GENETIC CHARACTERIZATION OF MALLARD DUCKS (*ANAS PLATYRHYNCHOS*) AND MUSCOVY (*CAIRINA MOSCHATA*) USING SDS-PAGE

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ABSTRACT

Duck has been essential producer of meat and eggs to supplement local chicken products. In Nigeria, Mallard duck (*Anas platyrhynchos*) and Muscovy duck (*Cairina moschata*) are the most available species being raised. Few genetic studies have been reported on both poultry despite their contributions to household income. In this study, genetic characterization of both species of *A. platyrhynchos* and *C. moschata* using blood serum protein through Sodium Dodecyl Sulphate - Polyacylamide Gel Electrophoresis (SDS-PAGE), were assessed. Blood samples were drawn from the wing vein of each species of the duck and SDS-PAGE was used for its analysis. PAlaeontological STatistics (PAST) software was used to generate dendrograms analysis. The results revealed 0.4% genetic distance between the two species, showing their very close relationship. Further molecular studies using DNA will reveal more genetic relationship of both species.

Keywords: Duck, *Anas platyrhynchos, Cairina moschata;* Electrophoresis.

INTRODUCTION

In Nigeria, the local duck, Muscovy duck (*Cairina moschata*) and Mallard duck, also referred to as exotic duck (*Anas platyrhynchos*) are the most available species being raised. They are found in the agroecological zones of Nigeria, and have been in domestication. However, *C. moschata* is more available in the country compared to *A. platyrhynchos* (Nwanta *et al.*, 2006; Adeyemi *et al.*, 2008; Oguntunji and Ayorinde, 2015).

The population of duck, as a member of waterfowl, has been reported to be about 9,553,911 after chicken (101,676,710) and guinea fowl (16,976,907) in Nigeria according to NBS (2012) (Oguntunji *et al*., 2020). They have been essential producer of meat and eggs to supplement local chicken products.

C. moschata constitute 74% of the ducks in Nigeria, and has lower fat of meat and considered safe (Adesope and Nodu, 2002; Foluke, 2022) and also contributes to household income. Despite the contributions of duck, it is underutilized, especially Muscovy, perhaps due to some taboos and superstitious, bias and social stigmas being attached to its breeding, consumption, marketing etc (Oguntunji, 2014; Oguntunji and Ayorinde, 2014). They are even referred to as snake deity that is 'Nagi' or 'Nagin' for the Nageswari ducks in Bangladesh (Morduzzaman *et al*., 2015). The exotic or mallard ducks are limited in number and not widely raised by farmers, hence the economic purposes are yet to be fully utilized; but both still share common attributes despite easy identification. This could be due to few genetic studies (Adeola *et al*., 2022) to guide in breeding programmes; fear of suitability to extensive management system and acceptability among others. For ease of breeding and better utilization of genetic resources, the present study assessed genetic characterization of both species of *C. moschata* and *A. platyrhynchos* using blood serum protein.

Materials and Methods

Sample collection: Thirty-two (32) species each of *A. platyrhynchos* and *C. moschata* were obtained from reliable farms in Akure, Ondo State. The species were transported live to Adekunle Ajasin University's Teaching and Research Farm, Akungba-Akoko, Ondo State, Nigeria, for breeding study.

Serum sample preparation: Blood samples were drawn from the wing vein of each species of the duck using hypodermic syringes into test tube. 0.9% NaCl (physiological saline water) was added at 3:2 blood samples; and kept for 1 h at ambient temperature. This was then centrifuged at 3,000 rpm for 10 min. The serum protein was pipetted and stored at -20 ^{o}C for further analysis (Avtalion, 1984)

Preparation of Gel: Sodium Dodecyl Sulphate-Polyacylamide Gel Electrophoresis (SDS-PAGE) gel was prepared using the Bio-Rad Mini Protean II Cell kit of 10 ml capacity (Bio-Rad, 1995). A discontinuous buffer system analysis was employed. Preparation for 4% stacking gel, 12% resolving gel for SDS-PAGE were carried out (Bio-Rad, 1995).

Sample preparation for SDS-PAGE: 30 µl of 7.5 % β-mercaptoethanol (Sigma) was added to 370 µl of sample buffer. Therefore, to each of 10 µl protein sample, 40 – 60 µl of mixture of sample buffer plus β-mercaptoethanol was added at ratio 1:5. The prepared samples were heated at 95 ^{o}C for 4 min for denaturation. Thereafter, after cooling, 10 µl each was loaded in each well of the kit. The separation of protein was carried out with the aid of Bio-Rad Electrophoresis Power Supply Model 200/2.0 in the Bio-Rad Mini Protean II Cell at 150 V for about 45 min.

Staining and de-staining of gel: The gels were carefully removed from the kit after the electrophoretic run and stained in 0.1% Coomassie blue in glacial acetic 1:4 methanol for about 1 h. Thereafter, the gels were destained with 60% glacial acetic 1:4 methanol solution for about 3hrs. The gel was then documented.

Scoring of Gel and Data analysis: Each gel was scored visually for the presence (1) or absence (0) of protein bands. The data were log transformed and analysed with PAlaeontological STatistics (PAST) software to generate dendrograms (Hammer *et al.,* 2008). The mean value of each species was employed to generate distance indices data for comparative genetic distance evaluation choosing Dice option.

Results and Discussion

Representative gels of the samples from both species are presented in Figures 1 and 2. Figures 1 and 2 respectively showed sera protein in all their lanes for *A. platyrhynchos* and *C. moschata*. The clustered algorithm analysis for association between the samples was shown in Figure 3. The genetic difference between the two species revealed 0.4%. This indicates high level of proximity of these two species.

