A case of Gynandry in the Lady Amherst's Pheasants

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Abstract

Female birds, once they reach sufficiently advanced age, can suddenly grow male plumage and take on male behaviours. This has led to the common myth that some birds, more accurately female pheasants, undergo a spontaneous sex reversal at a later age. This paper makes an effort to shed light on the long-running mystery of why some birds seemingly change sex, with instances of two female Lady Amherst's Pheasants (*Chrysolophus amherstiae*) at Padmaja Naidu Himalayan Zoological Park, Darjeeling.

Fig 1. Male Lady Amherst's Pheasant

Fig 2. Female Lady Amherst's Pheasant

Introduction

Padmaja Naidu Himalayan Zoological Park, Darjeeling houses a total of 12 (2:10) Lady Amherst's Pheasants (*Chrysolophus amherstiae*), of which five females are housed at the Park and the rest at the Conservation Breeding Centre for Pheasants and Herbivores at Dow Hill, Kurseong. Recently there were reports of two of the females changing their sex and turning into males and acquiring male plumage pattern. On closer inspection it was found to be a case of Gynandry (C.H. Bigland and F.E. Graesser, 1955) where, the female Lady Amherst's Pheasants had reached the menopausal stage. In such a stage the female suffers major hormonal changes which lead them to acquire male plumage pattern that becomes more prominent with each subsequent moult. The female also becomes infertile during Gynandry.

Materials and methods

At the end of last year's (2014) breeding season, the five female Lady Amherst's Pheasants underwent molting. After which, two of the females were observed to develop male plumage gradually. The resemblance with the males became more prominent with passing time with the individuals developing male like capes and long tail feathers. The morphological changes were noted down. During this time the activities, such as feeding and locomotion of these changing females were also closely monitored. The two females were housed along with the other 3 females and the group was provided with normal feed; consisting of crushed maize, rice and wheat husk, onion, garlic, green leafy vegetables and boiled egg.

Observations

Morphological Changes Observed in the Gynandrous Females

Though the female pheasants resembled the male they lacked the true exuberance and grandeur of the male plumage (Fig. 1). The pheasants after the first moult

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Fig 3. The Gynandrous Female

were seen to have a red crest, complete with a silvery white and black cape (Fig. 3). Though the back feathers resembled the dull brown colour of the females they had elongated grey tail, along with orange feathers on the side. The neck region had greenish blue feathers, which resembled the males. Even the abdomen region was seen to be more whitish than the normal females (Fig. II.). If the pheasants survive, the appearance of the male plumage will be more pronounced with each subsequent molt. The gynandrous females were observed to be a bit lethargic and geriatric, which is quite natural during this phase.

The Reason Behind Gynandry

In female birds the adrenal cortex is known to secrete a small amount of the male sex hormone, testosterone along with the female hormone, oestrogen. The oestrogen is greatly responsible for ovulation and imparting the female sexual characteristics. The increased amount of oestrogen somehow suppresses the effects of testosterone, which otherwise is responsible for the male traits, throughout the entire period the female is capable of laying (Gurney, 2008). Once the female bird reaches the menopausal stage, ovulation ceases and the level of oestrogen falls rapidly, until it stops being produced. The small amount of testosterone being produced by the adrenal cortex starts expressing itself, as a result of which male characteristics appear. Although, female birds possess one pair of ovaries, but unlike mammals, use only their left ovary for egg production. Hence, when they cease ovulating, the hormonal swing is greater, compared to other groups of animals, hence the masculine traits are more pronounced (Corder, 1998). If the females continue to survive, subsequent moults will increase the male colouration but this will not achieve the brilliance of the actual male plumage. In captivity, with a good environment and a good diet, birds tend to live longer than their wild cousins so they have a greater chance of reaching gynandry before something predates them. This factor is increased considerably if the zoo where the birds live takes eggs for artificial incubation, causing the bird to lay additional eggs each year. The more eggs the birds lay, the more likely it will be that she will become gynandrous. There is some indication that a tendency towards early gynandry might be inherited, or that in-breeding might increase the likelihood. A poor quality diet could also encourage the development of gynandry.

