwestward, probably at least to the western part of Magellan Strait. Descriptions. The best account of the Fuegian Dog is that given by d’Herculais (1884) of two Yahgan Dogs brought back to France by Dr. Hyades of the Mission scientifique au Cap Horn (expedition de la Romanche), in 1883. These were obtained as puppies from the Yahgans at Orange Bay and grew up to be tame and affectionate dogs. They are described as small but well-proportioned, remarkable for their large pointed and erect ears, and very sharp slender muzzles. The color-pattern is very variable, often a uniform grayish tan recalling the jackal; again, the body is marbled with extensive black or tan areas on a white ground. The feet are plainly webbed. The two dogs above referred to, were said to measure, the male and female respectively: height at shoulder, 49 and 44 cm.; length from tip of nose to root of tail, 80 and 72 cm.; length of tail, 26 and 23 cm.”

Later on the text Allen [4] added (pp. 493–494) “The further description by Dechambre supplements that of d’Herculais based on the same individual. He describes its fox-like head with pointed muzzle, broad forehead, its erect and high-set ears, usually directed forward, very mobile; eyes slightly oblique. The body is large, limbs slender, the neck short and powerful, the shoulders slightly higher than the rump; tail bushy and carried high. Pelage with a short under fur, pied black and white, passing to slaty at the throat, clouded with tan; over each eyebrow a white spot with a few fulvous hairs. The coat has the appearance of a domesticated animal in its pattern.

Captain Fitzroy of the Beagle, in a letter to Hamilton Smith (1840, p. 214) describes these dogs of the ‘Canoe Indians’ as resembling ‘terriers, or rather a mixture of fox, shepherd’s dog, and terrier. All that I examined had black roofs to their mouths, but there was much variety in the colours and degrees of coarseness of their coats. Many Fuegian dogs are spotted and not a few have fine short hair, but all resemble a fox about the head. One brought from Tierra del Fuego was white with one black spot, and very handsome; his size was about that of a terrier, his coat short but fine, and his ears extremely delicate and long, although erect;’ the muzzle also is long, the tail rough and drooping.”

Allen [4] (p. 495) commented “Their small size, and consequent adaptability as canoe companions, are no doubt the chief cause for their preference by the Canoe

Indians of the west Patagonian Archipelago, over the larger dogs found among the so-called Foot Indians of the mainland and the eastern and inland parts of Tierra del Fuego." And also that "...Gennes saw five or six small dogs among the Alacalufs of Port Famine. The Manekenkn (*sic*) met by the first Cook expedition in 1769 at Good Success Bay, southeast end of Tierra del Fuego, had dogs about two feet high with sharp ears; they all barked. The small dog here described is apparently found among the so-called Canoe Indians of the western archipelago, the Yahgans and Alacalufs, the most southerly tribes of men in the world." No doubt, Allen [4] discriminated between the small fox-like Yahgan (and Kawesqar) dog from the larger wolf-like dog of the mainland Aonikenk, and of the island Selk'nam and Manek'enk (= Haush).

Latham [5] provided another pioneering and complex account of dogs in pre-Columbian South America. But owing to taxonomic uncertainties of that epoch, he mixed true dogs and South American "foxes." For instance, he recognized the following "dogs" (pp. 24–25): (a) Perro chileno or Mapuche's *thegua*, a cross between *Canis ingae* (the Peruvian or Inca hairless bulldog) and *Canis magellanicus* (a synonym of the Culpeo fox *Lycalopex culpaeus*). (b) Perro patagónico *Canis familiaris magellanicus*, encountered in Patagonia and the Strait of Magellan by the earlier explorers, being the largest of the indigenous dogs in South America. (c) Perro chono o fueguino, *Canis* sp. a small-sized and long-haired dog found among Chonos peoples in 1558 and later on among Alacalufes in southernmost Chile. Chonos and Alacalufes (=Kawesqar) were said to carry these small dogs in their canoes and used them for fishing [36].

In pp. 63–64 Latham [5] summarized the chronicles of Pedro Sarmiento de Gamboa [37, 38] –to which we did not have direct access– reporting his navigations in the Strait of Magellan in 1580 [37, 38] described that around Cabo Gregorio (52°35' S, 70°10' W) he contacted "tall Indians" (=Aonikenk), who had "barcinos de traylla," domesticated pied (=bicolored) dogs larger than an Irish Setter. Later on, the same Sarmiento de Gamboa [37, 38] referred to "Patagones" (=Aonikenk) having "lebreles" (=whippets or greyhounds) colored mostly white or brown, which sometimes were leashed and were used for hunting and warring. Latham [5] (p. 65) estimated that those dogs measured over 60 cm at the withers (top of the shoulder blades), were robust, had long but not curly pelage, a bushy tail kept parallel to the ground, short and prickly ears, a long but not very pointed snout, and strong teeth. He ([5]: pp. 65–66) reported that the "Patagones" were fond of raising numerous dogs, of different sizes and colors, but prevalently "barcinos" or "overos" (i.e., dogs with a pied coat pattern of white and

black or brown patches similar to that of Pinto horses, *Equus ferus caballus*).

