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Full Length Research Paper

A comparative study on the morphology, anatomy, physiology and karyotype of the gadwall and red crested pochard that migrate to south Iraq marshes

Khitam Jassim Salih[1]* and Majeed Hussein Majeed Al-Sarry[2]

[1]Vertebrate Department, Marine Science Center, Basrah University, Iraq.
[2]Nursing College, Basrah University, Iraq.

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Although the gadwall *Anas strepera* and red-crested pochard *Netta ruffina Netta* are reclassified back to the same family origin, most of their characters such as morphology, anatomy, and physiology were different. A total of twenty birds of the gadwall and red-crested pochard were included in this study. These birds were hunted in the south of Iraq marshes by the use of catch drag. The results revealed cardinal differences in the blood picture between *A. strepera* and *N. ruffina Netta* summarized in increase red blood cell count, white blood cell count, hemoglobin level, packed cell volume and differential white blood cell count in *N. ruffina Netta* compared to *A. strepera*. In addition, this study showed no differences in the karyotype of the two species.

Key words: Gadwall, red crested pochard, *Anas strepera*, *Netta ruffina Netta* dabbling ducks, south Iraq marshes.

INTRODUCTION

The aim of this study is to record some aspect data base about two different species of birds that emigrant to Iraq marshes. Various bird populations migrate long distances along a flyway. The most ordinary guide involves flying north in the spring to breed in the temperate or arctic summer and returning in the autumn to wintering grounds in warmer regions to the south. The gadwall *Anas strepera* is a common and widespread duck of the family Anatidae. This species was first described by Linnaeus in his system nature in 1758 under its current scientific name (http/www.Gadwall. Wikipedia, the free encyclopedia, 2011). The gadwall's closest relative within the genus *Anas* is the Falcated Duck, followed by the wigeons (Johnson and Sorenson, 1999). In addition, there are two subspecies although one is extinct, the nominate common gadwall *A. strepera strepera* and the Coues' Gadwall, extinct circa 1874 *A. strepera couesi*, that was located on Fanning Island (Clements, 2007). The diving ducks, commonly called pochards or scaups, are a category of duck which feed by diving under the surface of water. They are part of the varied and very large Anatidae family that includes ducks, geese and swans. The diving ducks are located in a distinct sub-family, Aythyinae. While they are morphologically close to the dabbling ducks, the red-crested pochard is a Palearctic species (Cramp and Simmons, 1977) of Sarmatic origin (Voous, 1960). Its breeding circulation extends just about between the latitudes 35° and 55° north, in continental, temperate and Mediterranean climatic regions, from the British Isles to China (Scott and Rose, 1996).

*Corresponding author. E-mail: khitam_36@yahoo.com.

MATERIALS AND METHODS

A total of twenty bird of the gadwall *A. strepera* and the red-crested Pochard *N. ruffina Netta*, ten samples (five males and five females) each, were hunted in the south Iraq marshes by the use of catch drag. Afterwards, they were reared for one week to investigate the morphology, anatomy, genetic (Sugiyama, 1971) and physiology differences between them (Haen, 1995).

RESULTS AND DISCUSSION

Although the gadwall *A. strepera* and the red-crested

Figure 1. The gadwall and red crested Pochard.

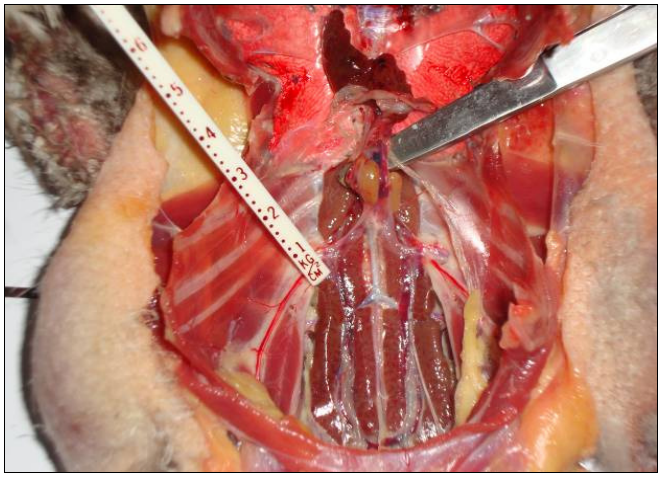

Figure 3. Kidney of the gadwall.

