diversity

MDPI

Review

The Patagonian Sheepdog: Historical Perspective on a Herding Dog in Chile

Natasha Barrios [1], Alvaro Fuenzalida [2], Marcelo Gómez [1,*], Consuelo Heuser [3], Rodrigo Muñoz [4], Elaine A. Ostrander [5], Heidi G. Parker [5] and César González-Lagos [6,7]

1 Institute of Pharmacology and Morphophysiology, Faculty of Veterinary Science, Universidad Austral de Chile, Valdivia 5090000, Chile; nbarriosveterinaria@gmail.com
2 Independent Researcher, Santiago 7500000, Chile; anfuenza@gmail.com
3 Independent Researcher, Osorno 5290000, Chile; mcheuser@gmail.com
4 Independent Researcher, Coyhaique 5950000, Chile; elcoiron@gmail.com
5 Cancer Genetics and Comparative Genomic Branch, National Human Genome Research Institute, National Institutes of Health, Bethesda, MD 20892, USA; eostrand@mail.nih.gov (E.A.O.); hgparker@nhgri.nih.gov (H.G.P.)
6 Centro de Investigación en Recursos Naturales y Sustentabilidad (CIRENYS), Universidad Bernardo O'Higgins, Santiago 8370993, Chile; cesar.glagos@gmail.com
7 Center of Applied Ecology and Sustainability (CAPES), Santiago 8331150, Chile
* Correspondence: marcelogomez@uach.cl; Tel.: +56-63-2-221072

Received: 7 October 2019; Accepted: 14 December 2019; Published: 17 December 2019

Abstract: The "Patagonian Sheepdog" is a local working dog breed that was produced by selection from European working sheepdogs that arrived in the Magallanes region of southern Chile in the late nineteenth and early twentieth centuries. Currently, the Patagonian Sheepdog is most commonly found in the Chilean Patagonian region (43°12′ S to 56°30′ S), where it plays a fundamental role as a working dog in sheep and, to some extent, in cattle farming. Dog types that may have contributed to the Patagonian Sheepdog include the Old Welsh Grey and other old UK herding dogs. The modern Patagonian Sheepdog has been selectively bred by local sheep farmers to produce a herding dog that is well adapted to the area: a medium body size, long or semi-long fur, drooping or semi-erect ears, a docile character, and a great aptitude for sheep herding. Morphological studies have determined the body measurements, zoometric indices, coat color, and marking for Patagonian Sheepdogs. The objective of this investigation was to collect historical information related to the presence of this dog in Chilean Patagonia, providing general aspects of the morphology and behavior, all key factors for the recognition and conservation of this little-known herding dog.

Keywords: Patagonian Sheepdog; dog; herding; historical; Patagonia; Chile

1. Introduction

Sheep in Chilean Patagonia and the Patagonian Sheepdog

Sheep farming has been part of the economic, social, and cultural identity of the Chilean Patagonian region since its colonization [1]. The total number of sheep in Chile is estimated to be 2.03 million [2]. Approximately 70% of the Chilean sheep population is in the Magallanes (Southern Patagonia) and the Aysén regions (Northern Patagonia) [2]. The extensive sheep production systems of this area would not have been economically and physically viable without the contributions of well-trained Patagonian Sheepdogs [3]. These dogs, also called "Barbucho" or "Ovejero Magallánico", are used for herding sheep grazed on extensive farms. Despite their central role in the livestock economy of the region, little is known about these dogs. No genealogical records are available, and no census or demographic

data has been collected. Neither the Federation Cynologique Internationale, The American Kennel Club, or The British Kennel Club have officially recognized Patagonian Sheepdogs as a breed [3,4].

In this study, we document the history of the origin of Patagonian sheepdogs, providing general morphological and behavioral features as a first step toward maintaining and preserving this rare local working dog population. In addition, we highlighted the value of these dogs as part of the cultural and historical heritage of the Patagonian region, a key criterion to reach successful breed conservation efforts [5,6]. The preservation that secures the functional features of Patagonian sheepdogs will allow sheep farmers to derive additional value from their production, similar to the pastoral breeds that are currently recognized locally and used for the sheep herding in other countries [7]. Because of their geographic isolation, adaptation to harsh climatic conditions, and cultural importance, the genetic diversity and functional attributes of Patagonian sheepdogs need to be maintained. Such conservation efforts require further data on biological, genetic, and historical-cultural variables [8].

2. Historical Context

Development of Sheep Farming in Chilean Patagonia

Sheep herding practices in southern Chile are based on the techniques and standards of Anglo-Scottish traditions that had been adopted in the Falkland Islands. The management of sheep farms was first entrusted to Scottish and then to British experts [9,10]. Sheep farming in Patagonia began in 1876. During that period, the Chilean Government believed that the only way to advance the Patagonian region was to take advantage of the Magellanic pastures by introducing sheep as a source of economic development [11]. In 1877, an English immigrant brought the first three hundred sheep from the Falkland Islands to Magallanes [10–13]. After a year of successful herd management, Henry Reynard, another English immigrant, became the founding pioneer of large-scale sheep breeding in Magallanes and, ultimately, throughout Patagonia [10]. Following his success, several other farmers imported additional sheep from the Falkland Islands [12].

The industry expanded under the protection and encouragement of the Chilean Government, who granted authorization for the occupation of pastoral lands. From the three hundred sheep initially introduced in 1877, sheep totals in the region reached 40,000 in 1885 and 300,000 in 1889 [12]. This increase coincided with the immigration of people and additional sheep from the Falklands to the Magallanes during the 1880s [10].