He ([5]: p. 68) also stated that Patagonian and Fuegian peoples had three dog varieties: (a) The large Patagonian dog of the Aonikenk and Selk'nam; it resembled a wolf but was derived from the Culpeo fox *Lycalopex culpaeus*. (b) A similar but smaller dog derived from the Pampas fox *Canis azarae* (currently *Lycalopex gymnocercus*), which is a very doubtful origin. (c) A third, small, long-haired and curly dog of uncertain derivation, but likely a true dog *Canis lupus familiaris*. He [5] (pp. 71–72) put forth that Aonikenk and Yahgan had two dog varieties (each or separately?), one large and the other small, and quoted Furlong [16] for purportedly stating the same, to which Cunningham [35] supposedly commented that one was derived from "fox" and the other from "wolf." Using current terminology, the fox-like dog must be *Canis* and the wolf-like must be *Lycalopex*. But because of the confusing wording of Latham, he made not clear if the Aonikenk had the large wolf-like dog and the Yahgan the smaller fox-like one, or both peoples had the two varieties simultaneously. Charles Wellington Furlong (1874–1967) visited Tierra del Fuego in 1907 and 1908 and published two books on its indigenous peoples, while Robert Oliver Cunningham (1841–1918), who wrote on the natural history of Patagonia and the Strait of Magellan [35] and was a friend of William Henry Hudson (1841–1922), an Anglo-Argentinian naturalist of fame. Indeed, both are reported by Martinic [39] as having had direct contact with the Aonikenk.

Bridges [13] (p. 101) described that "The Yahgan hunting-dogs were small. Large dogs would have been unsuitable for accompanying canoe people cruising among the islands of Fireland, so their dogs were not much larger than a big fox-terrier. They were, however, both fierce and strong, and of a very mixed type, some being much more shaggy than others. All had prick-ears, and might have been a very stunted cross between an Alsatian police dog and a wolf. Black and white or gray were their usual colours; hardly any of them were brown. They were untrained, ill-natured and quarrelsome, but, though always expecting a blow, snuggled in amongst the family close to the fire and mixed happily with the children in the sometimes crowded canoes." The Spanish translation [14] (p. 97) described that "Los perros de los yaganes eran pequeños, de otra manera no hubieran sido apropiados para acompañarlos en sus travesías en canoas. Quizás por esta razón los perros yaganes eran poco más o menos del tamaño de un foxterrier grande. Pero eran fuertes, feroces y de una raza muy mezclada; algunos mucho más lanudos que otros. Todos tenían orejas puntiagudas y parecían el producto raquíctico del

cruce entre un perro de policía y un lobo. Casi todos eran blancos, negros, o grises; muy pocos eran castaños. Indisciplinados, poco dóciles, peleadores, aunque temerosos siempre de recibir un golpe, se acomodaban con la familia cerca del fuego o se acurrucaban entre los niños en las canoas a veces repletas.” We may take issue with the original “very stunted” being equated with “rachitic” in the Spanish version, because the first refers to underdevelopment or dwarfism and not necessarily to a spine malformation.

Gusinde [17] (pp. 135–136) in a pioneering monograph on the Selk’nam, referred thus to their dogs: “También tenía que aprender a encontrarme con los perros indios. Resulta verdaderamente difícil para quien no se las ha tenido que ver nunca con estas fieras. Son unos perros peligrosos que, deseosos de atacar, enseñan a todo europeo sus afilados dientes que sobresalen de su puntiagudo y medio abierto hocico. En cada cabaña existen por lo menos cuatro de estos mordaces e irreconciliables canes. Cuando un visitante forastero se encuentra todavía a muchos pasos salen a su encuentro con toda furia, ladran hacia el sitio por donde viene, dando ocasión a que se unan a ellos todos los demás canes con ensordecedor ruido. Un ejemplar aventaja al otro en repugnancia; están sucios y llenos de piojos, desaliñados y sarnosos. Los indios los aprecian porque se aprovechan de ellos por su fidelidad inquebrantable. Sin esgrimir una fuerte estaca en la mano, no debe uno aproximarse nunca a una cabaña india, pues arrojando piedras o chillando es imposible deshacerse de ellos.” A briefer and free translation would be that they were dangerous dogs, eager to attack, with sharp teeth that protruded from a pointed muzzle. They were dirty and full of lice, scruffy, and mangy. Again, He [17] (pp. 183–184) reported that “Corrientemente el Selk’nam sale de caza solamente acompañado de los perros. Si éstos descubren una pista, corren en seguida tras ella y sitúan al guanaco valiéndose de fuertes ladridos: el cazador se acerca corriendo y dispara la flecha, desde una distancia de unos 20 a 30 metros, sobre el cuello del animal. Los perros, ladrando rabiosamente, acorralan al animal herido hasta que, abatido, muere.” That is, the Selk’nam used their dogs to trail and corral guanacos, which they took down with an arrow to the neck (see also [40]: p. 138).