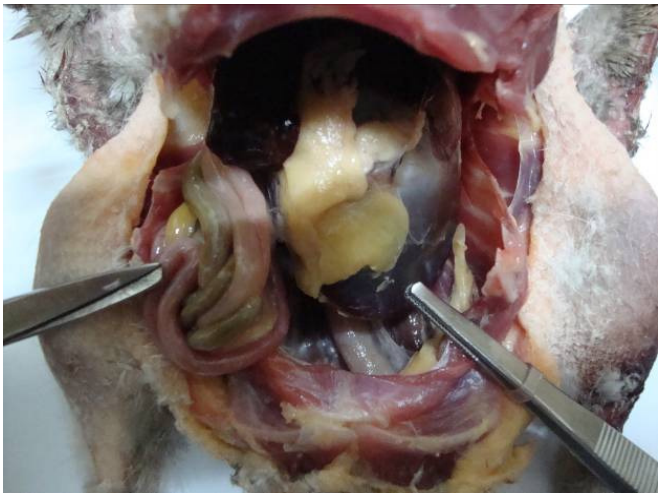

Figure 2. The viscera of the red crested Pochard.

Figure 4. Viscera of the gadwall.

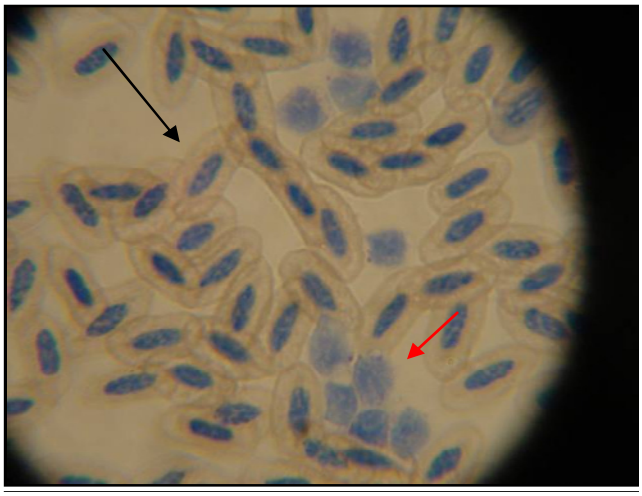

Figure 5. Erythrocytes and thrombocytes of the red-crested Pochard.

pochard *N. ruffina Netta* are placed back to the same family origin (Figure 1), the present study showed many differences between them in morphology and some physiological parameters enumerated in color of the beak, head, neck, chest and flank, wing and feet of the males and females of both species. Also, there are dissimilarities in the internal organ weight between them (Figures 2, 3 4, and Table 1). Moreover, the results revealed cardinal differences in the blood picture between the two species listed in the increase of red blood cell count, white blood cell count, hemoglobin level, packed cell volume and the differential white blood cell count. All these variations between the two species may be due to the behavior of each species concerned with the type of food and properties of diving under water. The red-crested Pochard, the number and level of blood parameters preceded those of the gadwall (Table 1, Figures 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14).

Table 1. Shows the morphology, anatomy, and physiology comparison between the gadwall and red-crested pochard.

Parameters	Gadwall	Red-crested pochard
Head and neck	Male head and neck are brown spotted color while female has head and neck dark brown color	Male head and neck are bright henna color with short gold while female head is dark brown with grayish neck color
Beak	Male has black or brown greenish beak, while the female has orange beak	Male has carmine beak and female has grayish with red edges beak
Chest and flank	Male chest and flank are stripped with white and brown lines and flank stripped with grayish color. While female chest and flank are bright brown color with some dark brown spot	Male has dark chest and flank with some white feathers on the shoulders and the abdomen plumage dark brown black line striate, with white feathers in flank. The female has dark brown color with some dirty white spot chest
Wings	Both male and female have white wing bar	Both male and female have big white spot
Foot	Both male and female has dark orange	Male have orange foot and female has red foot
Red blood cell count million /cm^3	2.46	3.08
White blood cell count thousands/cm^3	22.50	24.30
Hemoglobin level (%)	48.30	41.05
Packed cell volume (%)	29.80	34.25
Lymphocytes (%)	25.88	26.15
Monocytes (%)	11.92	11.83
Hetrophils (%)	52.96	56.08
Eosinophils (%)	3.84	3.59
Basophils (%)	1.95	1.90
Liver weight (g)	23.13	28.50
Proventriculus (empty) weight (g)	10.60	13.20
Gizzard (empty) weight (g)	16.80	18.50
Gall bladder(fill) weight (g)	2.80	3.50
Kidney weight (g)	5.60	7.60
Alimentary canal length (cm)	108.50	115.10
Male length (cm)	48.70	55.50
Female length (cm)	45.80	48.90
Male weight (g)	910.70	980.20
Female weight (g)	830.50	910.50