A truly massive arrival of sheep began in 1893 with the creation of the Tierra del Fuego Exploitation Society [14]. In 1898, the Chilean government authorized the assignment of great land grants to private individuals and societies in the Aysén region [15]. The Magellan sheep societies developed farms in Aysén, forming the livestock societies of Aysén, Río Cisnes, and Río Baker [16]. The Livestock Society of Aysén developed a system of roads and settlements that remains in use today [16,17]. While the implementation of the system was successful, the work force came with varying skills and customs [15]. As a consequence of the importation and success of the rural sheep-labor systems of British origin, workers in the Chilean regions adopted the same way of life that prevailed in the sheep fields, while those of Scottish, English, Welsh, Irish, and Australian/New Zealand origin, and their Chilean or Argentine descendants, acquired British traditions of language and other cultural habits. This meant that the livestock production system was British in nature, defined by sheep stables, kennels, pens, and paddocks [15]. These functional systems defined the morphologic and behavioral needs of successful herding dogs of the region, setting the stage for strong human selection for the ideal Patagonian Sheepdog (Figure 1).

Figure 1. Photograph of a national Chilean celebration in Baquedano, Aysén region (1931); a Patagonian sheepdog is visible in the picture [15]. (Retrieved from Martinic, M. *De la Trapananda al Aysén*, 2nd Ed.; Fundación Rio Baker: Santiago, Chile, 2005).

3. Origin and Characteristics of Patagonian Sheepdogs

It is unknown when the first Patagonian Sheepdogs appeared in Chilean Patagonia. Historical documents indicate that they originated from working British dogs brought by Scottish shepherds who came from the Falkland Islands to Chile [18]. Navarro (1897) described the organization of sheep farms or "estancias" (def: large South American sheep or cattle farm) in Patagonia. "*Generally, a shepherd is used for every 2000 sheep, when they are in the open field. This sheepherder is almost always a Scotsman; he has a herd of six horses and two dogs at his service. Dogs are indispensable. They replace the service of man. They are of English breed and admirably trained. A good dog, taught, costs three to five pounds sterling.*" [19]. The economic value of a sheepdog in 1890s of 3–5 pounds sterling was important, considering that an equine of work during that period had an estimated average value of 10 pounds sterling (currently £1,270.00 or 1680US$) [20].

The adoption of the British sheep production system required the use of the tools typical of European sheep management [18,21]. Indeed, a recruitment contract for workers from Lewis Island in Scotland who agreed to serve as shepherds in Magallanes stipulated that each sheepherder must bring with him one or two sheep dogs [22]. This recognition is remarkable as the first government document, anywhere in an early settlement, that recognized a specific human–animal partnership as being key to the success of an activity. Neither the shepherd nor the sheepdog was replaceable, and their success was due to the important contribution that each made to the working partnership [18].

In 1933, another document making reference to Patagonian sheepdogs mentions that "These dogs have special aptitudes to work with the sheep; they learn easily and quickly under the direction of the shepherd, to whom they save (as much as the "estancias" in general), a lot of work, time and money. There is amazement at its intelligence and submission, always alert to the orders of the shepherd, either by shouting or by means of shrill whistles" [23]. It also indicates the type of dogs imported by the Menéndez Behety Society, stating that "it is characterized by its medium size, shaggy and long hair, pointed snout, short legs with developed hindquarters. It is a small animal, black and white color, white legs, white line on the head and neck, chest and tip of the tail also white, short hair, small head and vivacious, ears erect and pointed. Very intelligent, obedient and agile" [24]. Sheepdogs must endure harsh environmental conditions in Patagonia, which include arid to semi-arid steppes with mean annual temperatures of 5.4 °C and strong west winds (40–150 km/hr) in spring and summer [25]. Hence, Patagonian sheepdogs must cover large areas and endure working in rugged terrain [18].

These well-known attributes are derived from British breeds that have been selected for herding in other environments [18,21] (Figures 2 and 3).

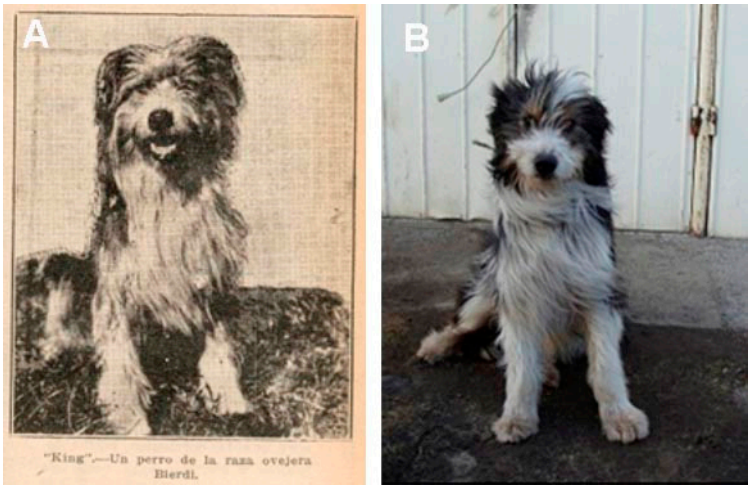

Figure 2. Photograph of a Magellan working dog (1933) from the Revista Menéndez Behety Collection (**A**). Patagonian Sheepdog (2010), photograph provided by Violeta Tafra (**B**).

Figure 3. Photograph of a Patagonian Sheepdog and his owner (Ernesto Rodríguez), 1940. (Retrieved from "*The British Presence in Southern Patagonia*", http://patbrit.org).