Martinic [41] in a book dedicated to the Aonikenk had a section (pp. 298–300) on their dogs, and recapitulated observations made originally by (in chronological sequence): Pedro Sarmiento de Gamboa, Robert Fitz Roy, George Catlin, Robert Oliver Cunningham, George Charles Masters, and Carlos M. Moyano. Most of those observations coincided with reports already commented

at length above, with the intriguing omission of the putative “wolf” origin of the Aonikenk dog.

Biological and biogeographical issues

Gilmore [6] stated that many morphotypes of domesticated dogs *Canis lupus familiaris* may have been present in South America at different times and lists nine possible breeds, remarking that parallel selection pressures or morphological constraints resulted in at least a terrier-like dog (the Fuegian dog), a setter-like dog (the Ona dog), a foxhound/greyhound type dog (the Tehuelche dog), and another terrier-like dog (the Techichi dog), as well as hairless dogs. He [6] thus implicitly considered that the Fuegian dog was that of the Yahgan people, while the Ona dog was that of the Selk’nam, and the Tehuelche dog was that of the Aonikenk. Interestingly, He [6] (p. 377) stated that “Nor is it known that the blood of any Neotropical fox has entered into any breed of aboriginal dog despite assertions by Latham (1922). Rarely do foxes and true dogs cross, and then the offspring may be infertile. However, Krieg (1925) reported two litters from a cross between ‘*Pseudalopex azarae*’ (= *Dusicyon gymnocercus*) and a fox-terrier hybrid (terrier X fox?).” He [6] (p. 425) added “*Dusicyon* is more like *Canis* than the other genera of South American ‘foxes,’ and this may be significant.” We remark that *Dusicyon* is now a synonym of *Lycalopex*, and thus Gilmore [6] doubted but did not deny that the Selk’nam dog could be a Culpeo fox *Lycalopex culpaeus*, or perhaps a cross between it and *Canis lupus familiaris*.

Martinic [42] made a puzzling assertion: “Cabe citar entre los cánidos de la Patagonia y Tierra del Fuego a dos especies probablemente extinguidas: el Perro salvaje de los Onas y el Zorro-Lobo de las Islas Malvinas.” No doubt *Dusicyon australis* became extinct in 1876 in the Falkland Islands [43], but declaring the same for the Fuegian dog in the 1950s came out as a benchmark. Although the Fuegian dog was important to Selk’nam and Yahgan people’s life, the taxonomic and conservation status of this supposedly extinct dog was uncertain until recently. Three recent developments have shed light on its origins and whereabouts.

Petrigh and Fugassa [27] made an earthshaking discovery when examining one taxidermized Fuegian dog belonging to a Selk’nam and donated to the Fagnano Regional Museum collection in Río Grande (Argentine Tierra del Fuego), and noted that “This canid, with a short light ocher coat, has a height of about 40 cm, a lean, small head, and is reminiscent of a greyhound.” They conducted a molecular-genetics analysis of DNA from that Fuegian dog, three Patagonian “foxes” (*Lycalopex culpaeus*, *Lycalopex griseus*, and *Lycalopex gymnocercus*) and domestic dog *Canis lupus familiaris*. Their analyses

showed higher identity between the Fuegian dog and the Culpeo fox *Lycalopex culpaeus* (97.57%), and lower with domestic dog (88.93%). Indeed, they [27] stated that “As the spread of dogs occurred early in Patagonia, they could have arrived to Isla Grande de Tierra del Fuego by crossing the Estrecho de Magallanes through exchanges between Aborigines from the mainland and the archipelago.” And added that “The Fuegian dog taxonomic status is uncertain, but ethnographic accounts speculate about its zoological identity. In this sense, there are two hypotheses about the Fuegian dog origin: One suggests that it originated through domestication of fox (Gallardo, 1910) or through a dog and fox hybridization (Señoret, 1896), which is unlikely. The other proposes that dogs were brought by Europeans (Emperaire, 1946; Gusinde, 1982; among others).” The molecular results obtained by [27] point out to Culpeo fox possession, taming, or domestication by the Selk’nam people.

Silva Rochefort and Root-Bernstein [19] discussed that “The initial Spanish colonization of Chile only extended to Chiloé which does not rule out a European origin of Selk’nam dogs via long-distance trade, but also makes it plausible that these dogs had a previous origin in pre-Columbian trade networks or migrations. Coiazzi (1914) suggests that the Selk’nam dogs had displaced the populations of a native canid similar to a fox, though whether he means by competition (cf. Vanak and Gompper, 2009) or as a favored domesticate is unclear.” They [19] concluded that “In this context and with such characteristics, the possibility of a native canid being domesticated in Tierra del Fuego by Selk’nam is certainly more plausible. In addition to this, the study by Petrigh and Fugassa (2013), in which they genetically identified a taxidermized canid belonging to native people of the area, showed that this specimen was closely related or identical to *L. culpaeus*.”