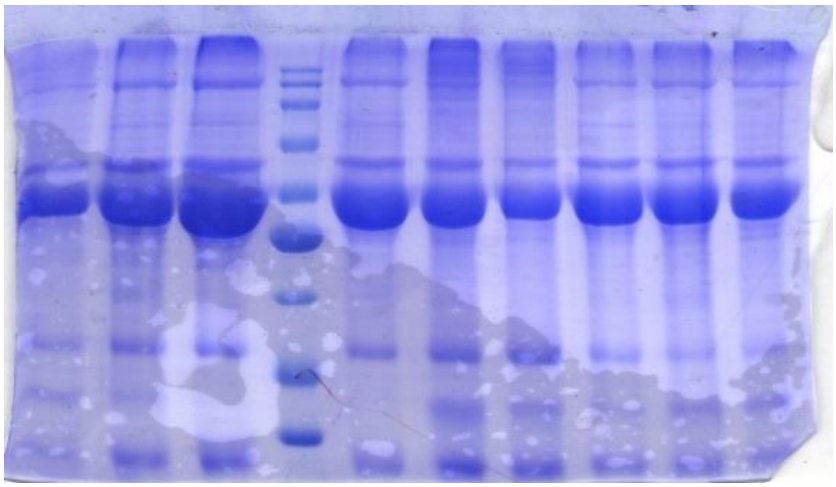

Fig. 1: Representative gels of the samples from *A. platyrhynchos*

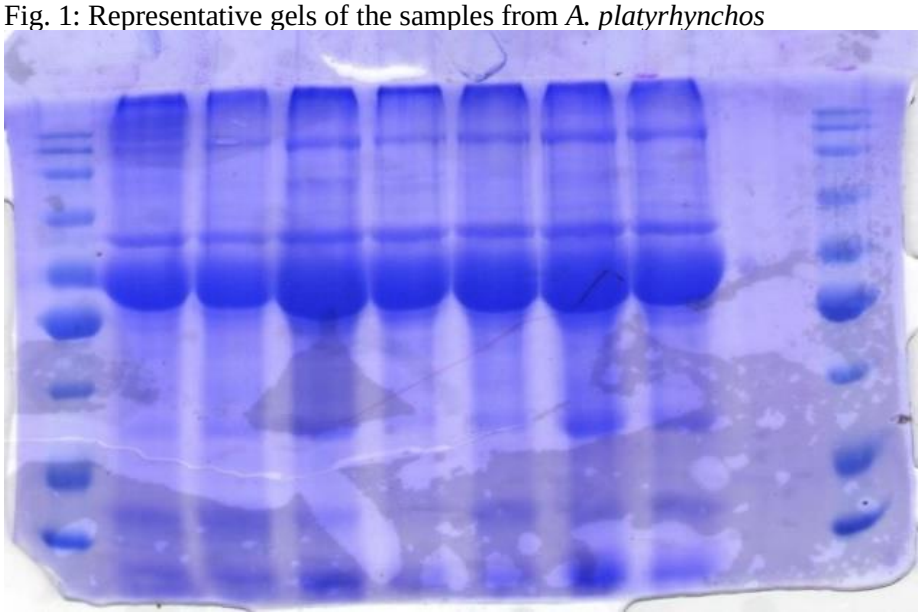

Fig. 2: Representative gels of the samples from *C. moschata*

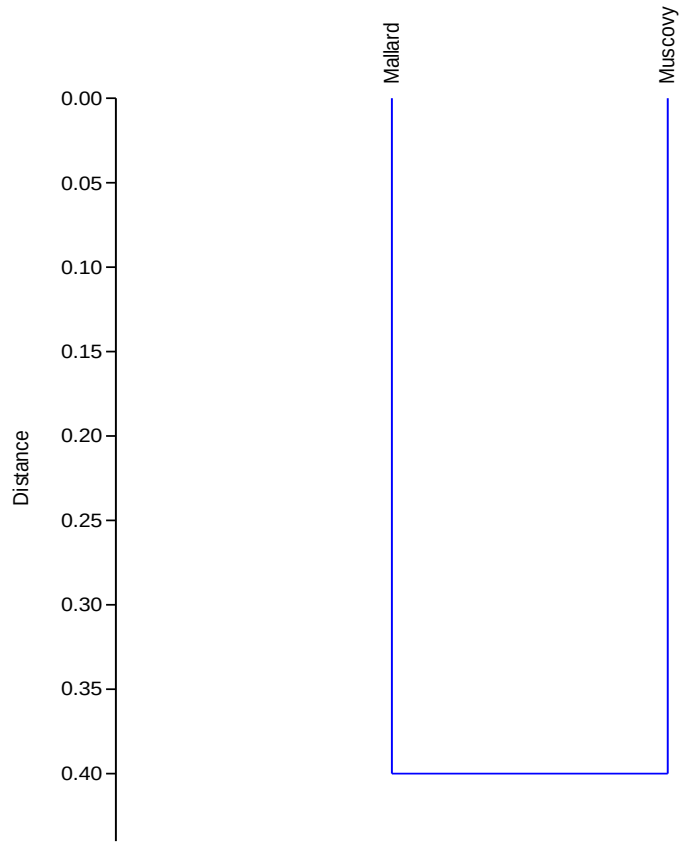

Fig. 3: Dendrogram for Mallard duck, *A. platyrhynchos* and Muscovy duck, *C. moschata*

Conclusion

This research showed that these two species are closely related genetically but significantly different. Therefore, they may be close substitutes for each other especially in breeding programs such as hybridization. However, further molecular studies are necessary into their genetic relationships.

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