Among the breeds likely to have contributed to the Patagonian Sheepdog are the Old Grey Welsh and other old UK herding dogs with similar aptitudes for sheep herding [26,27]. The time at which the ancestors of Patagonian Sheepdogs arrived in Patagonia (between 1877 and 1910) was a period of extensive colonization. Dog breed standards had not yet been defined, and the dogs used in sheep farming were simply known as Working Collies or Shepherd Working Dogs [18,27] (Figure 4). The British Border Collie Museum contains records documenting the exportation of European dogs from Britain to Patagonia in the late nineteenth century and the early twentieth century [28] (Figure 5). These regional varieties disappeared at the end of the 19th century, however, as a result of industrialization and changes in trade and transportation patterns [26].

Figure 4. Photographs of the Old Working Dog Beardie type (**A**,**B**) and the Old Welsh Gray Dog (**C**,**D**) (now extinct). The photograph shown in C was taken by Barbara Carpenter, Rhandirmoyn, Wales, in around 1987. Permission to reproduce these images was obtained from the Border Collie Museum (http://www.bordercolliemuseum.org).

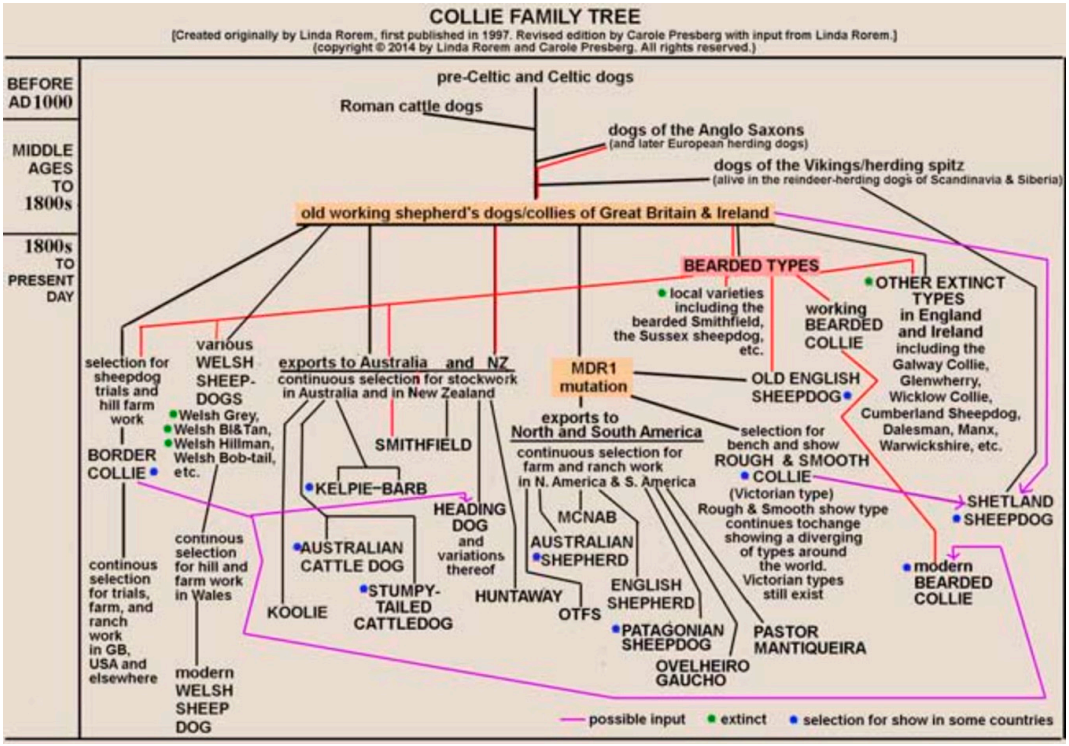

Figure 5. Collie Family Tree. The red circle indicates the Patagonian sheepdog which, in theory, was derived from the direct line of old working dogs. (Image generated by Linda Rorem used with the permission of Carole Presberg, Border Collie Museum).

The geographical isolation of Chilean Patagonia from the rest of Chile (limited by Andean mountains, Pacific Ocean, Fjords, and the North and South Patagonian Icefields) [24], coupled with

strict behavioral selection, has probably been the determining factor that has allowed the genetic pool of the Patagonian Sheepdog to adapt to their environment over the last 130 years, with probably few opportunities of contributions from other breeds [18].

4. Modern Patagonian Sheepdogs

In 2014, a study described the body measurements of Patagonian Sheepdog from Magallanes region [3]. These included a mean body length (from scapulo-humeral joint to ischial tuberosity) of 61.86 cm. (±3.57 cm.) for males and 58.09 cm. (±3.71 cm.) for females. The mean of the height at the withers (from cranial angle of the scapula to the floor) in males was 54.95 cm. (±3.04 cm.) and 50.08 cm. (±2.2 cm.) for females. The mean height at the pelvis (from iliac crest to the floor) was 55.26 cm. (±3.30 cm.) for males and 49.82 cm. (±2.18 cm.) for females. The mean body weight for males was 23.77 kg. (±3.05 kg.) and 19.82 kg. (±2.66 kg.) for females [3]. These measures are similar to those recorded for Border and Bearded collie-breeds from the Collie lineage, the hypothetical closest related group to Patagonian sheepdogs [28–30].