Franklin [25] stated that “Dogs have been a fundamental part of many human cultures since prehistoric times (Lugli, 1916), including the indigenous Tehuelches of Patagonia (Cabrera, 1934). On Tierra del Fuego the indigenous Selk’nam/Onas kept Fuegian dogs (now extinct) for companionship, hunting and guarding (Massone et al., 1993)” –see [44]. He [25] then stated “I propose that canoeists when they recolonised Tierra del Fuego in the Middle Holocene selectively introduced two ‘utility species’ of mammals to Tierra del Fuego that were of direct survival value for the existence of a terrestrial hunter-gatherer culture on the island: the guanaco because of its importance as a familiar and sustained source of food and skins (clothing and shelters), and the domestic Fuegian dog in a mutualistic relationship for its companionship, protection and hunting abilities (see Stahl, 2012).”

Franklin [25] finally added that “Although the Fuegian dog was a tame companion under the stewardship of peoples of Tierra del Fuego for thousands of years, its close genetic and phenotypic similarities to culpeo foxes and wild behavioural tendencies indicate it was not truly domesticated in the classical, domestic dog sense, but only partially as an intermediate between domestic and wild—strongly favouring the latter. Culpeo foxes lack the gregariousness of wolves and its solitary social system except for reproduction is considered to have been a major stumbling block in the way of full domestication (Stahl, 2012). The reversion of lost or abandoned Fuegian dogs back to culpeo foxes is intriguing but was most likely an easy transition that paralleled today’s equivalent examples of domestic horses in North America (Berger, 1986) and dromedary camels in the Australia Outback (Dörge and Heucke, 1995) successfully reverting to ancestral wild populations when returned to compatible environments. Based upon what we know to date, I suggest that the semi-domestic Fuegian dog is best recognised and referred to as the ‘culpeo dog’. It is noteworthy that the ‘domestication’ of the culpeo dog by Stone-Age, Patagonia hunter-gatherer societies, was a special case and atypical of canid domestication, different from the dual wolf-to-dog domestications in the northern hemisphere. While species of endemic wild foxes (avus and culpeo) in South America might not have been fully domesticated as the domestic dog, Patagonia archaeological records suggest an intimate and enduring relationship with humans (see Stahl, 2012, 2013; Petrigh and Fugassa, 2013; Genetics Staff, 2014; Prates, 2015; Frantz et al., 2016; Appendix S10, Fuegian dog domestication).”

Following this reasoning, the Fuegian dog may not have become fully extinct, but simply regressed from being a tamed Culpeo fox harbored by the disappearing Selk’nam people, back into its wild form –which still subsists on Tierra del Fuego Island: *Lycalopex culpaeus lycoides*. More genetic studies are needed to clarify this important issue.

Discussion

“Dog” has been a bad choice to refer to two different canid varieties in a complex confusing geographic and ethnographic setting: The domestic dog *Canis lupus familiaris*, typical of the Chonos, Kawesqar, and Yahgan peoples, and the tamed “wolf” *Lycalopex culpaeus* typical of the Aonikenk, Manek’enk, and Selk’nam peoples. How should these “dogs” be called? If we give seniority to priority, then we should follow Allen’s [4] terminology: Fuegian dog for the former and Patagonian dog for the latter. Latham’s [5] terminology paralleled (and perhaps copied) that of Allen’s [4]: “Perro chono

o fueguino" (*Canis* sp in the original), small-sized and long-haired dogs found among peoples who carried them in their canoes. The other was "Perro patagónico" (*Canis familiaris magellanicus* in the original), found in Patagonia and the Strait of Magellan, and being the largest of the indigenous dogs in South America. Disregarding the stale taxonomy, we should then label these dogs as Fuegian and Patagonian, the former being presumably derivatives of domestic dogs [20] and the latter of Culpeo "foxes." Following in seniority we have Gilmore [6], who recognized the terrier-like "Fuegian dog," the setter-like "Ona dog," and the foxhound/greyhound-like "Tehuelche dog." He [6] thus implicitly considered that the Fuegian dog was that of the canoe peoples (Chonos, Kawesqar, and Yahgan), while the Ona dog was that of the Selk'nam (and likely of the Manek'enk) people, and the Tehuelche dog was that of the Aonikenk. A potential conflict in terminology may arise given the recent recognition of the Patagonian sheepdog as a legitimate, but quite new breed of dog [45].