The karyotype of *A. strepera* and *N. ruffina Netta* species is presented in Figures 16 and 18. It was extremely difficult to determine the chromosome number because of the large number of micro-chromosomes. The result of this study showed no differences in the karyotype of the two species. Of these chromosomes, the first pair appeared as metacentric, the second pair was subtelocentric and the pairs no. 3, 4, 5, 6, 7 and 8 were acrocentrics. The chromosome Z was identified as a submetacentric with a size larger than that of the fourth pair (Figure 15) and the chromosome W was small acrocentric and easily identified (Figure 17). The micro chromosomes were so numerous and often so small to a degree that could not be morphologically identified, a fact that is also reported in other duck species (Belterman and Boer, 1984; Lucca and Rocha, 1985; Lucca and Waldrigues, 1985).

In individual organisms, the phenotype consequences from its genotype and the power from the ecosystem lead to individual variation. A considerable branch of the variation in phenotypes in a population is caused by the differences between their genotypes. The current evolutionary combination defines that evolution was the modified mean greater than the time in the genetic differences. The incidence of one exacting allele will vary, becoming more or less common relative to other forms of

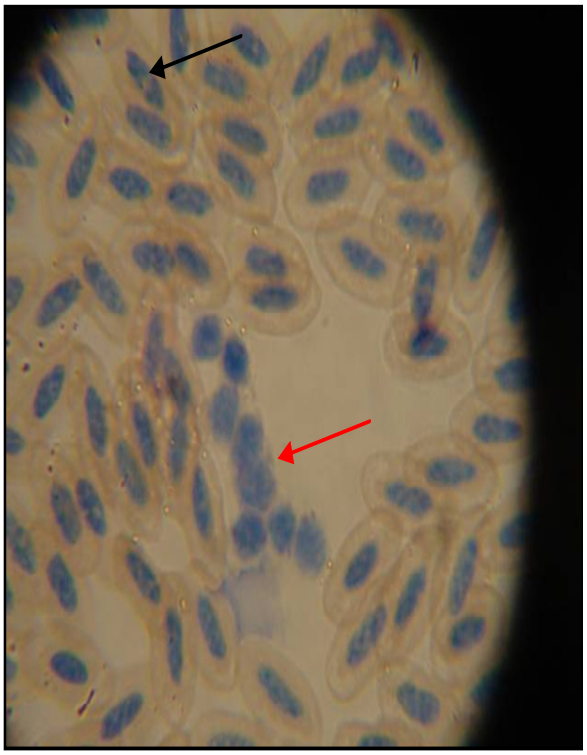

Figure 6. Erythrocytes and the gadwall.

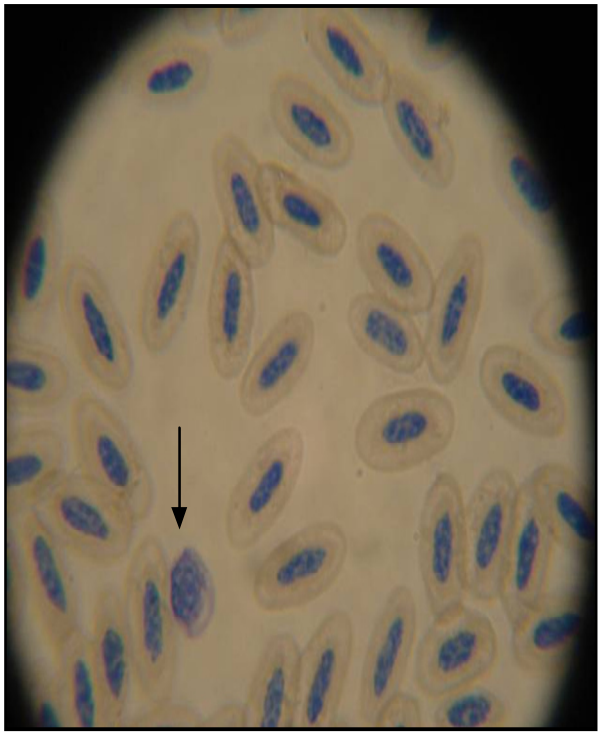

Figure 8. Lymphocyte of the gadwall.