Tafra et al. (2014) documented zoometric indices for Patagonian Sheepdogs [3]. Among these indices, the cephalic index, based on the width/length ratio, classified the Patagonian Sheepdogs as dolichocephalic, highlighting the predominate nature of length over width. These dogs are also classified as dolicothoracic, indicating the conformation of an elliptical chest. Dolicothoracic is actually an index of proportionality that indicates Patagonian Sheepdogs, unlike many modern breeds, tend to be longer than they are tall. When compared to the Border Collie breed standard, there is similarity in conformation, as the body for both is slightly longer than the height at the withers. By comparison, the English Shepherd differs from the standard in that the body is short and compact [30]. The pelvic index indicated by the width/length ratio classified the Patagonian Sheepdog as brachypelvic, which is the ratio of the width of the pelvis over the length [3] (Figure 6). The results of Tafra et al. (2014) also indicate that the morphometric indices of 74 sampled Patagonian Sheepdogs showed a coefficient of variation of less than 10%, indicating high group uniformity [3].

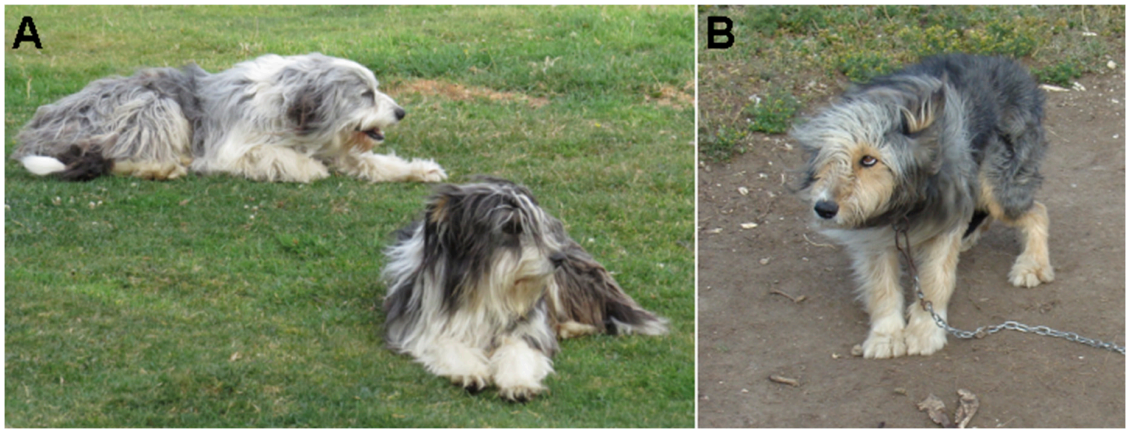

Figure 6. Patagonian Sheepdogs from the Aysén (**A**) and Magallanes regions (**B**) of Southern Chile [3]. The use of these images was authorized by the owners of the photographs.

Also in 2016, an additional study determined that the Patagonian Sheepdog from the Magallanes region displayed strong variation in coat color [4]. A total of 16 coat colors were observed, with a predominance of dark colors such as grays, blue merle, and black [4]. When compared with mantles of Collie family breeds such as Bearded collie, English shepherd, and Border Collie, there are similarities in terms of slate gray, black, and sand tones [28–30]. Twelve coat markings were described, many of which are shared by other breeds in the Collie family, such as muzzle spotting, high and low socks, necklace, and tail tip [4,28–30]. However, two marking patterns (mask and ears) are specific to Patagonian Sheepdogs [4] (Figure 7) and share similarities to Bearded Collies, Border Collies, and

Bobtails in coat color and marking [4,28–30]. This greater variability in the expression of mantle colors is probably associated with selection based on the herding environment or other functionality, rather than aesthetic purposes.

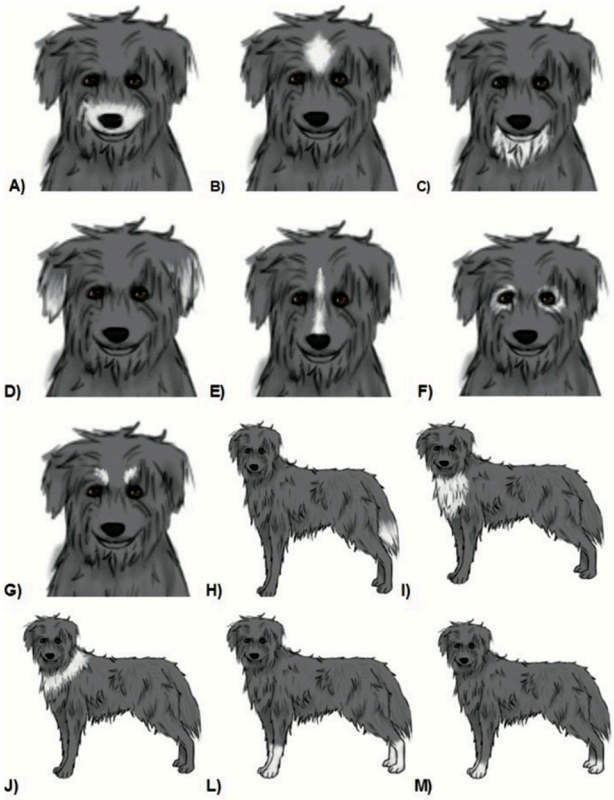

Figure 7. Schematic view of the 12 marking pattern phenotypes observed in 74 "Patagonian Sheepdogs". Muzzle spotting (**A**); Star spotting (**B**); Beard spotting (**C**) Ears spotting (**D**) Stripe spotting (**E**); Mask spotting (**F**); Eyebrow spotting (**G**); Tail tip (**H**); Chest (**I**); Necklace (**J**); High socks (**L**); Low socks (**M**) [4].