Common confusion with Gynandrmorphism

Gynandromorphism is a rare abnormal condition in which both female (gyn) and male (andr) characteristics are displayed in one individual. The term gynandromorph is mainly used in the fields of Lepidopterology (butterfly/moth study), entomology (all insects) and ornithology (birds) (Graves, 1996). In butterflies and many insects and birds, gynandromorphism is quite noticeable because the male and female are sexually dimorphic, they have different physical characteristics. They may vary greatly in size, colouration and presence/absence of certain body parts. Some individuals have one half of that of the male and the other half of a female. This condition is known as bilateral gynandromorphism and is the result of genetic mosaicism (Stratton, 1995). This gave scientists a lot of information that unfortunately was completely misleading. The sudden appearance of male plumage on female birds is not genetic at all. It is purely due to hormonal imbalance in the body of the aging female. When people began dissecting female birds that suddenly displayed male plumage, they found atrophied or nonfunctioning ovaries. When they removed the ovaries from healthy female birds, many of them began developing male plumage. Estrogen is the only thing that keeps female birds camouflaged in browns and grays (Todd, 2007). As ovaries age and stop working, or if they for some reason sustain damage, the sudden loss of estrogen causes females to grow vivid plumage, and even start calling or crowing like male birds. This is most often observed in chickens, since they are the most commonly observed birds. This phenomenon has been shown to happen in many pheasants and even peacocks. As females peahens age, they will often grow full peacock tails, the way male peacocks do, although they won't fan them.

Discussion

It must be noted that, although the female pheasants acquire a masculine appearance but they do not transform into males. This is in contrary to the common misconception of people who refer to them as changing their sex. The true male might continue treating the gynandrous female as the other females in the flock and might continue display of breeding behaviour, but the female will not lay again. This phenomenon is quite difficult to identify in the wild since the identity of the female birds is not known. The presence of sexual dimorphism also helps in identifying the condition (Kimball and Ligon, 1999). During the moult, the gynandrous female appears quite lethargic and disinterested in life but if she survives, she again becomes rejuvenated. In the wild, these birds are often predated upon or they may die of other causes during these trying times. We think of male plumage as an extravagance that is added to birds. It seems as if it's more of a default that needs to be hormonally suppressed to keep from showing up.

Conclusion

Gynandrous females though might achieve the full pattern of male plumage, will always lack the true brilliance of it. Hence they are not fit to be kept in the display, since they can be identified by a professional but can be a matter of confusion to the other visitors, many thinking them to be either a sub species or a young male. These females due to their increasing testosterone levels might possess a threat to the other laying females and to the chicks in the pen. Moreover, the males might tire themselves out in attracting these females and thereby ignoring the true females in the process. This might hamper breeding. The females should be kept in separate well enriched pens, owing to their tendency of giving up on life easily. Lastly, keepers and officials should be made aware of this phenomenon in order to quickly identify the birds and thereby not using them in exchange programmes.

References

Bigland, C.H. and F.E. Graesser (1955). Case Report of Sex Reversal in a Chicken. *Canadian Journal of Comparative Medicine*. Vol XIX, No. 2. Pages 50-52.

Corder, J., (1998). It's All Down To The Hormones. *WPA News*, No. 56. Pages 42–43.

Graves, G.R. (1996). Comments on a Probable Gynandromorphic Black-throated Blue Warbler. *The Wilson Bulletin*. Vol. 108, No. I. Pages 178-180.

Gurney, J.H. (2008). On the Occasional Assumption of the Male Plumage by Female Birds. IBIS, *International Journal of Avian Sciences*. Vol 30. Issue 2. Pages 226-230.

Kimball, R.T. and J.D. Ligon (1999). Evolution of Avian Plumage Dichromatism from a Proximate Perspective. *The American Naturalist* Vol. 154, no. 2. Pages 182-193.

Stratton, G.E. (1995). A Gynandromorphic *Schizocosa* (Araneae, Lycosidae). *Journal of Arachnology.* 23. Pages 130-133.

Todd, R.B. (2007). *The Cyclopedia of Anatomy and Physiology*, Volume 2. Pages 717-718.

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