The possibility that the "Patagonian dog" was originally a tamed Culpeo fox but later became a cross between domestic *Canis lupus familiaris* dogs and a *Lycalopex culpaeus* foxes cannot be ruled out, but it has been considered remote given the difference in chromosome number [46, 47] and the lack of archeological evidence [8, 9]. It should also be noted that the earliest records of "dogs" occurred when several European expeditions had already passed through the south of the continent [48], thus generating the opportunity to leave European dogs behind. Indeed, there is an absence of domestic dogs in pre-Columbian contexts of southern continental Patagonia and in the archaeological sites of Magallanes [49, 50] and Tierra del Fuego [51]. Nevertheless, [52] reported a record of Prehispanic dog in Río Negro Province, Argentina's Patagonia.

The only Patagonian dog specimen so far genetically analyzed turned out to be very close to a Culpeo fox, rather significantly removed from the genetic lineage of true dogs, and certainly not an intermediate hybrid [27]. Surely, we do not know the origin of the gift to the Museo Histórico y de Ciencias Naturales Monseñor Fagnano in Río Grande, Argentina back in the early 1900s. Was it really a Selk'nam's tame companion or simply a wild-caught or caged "fox"? None of the witnesses of that transaction survive to this day. Urgently needed is a genetic analysis of the Selk'nam dog at Museo Salesiano Maggiorino Borgatello, in Punta Arenas, Chile.

Domestication of true foxes has been attained so far only once [53], with the Russian silver fox (a melanistic phenotype of the red fox *Vulpes vulpes*). If the Selk'nam succeeded to domesticate (not only to tame) the Culpeo fox, this would be relevant news about the cultural power

of those almost extinct natives and of the workings of artificial selection [8, 9, 54]. Indicative of domestication (and of artificial selection) is the prevalence of "overo" dogs, with a pied (=bicolored) pattern of black or tan patches on a white coat [5, 12] or of white patches on brown pelage (e.g., the dog at Museo Salesiano Maggiorino Borgatello). This pattern does not exist among wild Culpeo foxes, which are reddish, with a blackish upperpart, and a black-tipped bushy tail (<https://en.wikipedia.org/wiki/Culpeo>).

In closing, a few words about the available illustrations of Fuegian and Patagonian "dogs." Fitz Roy [55] provided four plates with illustrations made by him, Conrad Martens, and A. Earle T. Landsee. In the frontispiece of his book there is a drawing labeled "Fuegian (Yapoo Tekeenica) at Portrait Cove," which shows one dog. In between pp. 136–137 there is the plate "Patagonians (at Gregory Bay)," also depicting one dog. Between pp. 170–171 we are presented with "Fuegians going to trade in Zapallos with the Patagonians," showing two dogs; and between pp. 208–209 there is the plate "Woollya" (currently named Navarino Island) depicting three dogs. They all are medium-sized fox-like canids exhibiting prick ears, pointed snout, bushy tail, and a rather short but thick unicolored coat [26]: pp. 75, 81]. The black and white drawing depicted in https://en.wikipedia.org/wiki/Fuegian_dog corresponds to Portrait Cove, in Hoste Island, of a man named Yapoo Tekeenica –not a Yahgan according to York Minstrel, likely a Kawesqar–with a medium-sized fox-like canid at his feet. Another illustration in [26]: p. 82] –from Hope harbor in Magdalen channel–shows a similar dog, but its ears do not seem erect. In [26]: p. 89] there are some Aonikenk accompanied by four unicolored medium-sized fox-like dogs. On the other hand, the color drawing depicted in Wikipedia was made by Philippe Alexandre Jules Künckel d'Herculais (1843–1918) from the sketch of a terrier-sized dog obtained from Tierra del Fuego and brought back to France by the French Scientific Mission to Cape Horn in 1882–1883. It exhibits prick ears, pointed snout, bushy tail, and a rather short coat, which is pied tan on white. It looks like a fox but with rather non-standard fur color or pattern. The illustration by Carlos Gallardo [12]: p. 199] shows Selk'nam people with a rather large short-haired white dog pied with darker (blackish, brownish, or greyish?) spots. Silva Rochefort and Root-Bernstein [19] in p. 6 reproduced this plate from Gallardo's [12] book, which is accessible at <http://www.memoriachilena.gob.cl/602/w3-article-8403.html>). That dog does not show its head but its tail is clearly not bushy and its pelage is not typical of the reddish-blackish Culpeo fox. With the advent of photography in the early 1900s, thus disappeared the images of fox-like dogs to be replaced

by a variety of domestic-looking dogs from fox-terrier to greyhound size, from a few unicolored to mostly pied (=bicolored) dogs. See for instance, the photographs by J. Peuser and E. Lucas Bridges from 1900–1908, and henceforth.