Currently, we are analyzing information collected from owners and dogs on 39 farms in the region of Magallanes and the Chilean Antarctic located in three provinces, including Magallanes, Tierra del Fuego, and Ultima Esperanza, and 29 sheep farms in the Aysén del General Carlos Ibañez del Campo region that belong to the four provinces, i.e., Coyhaique, Aysén, General Carrera, and Capitán Prat. To do this, the members of this research group traveled 12,857 km (7988 miles) in Chilean Patagonia, where they were personally able to observe the distribution of Patagonian Sheepdogs and the active herding work that these dogs perform in the "estancias" (Figure 8, Figure 9, and Figure 10).

The "estancias" typically operate with two sheepdogs; one dog leads the flock (pointer role) to the location that the sheepherder indicates by whistling, and the other rounds the flock, preventing sheep from remaining behind [31]. Most dogs can perform both functions, depending on the type of whistle that is used by the shepherd. Typically, the herding work is performed in extensive open fields, and a small number of dogs also work in pens. During herding, the Patagonian sheepdog shows little physical wearing, and maintains a moderately wide distance from the sheep (e.g., between 2 and 10 m), with a strong visual focus. These dogs have the ability to keep the flock together and easily follow the orders of the shepherd. They are docile and submissive, never bite, but tend to bark while working. The herding function of the Patagonian sheepdog is thus similar to that of the Border Collie (BC), but the latter does not bark, and the Patagonian Sheepdog does not display the BC's crouch position (lying ventrally flat on the ground facing the sheep) [7,32]. It has been estimated that one working Patagonian sheepdog is sufficient to control a flock of 200–300 sheep; a maximum of five dogs

are used because larger numbers of dogs disrupt the command orders, resulting in confusion rather than control. It is also important to note that in the last few years, many livestock operations in the Aysén region have shifted to cattle production, and the Patagonian Sheepdog has successfully adapted (personal observation). These dogs are able to work long days and cover long distances. Indeed, Patagonian Sheepdogs have great stamina that allows them to work for several days at a time. Most of the Patagonian sheepdogs have a moderate (three to five days per week) to intense (every day of the week) workload during the primary work season (i.e., between October and April), working up to 10 h per day. This stamina has, in part, resulted from breeding selection conducted by the shepherds based on the particular herding behavioral phenotypes observed in these dogs (docility, trainability, and endurance). Most importantly, dogs are selected for breeding based on herding skills but not aesthetics.

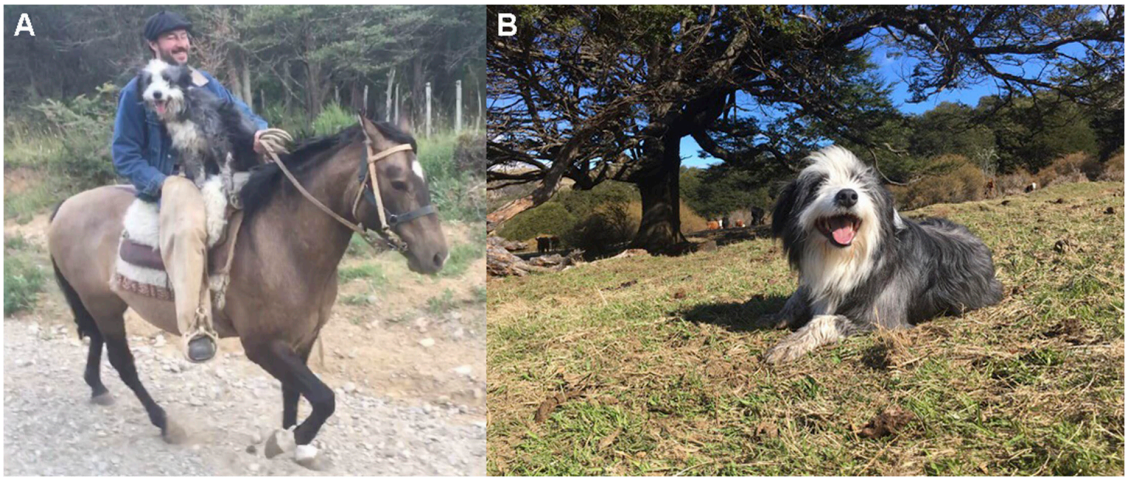

Figure 8. Photograph of Nicolás Bitsch (**A**) and his Patagonian Sheepdog "Chango" (**B**), Coyhaique Province, Aysén Region, Chile (2019).

Figure 9. Photograph of Dr. Natasha Barrios during dog examination and sampling. Aysén region, Chile (2018).

