Genetic polymorphism study of *Mx* gene resistant to avian influenza virus of the chicken strains in Egypt

A Thesis
Submitted for Ph.D. Degree in Zoology

By

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APPOROVAL SHEET

Title of the Ph.D. Thesis

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2017

بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

﴿فَتَعَٰلَى ٱللَّهُ ٱلْمَلِكُ ٱلْحَقُّ ۗ وَلَا تَعْجَلْ بِٱلْقُرْءَانِ مِن قَبْلِ أَن يُقْضَىٰٓ إِلَيْكَ وَحْيُهُۥ ۖ وَقُل رَّبِّ زِدْنِى عِلْمًا ﴿١١٤﴾﴾ **طه: ١١٤**

صدق الله العظيم،،،

I declare that, the work contained in this thesis is the result of my own the investigations. It has not been previously submitted for any degree at this or any other university.

Fatma Mohamed Sayed Ahmed

DEDICATION

THE MOST IMPORTANT PEOPLE IN MY LIFE, MY PARENTS, HUSBAND AND MY SON AHMED. THANK YOU FOR YOUR ENDLESS LOVE AND SUPPORT.

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In the name of Allah, the most gracious, the most merciful. May the peace, blessings and mercy of Allah be upon our prophet Muhammad, the final of messengers, his family and companions in entirety and those who follow him until the Day of Judgment.

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ABSTRACT

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Ph.D Thesis
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Thesis Title: Genetic polymorphism study of *Mx* gene resistant to avian influenza virus of the chicken strains in Egypt

ABSTRACT

The present study was performed in order to identify the genetic polymorphism of the chicken *Mx* gene in two breeds (Dandarawy and Fayoumi) and seven strains (El-Salam, Golden Montazah, Dokki-4, White egg commercial, red egg commercial, Gemmizah and Baladi) of Egyptian chickens. The study was performed on 246 chickens using PCR-RFLP methodology. DNA were extracted from blood samples collected from the birds understudy, Polymerase Chain Reaction was performed using specific primer for the *Mx* gene region of interest. In order to identify the alleles and genotypes, the PCR products were then cut with specific restriction enzyme and the product was run on agarose gel electrophoresis. The results showed that the allele A is present in all the breeds and strains studied, and the all Baladi strain birds were carrying the genotype AA

means that this strain is highly resistant to the viral infection. The obtained results were confirmed by DNA sequencing; sequences were compared and deposited successfully at the International gene bank. An ineffective addition of two bases TT in the intronic region was observed in some birds. In conclusion, applying the PCR-RFLP technique in the breeding programs to select chickens that carry the A allele with high frequencies could help in improving poultry breeding in Egypt by producing infectious disease-resistant chickens. It will also save the expenses paid in purchasing vaccines, drugs used for treating the infected birds. Moreover it will protect the humans near the infected birds from the infection transfer to them.

Keywords: *Mx* gene, Avian flu, Avian flu viruses, genetic polymorphism, orthomyxo viruses.

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LIST OF ABBREVIATIONS

aa	Amino acid
AI	Avian influenza
Asn	Asparagine
bp	Base pair
cDNA	Complimentary DNA
EDTA	Ethylene diamine tetraacetic acid
GAS	Genotype Assisted Selection
GED	GTpases effector domain
H	Hemagglutinin
HCL	Hydrochloric acid
HPAI	Highly pathogenic avian influenza
IFN	Interferon
Kb	Kilo base
L	Liter
LBMS	Live Bird Markets
LPAI	Low pathogenic avian influenza
MAS	Marker Assisted Selection
MD	Middle domain

mRNA	Messenger RNA
N	Neuraminidase
Na2EDTA	DiSodium Ethylene diamine tetra acetic acid
NDV	New Castle Disease Virus
O.D	Optical Density
PBS	Phosphate-Buffered Saline
PCR	Polymerase chain reaction
PCR-RFLP	Polymerase Chain Reaction- Restriction Fragment Length Polymorphism
rpm	Revolutions per minute
SAS	Self-assembly sequences
Ser	Serine
SNPs	Single nucleotide changes
UTR	Untranslated region
UV	Ultraviolet
VSV	Vesicular stomatitis virus