Finally, we think that the original Fuegian dog was indeed a *Canis lupus familiaris* brought along by the natives after the Bering's crossing. This leaves us puzzling why do their dogs at the tip of South America of the early 1800s looked so much like foxes. We also think that the Patagonian dog was a tame Culpeo fox *Lycalopex culpaeus*, which was progressively replaced by the more gregarious, human friendly, and colorful domestic dogs *Canis lupus familiaris* brought by European explorers, adventurers, colonizers, and settlers of Patagonia and Tierra del Fuego during the mid to late 1800s.

Acknowledgements

FMJ appreciates the warm hospitality of Erika Mutschke, Margarita Popovic, and Carlos Ríos in Punta Arenas, as well as the companionship of Gabriel Jaksic. Consultations with Leonor Adán, Claudio Latorre, and Alfredo Prieto helped us to understand several archeological issues and Patagonian indigenous peoples. This study was supported by Agencia Nacional de Investigación y Desarrollo (Chile), grant ANID PIA/BASAL FB0002.

Authors' contributions

FMJ and SAC designed the work, conducted the acquisition, analysis, and interpretation of data and prepared the manuscript.

Funding

Financial support was provided by Agencia Nacional de Investigación y Desarrollo, Grant ANID PIA/BASAL FB0002, to Fabian M. Jaksic.

Availability of data and materials

Not applicable; this is a literature review of published sources.

Declarations

Ethics approval and consent to participate

No ethical approval was required. All authors and institutions approved this participation.

Consent for publication

All authors and institutions have approved this publication.

Competing interests

The authors declare no conflicts of interest.

Received: 18 March 2023 Accepted: 16 July 2023

Published online: 26 July 2023

References

- Perini FA, Russo CAM, Schrago CG. The evolution of South American endemic canids: A history of rapid diversification and morphological parallelism. *J Evol Biol*. 2010;23:311–22. <https://doi.org/10.1111/j.1420-9101.2009.01901.x>.
- Loponte D, Acosta A, Gascue A, Pfrengle S, Schuenemann VJ, Bortolotto N, Carbonera M, García Esponda C, Voglino D, Milheira R, Ferrari A, Borges C. The southernmost pre-Columbian dogs in the Americas: Phenotype, chronology, diet and genetics. *Environ Archaeol*. 2021;00:1–32. <https://doi.org/10.1080/14614103.2021.1922985>.
- Chavez DE, Gronauc I, Hainsd T, Dikowe RB, Frandsene PB, Figueiro HV, Garcez FS, Tchaickai L, de Paula RC, Rodrigues FHG, Jorgel RSP, Lima ES, Songsaseng N, Johnson WE, Eizirik E, Koepflig K-P, Wayne RK. Comparative genomics uncovers the evolutionary history, demography, and molecular adaptations of South American canids. *Proc Natl Acad Sci U S A*. 2021;119(34):e2205986119. <https://doi.org/10.1073/pnas.2205986119>.
- Allen GM. Dogs of the American aborigines. *Bulletin of the Museum of Comparative Zoology*. 1920;63(9):431–517.
- Latcham RE. Los animales domésticos de la América precolombiana. *Publicaciones del Museo de Etnología y Antropología, Tomo III*. Santiago: Cervantes, 199 pp.; 1922.
- Gilmore RM. Fauna and ethnozoology of South America. *Handbook of South American Indians, Bulletin* 1950;143(6):345–464 + plates