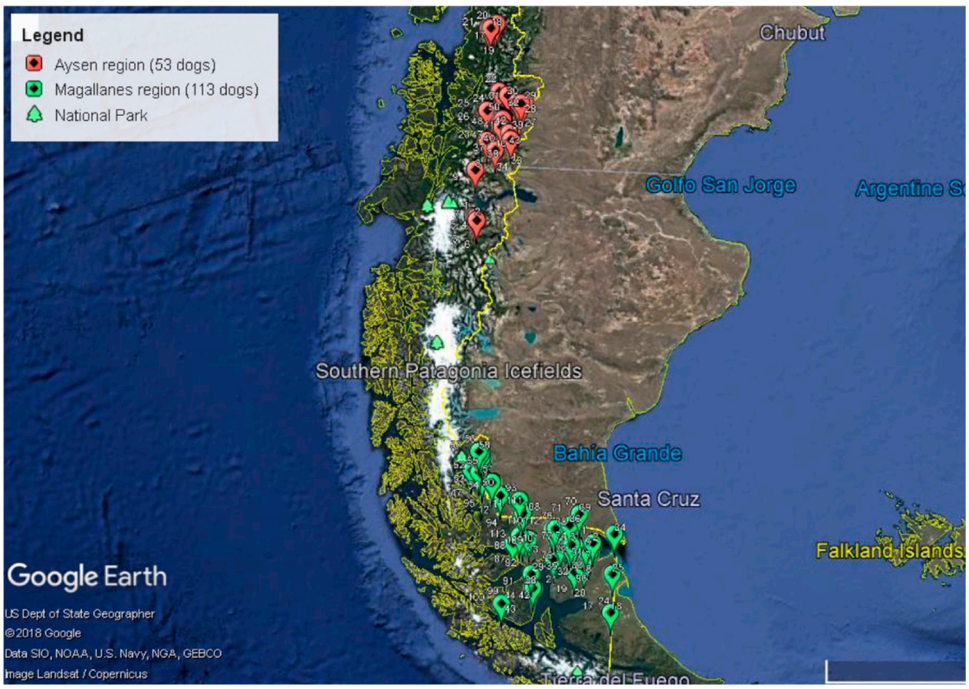

Figure 10. Current Patagonian Sheepdog distribution (166 dogs) in Southern Chile according to sampling conducted by our research group in regions of Aysén (red points) and Magallanes (green points), Patagonia, Chile. A wide distribution of dogs was observed; both groups are separated by ice fields and natural reserves (Picture generated by Googlemap, 2019).

Knowledge of the geographic separation, immigration, the role of hybridization in the history of the breeds, and the timeline of the formation of breeds, together with an availability of genomic data, will allow us to understand how the Patagonian Sheepdog was created [33]. Thus, further genomic studies of this isolated dog population are ongoing and are necessary to characterize this population, identify the genes underlying complex behavioral traits, and to better understand the hereditary diseases which afflict herding dogs. For example, the collie eye anomaly (CEA) affects several herding breeds, including the Collie, Border Collie, Shetland sheepdog, and Australian shepherd, all members of the UK rural clade (clusters of closely-related breeds of dogs that possess similar traits) [34,35]. The underlying causative CEA mutation and associated haplotype pattern is displayed across all affected breeds, and we speculate that all share a common affected ancestor [32]. The mutation in the *MDR1* gene (multi-drug resistance 1), which causes life-threatening reactions to multiple drugs in many of the UK rural breeds, is another hereditary condition to be explored in the Patagonian Sheepdog, as it does not seem to be associated with previously published mutations in the *MDR1* gene [26,35].

5. Conclusions

Based on the historic evidence, the colonization of Chilean Patagonia by European immigrants with their working dogs, the geographical isolation of both regions (Aysén and Magallanes), and the particularities of sheep livestock management in this territory, we suggest that the modern Patagonian Sheepdog is a descendant of old UK herding breeds with the characteristics of an isolated population, low genetic variability, and complete adaptation to the unique, harsh conditions of Patagonia. The population has morphologic and coat color features similar to other Collie-type breeds (Border Collie, Bearded Collie, and Bobtails). Understanding the historic context, as well as collecting genetic and genomic data from of this rare dog population, will help to establish it as a bona fide breed, design breeding programs for conserving desirable features, and reduce the incidence of potential hereditary diseases. In addition, this dog is valuable as part of the region's natural and cultural heritage, and together with its special herding phenotypic characteristics, it needs to be preserved as a local

genetic resource. We propose the following image (Figure 11) to explain the origin of the Patagonian Sheepdog. This theory could be verified through future morphometric and genomic studies, which are currently underway. This review article deepens our understanding of the creation and developmental history of this particular herding dog, providing a fundamental contribution to the growing body of genomic studies of dogs.

