biology and life sciences forum

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Proceeding Paper

An Overview of Camel Biodiversity and Genetics †

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† Presented at the 10th International Seminar of Veterinary Medicine: Camelids in Algeria & Maghreb, Constantine, Algeria, 20–21 December 2022.

Abstract: The process of desertification affects about 46% of Africa. Hence, the dromedary appears by far to be the most appropriate strategic investment. It is obvious that in view of global events, the number of areas that will be affected by desertification will increase considerably, which will make this animal a key element in maintaining food security for a considerable number of people. The objective of this review is to describe what is currently being carried out in the study of the phenotypic and molecular diversity of camels and to highlight the prospects for the exploitation and use of these products in sustainable farming systems. Due to the increasing demand for camels around the world, there is a need for knowledge about their phenotypic and genetic diversity. This is fundamental to the sustainable management and use of herds. It appears through this review that the morphological and genetic diversity of African camels and the scientific advance can be used for genetic improvement and conservation.

Keywords: Africa; camel; diversity; morphology; genetic

Citation: Gaouar, S.B.S.; Ciani, E. An Overview of Camel Biodiversity and Genetics. *Biol. Life Sci. Forum* **2023**, *22*, 15. https://doi.org/10.3390/blsf2023022015

Academic Editors: Amira Leila Dib, Said Boukhechem, Hithem Bougherara and El-Hacene Bererhi

Published: 10 April 2023

1. Introduction

Improving the diversification of locally adapted species and improving the ability to use genotypes to accurately predict relevant adaptive and production phenotypes has become a necessity with climate change [1,2]. As a result, camels appear to be the key animal in the situation. Camels are renowned for their production of quality milk, meat and fiber [3,4], are key species for ecological sustainability [5], and are sustainable with specific attributes, including draught capacity, means of transport and ecotourism, thus contributing to economic empowerment and food security. Understanding the structure and function of genomes is important for studying interactions between genes, studying interactions between genes and environments, and deciphering trait complexes. A high-quality reference genome assembly is a prerequisite to initiating functional genome annotation. Significant progress has been made in this direction by sequencing whole animal genomes, detecting sequence variants, associating them with phenotypic traits, and using genomic variation to select for predicted genetic differences in routinely measured traits [6]. Since characterization of a breed is the first step in its sustainable use; the extent of phenotypic and genetic variation is fundamental to the selection, improvement and use of diverse camel populations in Africa [7].This review covers several characteristics of camels in Africa.

2. Morphological Diversity

The distinction between camel populations by herders is subject above all to tribal detention. However, different intrapopulation classifications exist (notably through the color of the coat and the vocation of the animal). This parameter, in addition to being

a selection criterion for breeders, also plays an important role in terms of zootechnical performance [8]. The selection of animals according to their colors is rather influenced by culture and not zootechnical yield; for the latter, the selection of breeders is based on other criteria [3]. However, Amine et al. [3] provides evidence that skin color has a perceptible influence on the zootechnical performance of camels. This was confirmed genetically by the study by Holl et al. [8]. It appears from these studies and many others that the genes that control this phenotype have a significant pleiotropic effect that affects zootechnical parameters.

3. Molecular Diversity

Almathen et al. [9] conducted a study around the world with microsatellites and mtDNA markers and found no clear phylogenetic patterns. Apparently, the movements of camels along transcontinental trade routes may have eroded pre-existing phylogeographic patterns, resulting from their initial domestication. The same finding was highlighted by Cherifi et al. [10] with microsatellites on Algerian and Egyptian animals. The recent domestication of the dromedary, and selective pressures are factors that can be at the origin of a such result. However, with the development of the economic activities around this species, populations have started to be distinguished in terms of dairy, butchering and sports skills.

4. Genetic Studies

Building on newly available high-quality reference genomes, polymorphism analyses, both structural and functional, and the first genome-wide association studies, many outcomes were possible. These include the identification of genomic regions of environmental adaptation and heat stress, and the identification of genes and quantitative trait loci (QTL).

5. Conclusions

In terms of biodiversity; the camel species remains a species that contains significant genetic variability, especially at the intrapopulation level. This implies a great predisposition to selection. In terms of genetics, significant progress has been made in the knowledge of the multiple facets of dromedary genomics, which implies a better understanding of the improvement of production in this species.

Author Contributions: Conceptualization, S.B.S.G.; methodology, investigation, S.B.S.G.; writing—original draft preparation, S.B.S.G.; writing—review and editing, S.B.S.G.; visualization, S.B.S.G.; supervision, S.B.S.G. and E.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

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

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