

Historical developments in genetics

Yusuf Özşensoy PhD

Özşensoy Y. Historical developments in genetics. J Anim Genet Res. 2017;1(1):3.

Gregor Johan Mendel proposed the basic principles of genetics in 1865 by publishing his findings of his experimentations on pea plants that had conducted between 1858 and 1865 (1). Following Mendel's work, many different discoveries were uncovered in the years to come such as cell division, fertilization, presence of nucleic acids inside nucleus, metabolic and genetic diseases (2). At the start of the 20th century, it had been discovered the presence of somatic characters on chromosomes, and both the developments of chromosomes and their crucial functions in inheritance had been discovered. In addition to these proceedings, in 1940s molecular genetic analyses started to occur and develop (basic experiments on bacteria and viruses) which have given rise to the significant developments in the field of genetics (e.g. DNA replication, sequencing of nucleic acids, recombinant DNA technology, and DNA biotechnology) (3).

In light of the developments in molecular biology, today, markers are generally in use for the identification of a specific region present in genome. Three different types of markers, known as morphological, protein, and DNA markers, are in use for genome analyses and genetic studies. Characters that are exhibiting the Mendel inheritance were studied by using morphological markers. Later on, blood antigens and isoenzymes were mostly used for investigations of protein polymorphisms. With the discovery of polymerase chain reaction (PCR), PCR based markers have become more preferred for genetic studies. This technology which had been published by Karry Mullis in 1985 enabled researchers to *in vitro* amplify specific regions of the genome and to visualize these parts by using electrophoretic techniques. In line with the rapid developments in both DNA technology and molecular biology, PCR based DNA markers (RFLP, RAPD, EST, STS, SSCP, AFLP, STR and SNP) have become increasingly more used in genetic studies (4).

PCR analyses were found use in different studies such as maternity and/or paternity testing (5,6), identification of polymorphisms present in vital genic regions (7) and genetic characterization. Genetic characterization studies are particularly important in studies conducted for to determine inter- and intra-breed variations and for the identification of breeds. For these purposes, genetic characterization studies were conducted in autosomes (8-11), mtDNA (12) and Y chromosome (13).

Another important development for use in genetic studies is the utilization of genetic mapping techniques in genome scanning to discover genes responsible for economic traits or important diseases. It had been discovered in fruit flies (*Drosophila melanogaster*) that eye colorization and wing morphology is not inherited according to Mendel principles. From these findings, genetic linkage had been proposed for the first time and showed that genes might be present as linked on chromosomes (14,15). Genetic linkage and linkage analysis have different uses. Even though the first linkage mapping had been conducted back in 1913 (16), genetic mapping studies have been intensified for all species towards the end of the 20th century and as result, genetic maps for various breed have been provided (17).

REFERENCES

1. Bateson W. Mendel's principles of heredity, with a translation of Mendel's original papers on hybridization. Cambridge University Press Warehouse, WC. 1902.
2. Wexler B. Genetics and genetic engineering. Texas: Information Plus reference series, Information Plus, Wylie, USA, 2007.
3. Klug WS, Cummings MR. Genetik kavramlar. Palme Publishing, Ankara 2000.
4. Özşensoy Y, Kurar E. Marker systems and applications in genetic characterization studies (in Turkish). J Cell Mol Biol. 2012;10(2):11-9.
5. Özşensoy Y, Kurar E, Bulut Z, et al. Paternity testing in horses by using microsatellite DNA markers: A case report (in Turkish). Eurasian J Vet Sci. 2008;24(1):87-91.
6. Özşensoy Y, Kurar E, Doğan M, et al. Genetic characterization of Turkish cattle breeds by microsatellite markers: Usefulness for parentage testing. Kafkas Univ Vet Fak Derg. 2014;20(4):521-6.
7. Özşensoy Y. Investigation of PRL - Rsa I and Hae III gene polymorphisms in Anatolian water buffaloes bred by using PCR-RFLP method. Revista Brasileira de Zootecnia 2017 (IN PRESS).
8. Özşensoy Y, Kurar E, Dogan M, et al. Genetic characterization of some native cattle breeds in Turkey by using STR markers (in Turkish). Res J Biol Sci (BIBAD). 2010;3(1):163-71.
9. Özşensoy Y, Kurar E. Genetic diversity of native Turkish cattle breeds: Mantel, AMOVA and bottleneck analysis. J Adv Vet Anim Res. 2014;1(3):86-93.
10. Eroğlu T, Özşensoy Y, Kurar E, et al. Genetic characterization of various cat breeds in Turkey by using microsatellites. J Cell Mol Biol 2015;13(1&2):16-25.
11. Bulut Z, Kurar E, Ozsensoy Y, et al. Genetic diversity of eight domestic goat populations raised in Turkey. BioMed Res Int. vol. 2016, Article ID 2830394, 6 pages, Doi: 10.1155/2016/2830394.
12. Doğan M, Nizamlioğlu M, Özşensoy Y, et al. Maternal phylogenetic of some Anatolian cattle breeds. Universal J Agric Res. 2017;5(2):79-84.
13. Özşensoy Y, Kurar E, Bulut Z, et al. Y-chromosome analysis of native Turkish cattle breeds by microsatellite markers. Turk J Biol. 2014;38(3):388-95.
14. Morgan TH. Sex-limited inheritance in *Drosophila*. Science. 1910;32:120-2.
15. Morgan TH. The application of the conception of pure lines to sex-limited inheritance and to sexual dimorphism. Am Nat. 1911;45(530):65-78.
16. Sturtevant AH. The linear association of six sex-linked factors in *Drosophila*, as shown by their mode of association. J Exp Zool 1913;14:43-59.
17. Özşensoy Y, Kurar E. Genetic linkage analysis and applications (in Turkish). Erciyes Univ Vet Fak Derg. 2013;10(1):53-62.

Assistant Professor, Department of Veterinary Biometrics and Genetics, Camhuriyet University, Turkey

Correspondence: Yusuf Özşensoy, PhD, Assistant Professor, Department of Veterinary Biometrics and Genetics, Camhuriyet University, 58140, Sivas, Turkey. e-mail yusufozsensoy@yahoo.com

Received: November 3, 2017; Accepted: November 3, 2017; Published: November 10, 2017



This open-access article is distributed under the terms of the Creative Commons Attribution Non-Commercial License (CC BY-NC) (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits reuse, distribution and reproduction of the article, provided that the original work is properly cited and the reuse is restricted to noncommercial purposes. For commercial reuse, contact reprints@pulsus.com