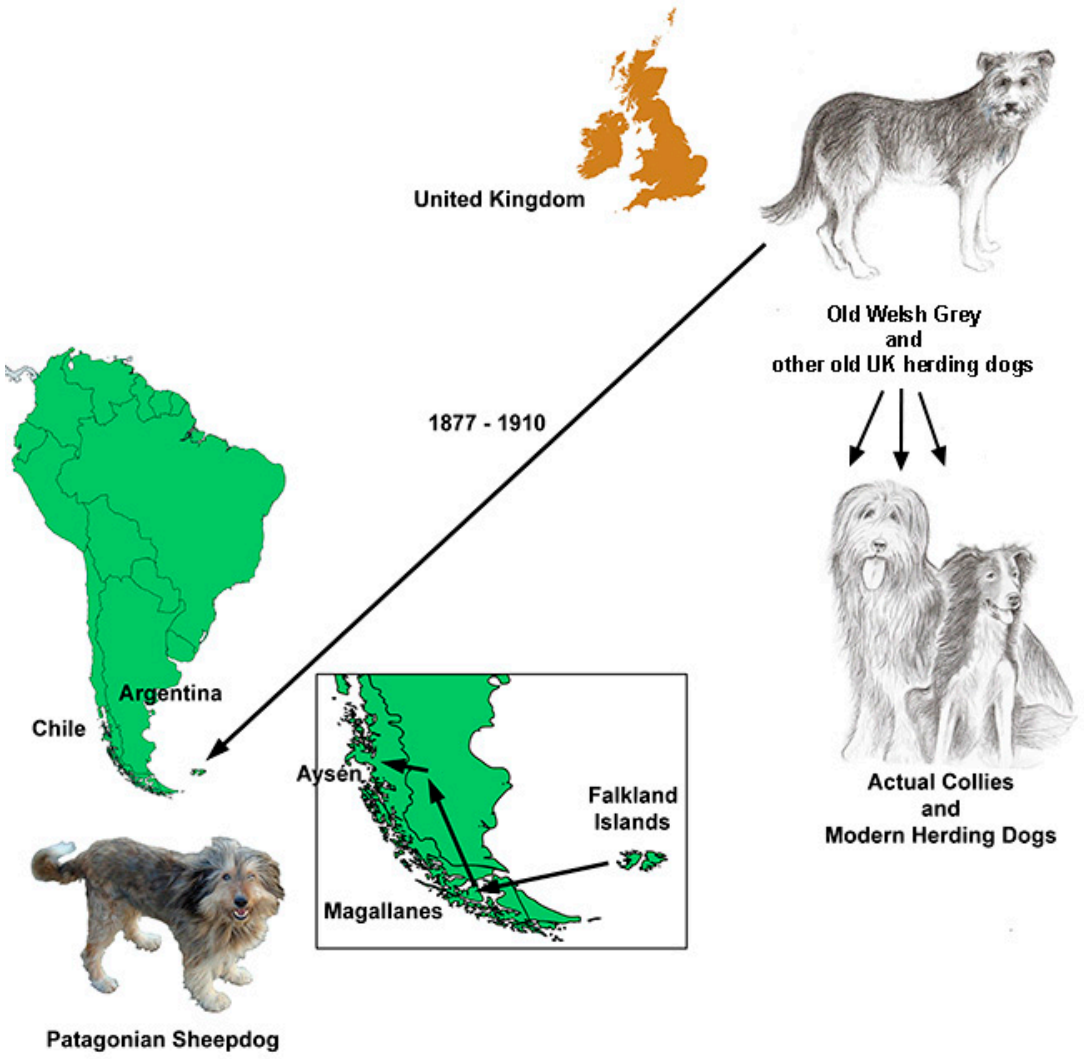

Figure 11. Schematic representation of how Old Welsh Grey and other old UK herding dogs arrived in the regions of Aysén and Magallanes, Chile from the United Kingdom (mainly England, Scotland, and Wales) between 1877 and 1910. During this period, there were no official organizations such as the Kennel Club or the FCI (Federation Cynologique Internationale).

Author Contributions: Conceptualization, N.B. and M.G. and C.G.-L and E.A.O.; investigation, N.B., A.F., C.H., R.M., E.A.O., H.G.P., C.G.-L.; writing—original draft preparation, N.B., M.G., E.A.O. and C.G.-L.; writing—review an editing, N.B., M.G., C.G.-L., E.A.O., H.G.P; supervision N.B.

Funding: The research included in this review was funded in part by FONDECYT grant 1181592 "The ovejero magallanico dog: genomic architecture, interbreed relationships and gene mutation tracking using next-generation sequencing", Beca Conicyt Doctorado 2018 and by the REDES grant Etapa Inicial, Convocatoria 2017, RED170062 and PIA/BASAL FB0002.