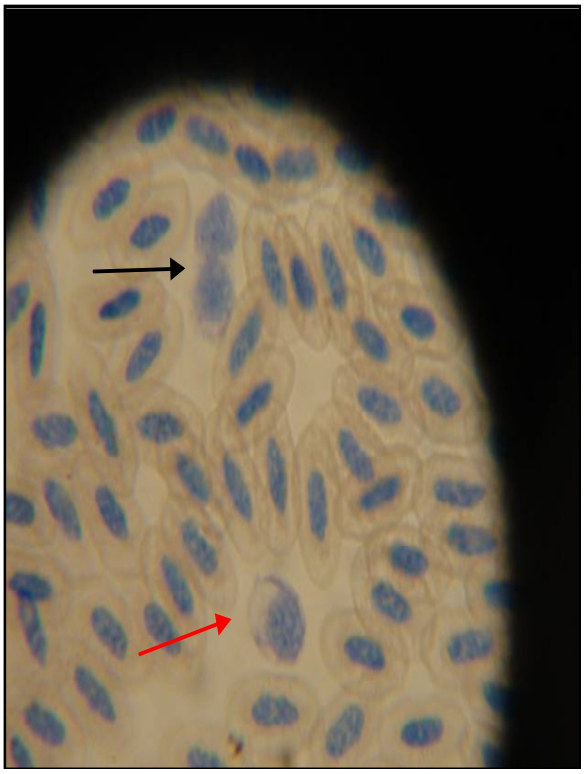

Figure 7. Lymphocyte and monocyts of the redcrested Pochard.

Figure 9. Hetrophil of the red-crested Pochard.

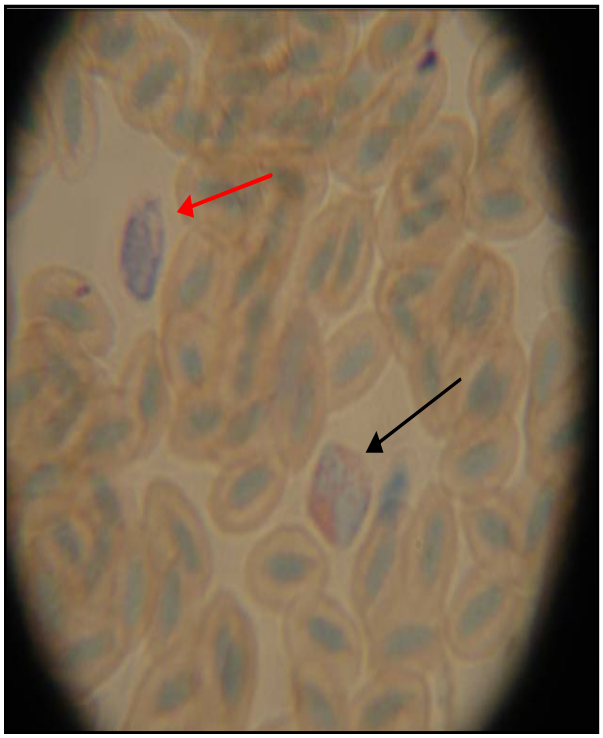

Figure 10. Hetrophil and monocytes of the gadwall.