- Stahl PW. Early dogs and endemic South American canids of the Spanish main. *J Anthropol Res*. 2013;69(4):515–33. <https://doi.org/10.3998/jar.0521004.0069.405>.
- Segura V, Sánchez-Villagra MR. Human-canid relationship in the Americas: An examination of canid biological attributes and domestication. *Mamm Biol*. 2021;101:387–406. <https://doi.org/10.1007/s42991-021-00129-y>.
- Segura V, Geiger M, Monson TA, Flores D, Sánchez Villagra MR. Biological and cultural history of domesticated dogs in the Americas. *Anthropozoologica*. 2022;57(1):1–18. <https://doi.org/10.5252/anthropozoologica2022v57a1>.
- Skottsberg C. *The Wilds of Patagonia*. London: Edward Arnold, 336 pp. + maps; 1911.
- Señoret M. *Memoria del Gobernador de Magallanes. La Tierra del Fuego i sus naturales*. Santiago: Imprenta Nacional, 44 pp.; 1896.
- Gallardo CR. *Tierra del Fuego: Los Onas*. Buenos Aires: Cabaut y Cia. Editores, 396 pp.; 1910.
- Bridges EL. *Uttermost part of the Earth*. New York: EP Dutton and Co., 558 pp. + maps; 1949.
- Bridges EL. *El último confin de la tierra*. Buenos Aires: Emecé Editores, 520 pp. + maps; 1952.
- Prosser-Goodall RN. *Tierra del Fuego: Argentina, territorio nacional de la Tierra del Fuego, Antártica e islas del Atlántico Sur*. Buenos Aires: Ediciones Shanamaim, 329 pp.; 1979.
- Furlong CW. Tribal distribution and settlements of the Fuegians: Comprising nomenclature, etymology, philology, and populations. *Geogr Rev*. 1917;3(3):169–87.
- Gusinde M. *Fueguinos: Hombres primitivos en la Tierra del Fuego (de investigador a compañero de tribu)*. Sevilla: Publicaciones de la Escuela de Estudios Hispano-Americanos, 398 pp.; 1951.
- Prieto A, Stern CR, Estévez JE. The peopling of the Fuego-Patagonian fjords by littoral hunter-gatherers after the mid-Holocene H1 eruption of Hudson Volcano. *Quatern Int*. 2013;317:3–13. <https://doi.org/10.1016/j.quaint.2013.06.024>.
- Silva Rochefort B, Root-Bernstein M. History of canids in Chile and impacts on prey adaptations. *Ecol Evol*. 2021;00:1–12. <https://doi.org/10.1002/ece3.7642>.
- Castroviejo-Fisher S, Skoglund P, Valadez R, Vilá C, Jennifer JA. Vanishing native American dog lineages. *BMC Evol Biol*. 2011;11:73. <https://doi.org/10.1186/1471-2148-11-73>.
- Lönnberg E. Remarks on some South American Canidae. *Arkiv för Zoologi*. 1919;12(13):1–18.
- Morrone JJ. Biogeographical regionalisation of the Neotropical region. *Zootaxa*. 2014;3782(1):001–110. <https://doi.org/10.11646/zootaxa.3782.1.1>.
- Morrone JJ. Biogeographical regionalisation of the Andean region. *Zootaxa*. 2015;3936(2):207–36. <https://doi.org/10.11646/zootaxa.3936.2.3>.
- Vázquez M, Borrero LA. Sinopsis de la arqueología de Tierra del Fuego. *Revista Española de Antropología Americana*. 2021;51:173–85. <https://doi.org/10.5209/reaa.72827>.
- Franklin WL. Guanaco colonisation of Tierra del Fuego Island from mainland Patagonia: Walked, swam, or by canoe? *Geo*. 2022;9:e00110. <https://doi.org/10.1002/geo2.110>.
- Moorhead A. *Darwin and the Beagle*. New York: Penguin Books, 224 pp.; 1971.
- Pettrigh RS, Fugassa MH. Molecular identification of a Fuegian dog belonging to the Fagnano Regional Museum ethnographic collection,