Acknowledgments: The authors wish to thank Violeta Tafra, the Border Collie Museum, the Museum of English Rural Life, and all the Patagonian shepherds.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Martinic, M. *Historia de la Región Magallánica*; Ediciones de la Universidad de Magallanes: Punta Arenas, Chile, 2006; p. 25.
2. Oficina de Estudios y Políticas Agrarias (ODEPA). *Estudio: Mercado de la Carne y Lana Ovina en Chile*; Centro de Información Silvoagropecuario, Ministerio de Agricultura: Santiago, Chile, 2019. Available online: https://www.odepa.gob.cl/estadisticas-del-sector/ficha-nacional-y-regionales (accessed on 7 October 2019).
3. Tafra, V.; Barrios, N.; Godoy, J.; De la Barra, R.; Gómez, M. Primera caracterización morfoestructural y faneróptica del perro Ovejero Magallánico, Chile. *Arch. Zootec.* **2014**, *63*, 371–380. [CrossRef]
4. Barrios, N.; Bórquez, A.; Gómez, M.; Tafra, V.Y.; Sponenberg, P. Estudio descriptivo del color de manto y señas del perro Ovejero Magallánico, Chile. *Arch. Zootec.* **2016**, *65*, 99–101. [CrossRef]
5. Ruane, J. A Framework for Prioritizing Domestic Animal Breeds for Conservation Purposes at the National Level: A Norwegian Case Study. *Conserv. Biol.* **2000**, *14*, 1385–1393. [CrossRef]
6. Sponenberg, D.P. Genetic Resources and Their Conservation. In *The Genetics of Horse*; Bowling, A.T., Ruvinsky, A., Eds.; CABI Publishing: Cambridge, MA, USA, 2000; p. 387.
7. McCaig, D. *The Dog Wars: How the Border Collie Battled the American Kennel Club*; Outrun Press: Hillsborough, NJ, USA, 2007.
8. Sponenberg, P.; Martin, A.; Couch, C.; Beranger, J. Conservation strategies for local breed biodiversity. *Diversity* **2019**, *11*, 177. [CrossRef]
9. Martinic, M. *El Ordenamiento Rural en Magallanes, 1894–1973: La Dirección y Manejo de Las Grandes Estancias en Vida Rural en Chile Durante el Siglo XIX*; Academia Chilena de la Historia: Santiago, Chile, 2001.
10. Martinic, M. *Los Británicos en la Región Magallánica*; Ediciones de la Universidad de Magallanes: Punta Arenas, Chile, 2007; pp. 72–75.
11. Martinic, M. *Presencia de Chile en la Patagonia Austral: 1843–1879*; Biblioteca Nacional de Chile: Santiago, Chile, 1971; pp. 192–196.
12. Martinic, M. *Nogueria el Pionero*; Ediciones de la Universidad de Magallanes: Punta Arenas, Chile, 1986; pp. 72–75.
13. Martinic, M. *Brief History of the Land of Magellan*; Ediciones de la Universidad de Magallanes: Punta Arenas, Chile, 2002; pp. 15–16.
14. Duran, F. *Sociedad Explotadora de Tierra del Fuego*; Directorio Sociedad Explotadora Tierra del Fuego: Valparaíso, Chile, 1951; pp. 12–22.
15. Martinic, M. *De la Trapananda al Aysén*, 2nd ed.; Fundación Rio Baker: Santiago, Chile, 2005.
16. Boisier, S. Territorio, Estado y Sociedad en Chile. La Dialéctica de la Descentralización: Entre la Geografía y la Gobernabilidad. Ph.D. Thesis, Universidad de Alcalá de Henares, Alcalá de Henares, España, 2007.
17. Echeverría, C. *Aysén Visión Histórica Siglo XX y su Futuro*; LOM Ediciones Ltda: Coyhaique, Chile, 2001; pp. 21–22.
18. Fuenzalida, Á. El Perro Ovejero Magallánico; Testimonio de Reconstrucción Histórica. Ph.D. Thesis, Pontificia Universidad Católica, Santiago, Chile, 2006.
19. Navarro, L. Las ovejas de Magallanes. In *El Territorio de Magallanes*; Guerrero, M., Ed.; Imprenta Ercilla: Santiago, Chile, 1897; p. 132.
20. Almeroth-Williams, T. Horses & Livestock in Hanoverian London. Ph.D. Thesis, University of York, York, UK, 2013.
21. Cerón, M. *Magallanes en su Primer Centenario*; Imprenta Ahues: Punta Arenas, Chile, 1944.
22. Campbell, D. Punta Arenas en su Primer Centenario. La Presencia Británica en la Patagonia Austral. 2005. Available online: http://patbrit.org (accessed on 7 October 2019).
23. Calderón, J. *Historia de la Industria Ganadera en el Territorio de Magallanes*; Boletín del Ministerio de Agricultura N° 10; Ministerio de Agricultura: Santiago, Chile, 1936.
24. Campos, F. Border Collie. In *Revista Menéndez-Behety N° 110*; Editorial Sociedad Anónima Ganadera y Comercial Menéndez Behety: Punta Arenas, Chile, 1933.
25. Hubbard, C. *Dogs in Britain. A Description of all Native Breeds and Most Foreign Breeds in Britain*; Macmillan and Co. Ltd.: London, UK, 1948; pp. 207–208.

26. Neff, M.; Robertson, K.; Wong, A.; Safra, N.; Broman, K.; Slatkin, M.; Mealey, K.Y.; Pedersen, N. Breed Distribution and history of canine mdr1-1D a pharmacogenetic mutation that marks the emergence of breeds from the collie lineage. *Proc. Natl. Acad. Sci. USA* **2004**, *101*, 11725–11729. [CrossRef]
27. Presberg, C. Border Collie Museum. Available online: www.bordercolliemuseum.org (accessed on 7 October 2019).
28. Federation Cynologique Internationale (FCI). *Bearded Collie*; FCI-Standard N° 271; FCI: Thuin, Belgium, 2010.
29. Federation Cynologique Internationale (FCI). *Border Collie*; FCI-Standard N° 297; FCI: Thuin, Belgium, 2010.
30. Federation Cynologique Internationale (FCI). *Old English Sheepdog*; FCI-Standard N° 16; FCI: Thuin, Belgium, 2011.
31. Gallo, C.; Tarumán, J.; Larrondo, C. Main factors affecting animal welfare and meat quality in lambs for slaughter in Chile. *Animals* **2018**, *8*, 165. [CrossRef] [PubMed]
32. Kydd, E.; McGreevy, P. Sex differences in the herding styles of working sheepdogs and their handlers. *PLoS ONE* **2017**, *12*, e0184072. [CrossRef] [PubMed]
33. Parker, H.G.; Dreger, D.L.; Rimbault, M.; Davis, B.W.; Mullen, A.B.; Carpintero-Ramirez, G.; Ostrander, E.A. Genomic Analyses Reveal the Influence of Geographic Origin, Migration, and Hybridization on Modern Dog Breed Development. *Cell Rep.* **2017**, *19*, 697–708. [CrossRef] [PubMed]
34. Parker, H.G.; Kukekova, A.V.; Akey, D.T.; Goldstein, O.; Kirkness, E.F.; Baysac, K.C.; Mosher, D.S.; Aguirre, G.D.; Acland, G.M.; Ostrander, E.A. Breed relationships facilitate fine-mapping studies: A 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res.* **2007**, *17*, 1562–1571. [CrossRef] [PubMed]
35. Mealey, K.L.; Meurs, K.M. Breed distribution of the ABCB1-1Delta (multidrug sensitivity) polymorphism among dogs undergoing ABCB1 genotyping. *J. Am. Vet. Med. Assoc.* **2008**, *233*, 921–924. [CrossRef]