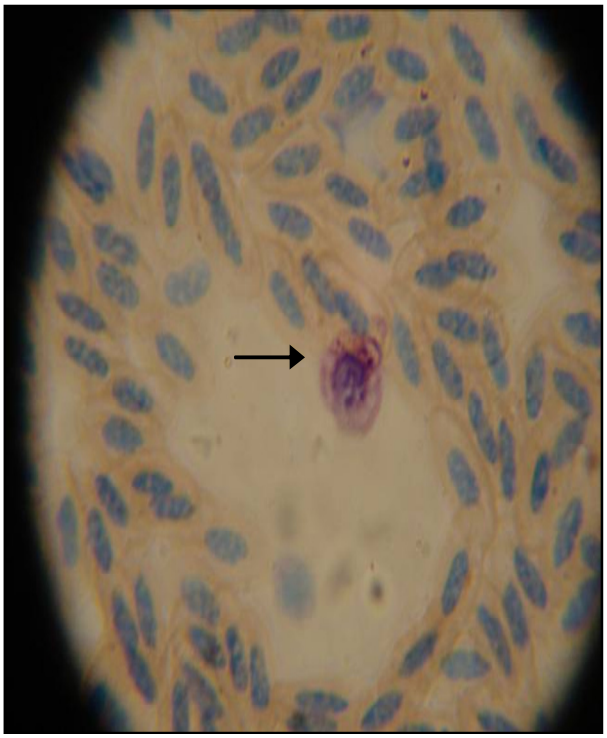

Figure 12. Basophil of the gadwall.

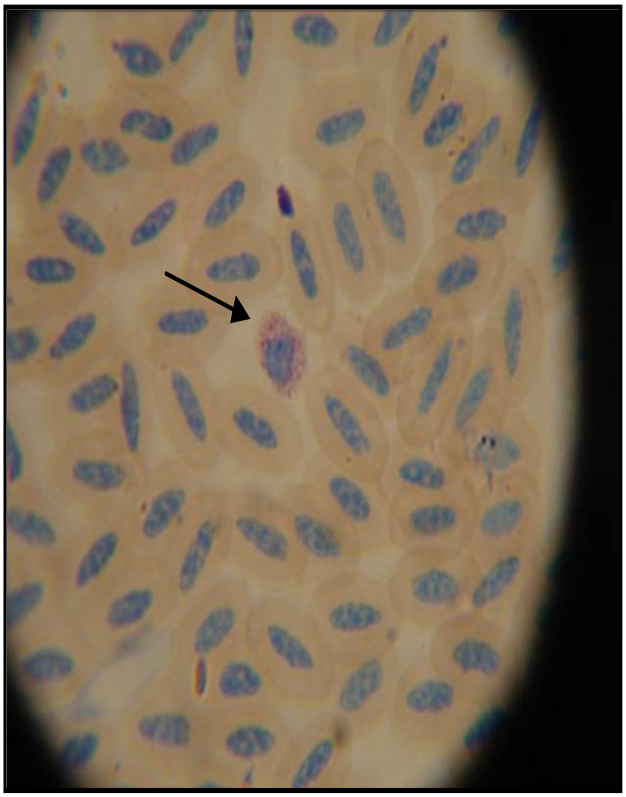

Figure 11. Basophil of the red-crested Pochard.

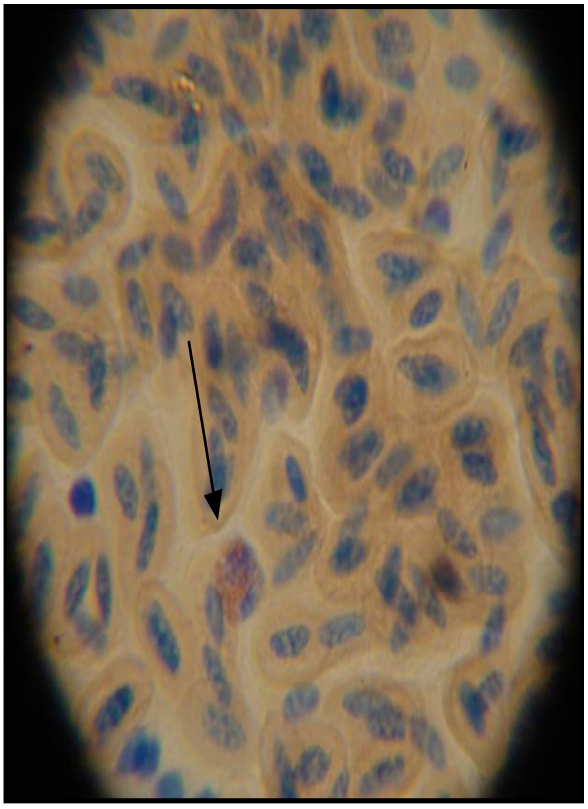

Figure 13. Eosinophil of the red-crested Pochard.