- Tierra del Fuego. *Quaternary Int.* 2013;317:14e18. <https://doi.org/10.1016/j.quaint.2013.07.030>.
28. Pigafetta A. Primer viaje en torno del Globo. Madrid: Calpe, 203 pp.; 1922.
 29. Castro SA, Jaksic FM. El primer viaje de circunnavegación global Magallanes-Elcano: Comentarios a los iniciáticos encuentros con la biodiversidad sudamericana. *Magallania (Chile)*. 2022;50(5):1–23. <https://doi.org/10.22352/MAGALLANIA202250005>.
 30. de Bougainville L-A. Viaje alrededor del mundo por la fragata del rey la "Boudeuse" y la fusta la "Estrella" en 1767, 1768 y 1769. Tomo I. Madrid: Calpe, 219 pp.; 1766–1769.
 31. Byron J. Viage del comandante Byron al rededor del mundo, hecho últimamente de orden del Almirantazgo de Inglaterra. Madrid: Francisco Mariano Nipho, 245 pp. + 1 map; 1769.
 32. Byron J. Relato del honorable John Byron (Comodoro de la última expedición al rededor del mundo) que contiene una esposicion de las grandes penurias sufridas por él i sus compañeros en la costa de la Patagonia desde el año 1740 hasta su arribo a Inglaterra en 1746 con una descripción de Santiago de Chile i de las usanzas i costumbres de sus habitantes i ademas una relacion de la pérdida de la fragata *Wager* de la escuadra del Almirante Anson. Santiago: Imprenta Cervantes, xiii + 155 pp.; 1901.
 33. Darwin CR. Narrative of the surveying voyages of His Majesty's ships *Adventure* and *Beagle* between the years 1826 and 1836, describing their examination of the southern shores of South America, and the *Beagle's* circumnavigation of the globe. Volume III: Journal and remarks, 1832–1836. London: Henry Colburn, ix + 629 pp. + maps; 1839.
 34. Milne Edwards A. Mammifères. In: Mission scientifique du cap Horn, 1882–1883. Tome VI, Zoologie, Première partie (Martial L. F., editor). Paris: Gauthier-Villars et files Imprimeurs-Libraires, pp. A3-A32 + plates; 1891.
 35. Cunningham RO. Notes on the natural history of the Strait of Magellan and west coast of Patagonia made during the voyage of the H.M. S. "Nassau" in the years 1866, 67, 68, and 69. Edinburgh: Edmonton and Douglas, xvi + 517 pp. + plates + maps; 1871.
 36. González Venanzi L, Prevosti FJ, San Román M, Reyes O. The dog of Los Chonos: First pre-Hispanic record in western Patagonia (43° to 47°S, Chile). *International Journal of Osteoarchaeology* 2021;1–10. <https://doi.org/10.1002/oa.3021>.
 37. Sarmiento de Gamboa P. Relación original de Pedro Sarmiento de Gamboa de lo acaecido a la Armada del general Flores de Valdés que iba a poblar y fortificar el Estrecho de Magallanes. --Río Janeiro, 1583–6–1— Madrid: Archivo General de Indias, reproduced by father P Pastells in "El Descubrimiento del Estrecho de Magallanes", 2nd part, p. 38; 1920a.
 38. Sarmiento de Gamboa P. Relación hecha por Pedro Sarmiento a Su Majestad sobre lo sucedido en el Estrecho cuando allí se quedó y fundó dos ciudades. --Pernambuco, 1584–9–18— Madrid: Archivo General de Indias, reproduced by father P Pastells in "El Descubrimiento del Estrecho de Magallanes", Tome II, document 30, pp. 265 and 284–6; 1920b.
 39. Martinic M. Los Aónikenk ¿Epitome del buen salvaje? *Magallania (Chile)*. 2013;41(1):5–28.
 40. Chapman A. Economy of the Selk'nam of Tierra del Fuego. *Journal de la Société des Américanistes*. 1977;64:135–48.
 41. Martinic M. Los Aónikenk: Historia y Cultura. Punta Arenas: Ediciones de la Universidad de Magallanes, 387 pp.; 1995.
 42. Martinic M. Fauna magallánica I: Los cánidos. *Boletín Ganadero (Punta Arenas)* 1957;21–22.
 43. Sillero-Zubiri C. *Dusicyon australis*. IUCN Red List of Threatened Species 2015:e.T6923A82310440. <https://doi.org/10.2305/IUCN.UK.2015-4.RLTS.T6923A82310440.en>.
 44. Massone M, Jackson D, Prieto A. Perspectiva arqueológica de los Selk'nam. Santiago: Editorial Universitaria, 170 pp.; 1993.
 45. Barrios N, Fuenzalida A, Gómez M, Heuser C, Muñoz R, Ostrander EA, Parker HG, González-Lagos C. The Patagonian sheepdog: Historical perspective on a herding dog in Chile. *Diversity*. 2019;11(12):245. <https://doi.org/10.3390/d11120245>.
 46. Wayne RK, Nash WG, O'Brien SJ. Chromosomal evolution of the Canidae. *Cytogenet Genome Res.* 1987;44:134–41.
 47. Vilá C, Leonard JA. Canid phylogeny and origin of the domestic dog. In: Ruvinsky A, Ostrander E, Sampson J, editors. *The genetics of the dog*. Oxfordshire: CABI; 2012. p. 1–9.
 48. Martinic M. Historia de la región magallánica. Segunda edición revisada. Four volumes. Ediciones de la Universidad de Magallanes, Punta Arenas, 1679 pp.; 2006.
 49. Amorosi T, Prevosti FJ. A Preliminary review of the Canid remains from Junius Bird's excavations at Fell's and Pali Aike Caves, Magallanes. *Chile Current Research in the Pleistocene*. 2008;25:25–7.
 50. Martin FM. Fell cave reinterpreted. *Chungará*. 2022;54(3):535–56. <https://doi.org/10.4067/s0717-73562022005000601>.
 51. Latorre C. Paleontología de mamíferos del alero Tres Arroyos I, Tierra del Fuego, XII Región, Chile. *Anales del Instituto de la Patagonia, Serie Ciencias Naturales (Punta Arenas)* 1998;26:77–90.
 52. Prates L, Prevosti FJ, Berón M. First records of Prehispanic dogs in southern South America (Pampa-Patagonia, Argentina). *Curr Anthropol*. 2010;51(2):273–80. <https://doi.org/10.1086/650166>.
 53. Dugatkin LA. The silver fox domestication experiment. *Evolution: Education and Outreach* 2018;11:16. <https://doi.org/10.1186/s12052-018-0090-x>.
 54. Stahl PW. Interactions between humans and endemic canids in Holocene South America. *J Ethnobiol*. 2012;32(1):108–27. <https://doi.org/10.2993/0278-0771-32.1.108>.
 55. Fitz Roy R. Narrative of the surveying voyages of His Majesty's Ships *Adventure* and *Beagle* between the years 1826 and 1836, describing their examination of the southern shores of South America, and the *Beagle's* circumnavigation of the globe. Proceedings of the second expedition, 1831–36, under the command of Captain Robert Fitz-Roy, R.N. Volume II: Voyages of the *Adventure* and *Beagle*. London: Henry Colburn, xiv + 698 pp. + plates + maps; 1839.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