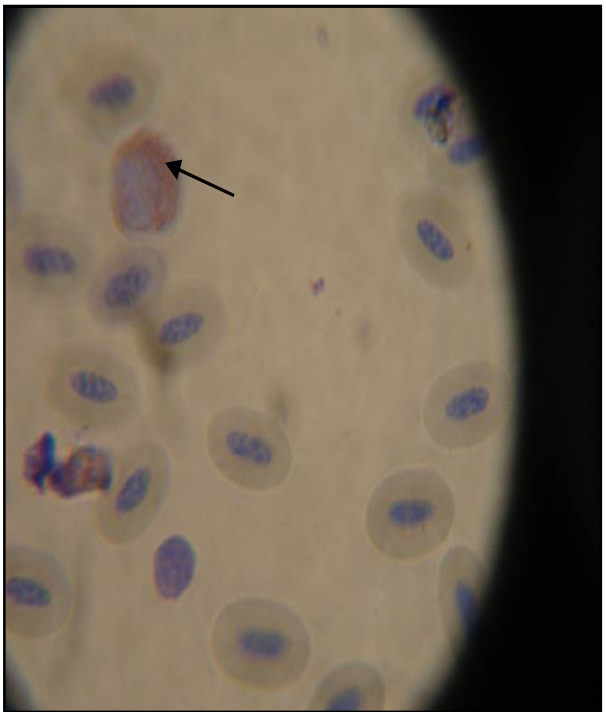

Figure 14. Eosinophil of the gadwall.

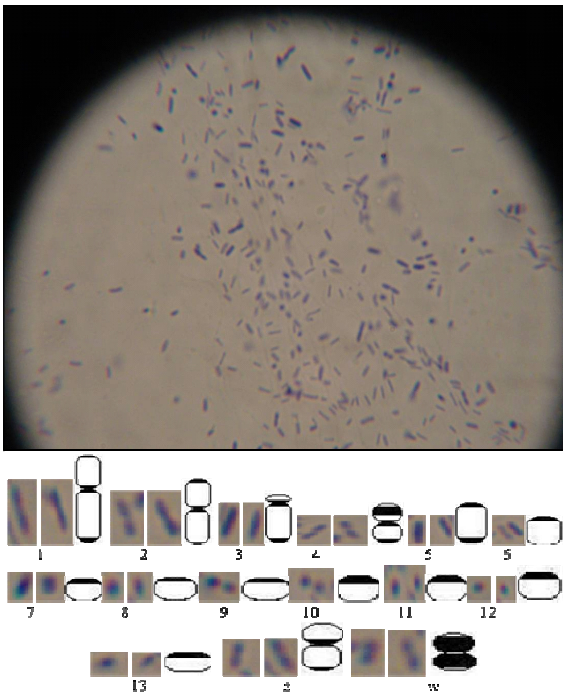

Figure 16. Ideogram and karyogram of the chromosomes of the gadwall (CBG banding).

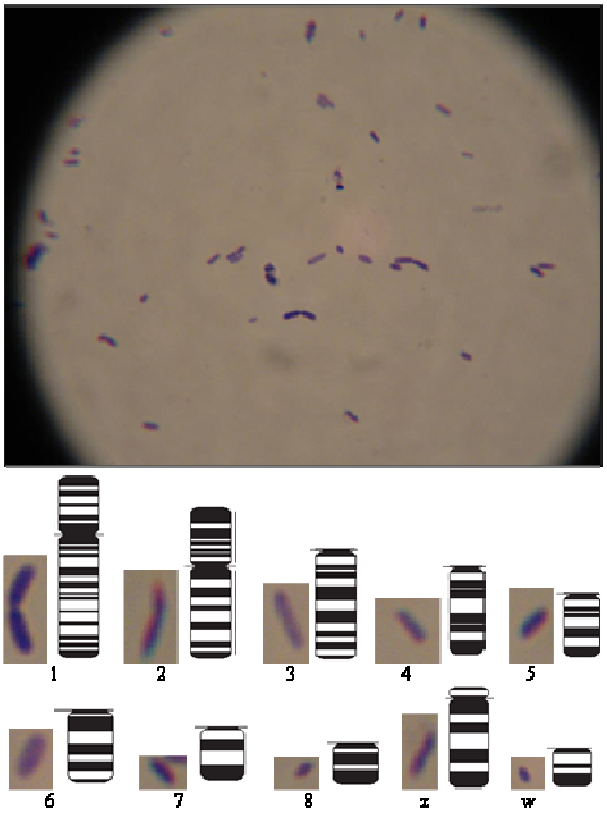

Figure 15. Ideogram and karyogram of the chromosomes of the gadwall (RBG banding).

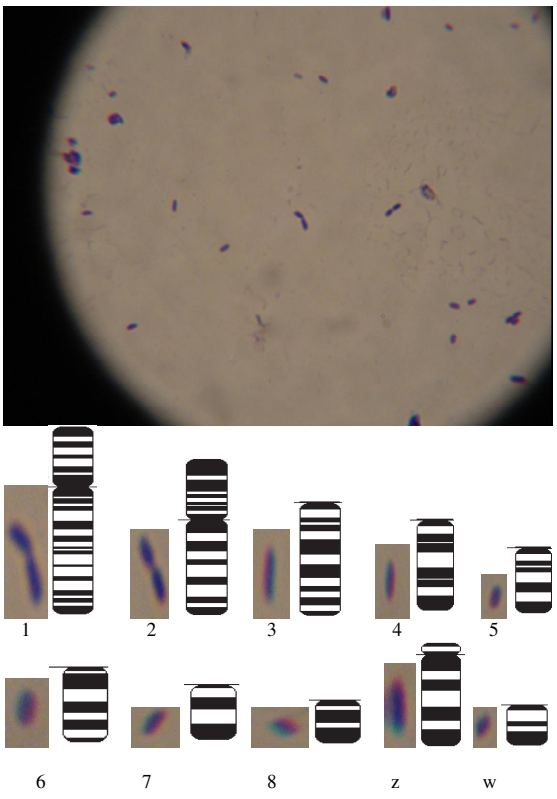

Figure 17. Ideogram and karyogram of the chromosomes of the red-crested Pochard (RBG banding).

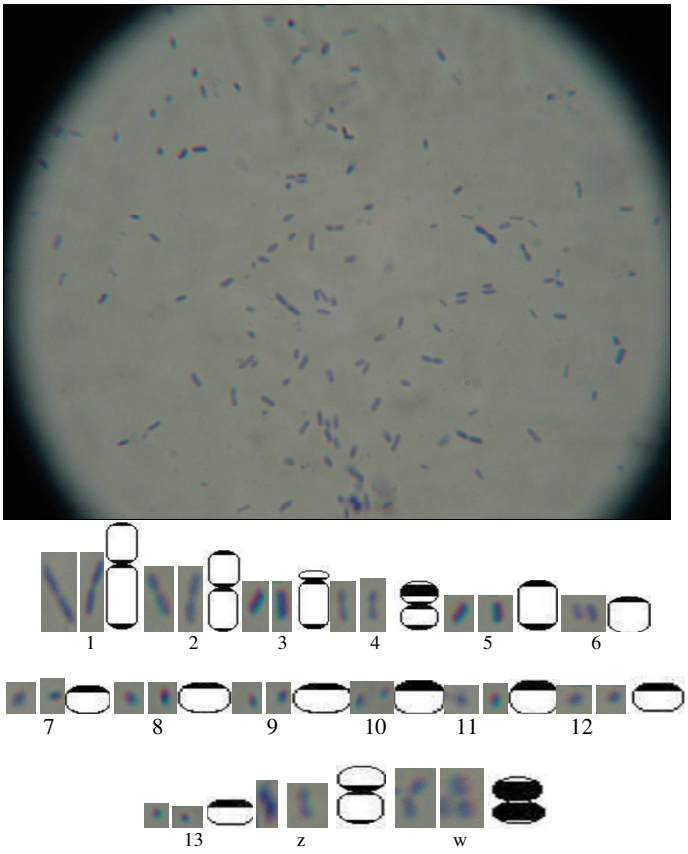

Figure 18. Ideogram and karyogram of the chromosomes of the red crested Pochard (CBG banding).

that gene. Evolutionary power proceeds by forceful of these changes in allele incidence in one direction or any more. Differences disappear when an allele reaches the end of fascination, when it either disappears from the population or replaces the inherited allele completely.

Variation comes from mutations in genetic material, migration between populations (gene flow), and the reshuffling of genes through sexual breeding. Variation also comes from exchanges of genes between different species; in spite of the stable forward of variation through these processes, most of the genome of a species is the same in all individuals of that species. However, even moderately small changes in genotype can lead to powerful changes in phenotype.

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