

## Population Status and Distribution Pattern of Red Jungle Fowl (*Gallus gallus murghi*) in Deva Vatala National Park, Azad Jammu & Kashmir, Pakistan: A Pioneer Study

Akram Subhani, Muhammad Siddique Awan, Maqsood Anwar\*, Usman Ali, Naeem Iftikhar Dar  
Department of Zoology, University of Azad Jammu & Kashmir, Muzaffarabad (AS, MSA), Departments of  
Wildlife Management (MA) and Environmental Science (UA), PMAS-Arid Agriculture University,  
Rawalpindi, and Machiara National Park, Muzaffarabad (NID)

**Abstract.-** A study was conducted during April- September, 2008 to determine the abundance and distribution of Red Jungle Fowl (*Gallus gallus murghi*) in Deva Vatala National Park, Azad Jammu and Kashmir. Study area was divided in to four localities/sites: Chhumb, Deva, Burmala and Vatala. Line transects and calling site counts methods were used to estimate the population of Red Jungle Fowl at study sites. A total of 34 line transects were walked in study area. A population of 109 individuals of Red Jungle Fowl was estimated in the study area for an overall density of 7.87 birds/km<sup>2</sup>. However, the bird density varied among the sites and was 6.07, 6.25, 8.75 and 15.63 birds/km<sup>2</sup> in Chhumb, Deva, Burmala and Vatala localities, respectively. Red Jungle Fowl occupied densely vegetated, hilly areas between 350m and 415m elevation, especially areas with grassland habitat followed by habitats with *Zizyphus mauritiana* and *Lantana camara* as dominant vegetation. Red Jungle Fowl seem to have pushed back into densely vegetated areas of the park mainly to avoid disturbance by local hunters, shepherds and grass cutters. Results of this pioneer study are important for conservation planning for this important and beautiful species in Deva Vatala National Park.

**Key words:** Red jungle fowl, Deva Vatala National Park, grassland habitat, threats.

### INTRODUCTION

**J**ungle Fowl are native to southern and southeast Asia (Genome Sequence Centre, 2006), from India eastward and Southern China to Malaysia and Indonesia. The domestic form is found worldwide, and hybridisation is widespread in these birds. Different species of Jungle Fowl were domesticated in Kenya during the early 1900s by Indians brought to Kenya to build the railway. While the domestic chicken has mostly derived from the Red Jungle Fowl, recent research done by Eriksson *et al.* (2008) suggests possible hybridization with the Grey Jungle Fowl.

There are four species of jungle fowl: Javanese Green Jungle Fowl (*Gallus varius*), Ceylonese Jungle Fowl (*Gallus lafayettei*), Indian grey Jungle Fowl (*Gallus sonnerati*) and Red Jungle Fowl (*Gallus gallus*). The Red Jungle Fowl is an important member of pheasant family and is often

believed to be the direct ancestor of all the domestic chicken (Delacour, 1951).

The Red Jungle Fowl is classified into five sub-species based on variation in home range, size of combs and facial wattles, size and colour of the earlobes, and length and colour of male hackle feathers. The Cochinese sub-species (*Gallus gallus gallus*) is found in Cochinese (China) Cambodia and nearby Islands, Vietnam (except extreme north) and eastern Thailand. The Burmese sub-species (*Gallus gallus spadiceus*) is found in South-western Yunnan, Myanmar, Thailand (except extreme east), Northern Laos, Malaysia and Northern Sumatra. The Indian sub-species (*Gallus gallus murghi*) is found in northern and North-eastern India, Assam and the lower ranges of the Himalayas and Southern Kashmir. This sub-species is found sporadically from the plains to 2135m, rarely occurring above the foothills in the Sal forest and adjacent scrub. The Tonkinese sub-species (*Gallus gallus jabouillei*) is found in North Vietnam (Tonkin), the extreme southeast of Yunnan, Kwangsi, Kwantung and Hainan. The Javan sub-species (*Gallus gallus bankiva* or *G. g. ferrugineus*) is found in Indonesia, the southern half of Sumatra, Jawa and Bali

\* Corresponding author: [maqsoodanwar@uaar.edu.pk](mailto:maqsoodanwar@uaar.edu.pk) -  
[awanzoajku@hotmail.com](mailto:awanzoajku@hotmail.com)

(Johnsgard, 1999).

Red Jungle Fowl (*Gallus gallus*) are of the size of domestic fowl. Males are 65-75cm in length and 672-1450g in weight, while females are 42-46cm in length and 485-1050g in weight (delHoyo *et al.*, 2001). Male and female birds show very strong sexual dimorphism. Males have large red flashy wattles on the head and long, bright gold and bronze feathers forming a shawl or cape over back of the bird from neck to lower back. The tail is composed of long, arched feathers that initially look black but shimmer with blue, purple and green in good light. The colourful cock also has vivid scarlet-red facial skin, throat, two lappets and heavily dented fleshy crest (comb), and red or white ear patches on the sides of the head (Delacour, 1951; Animal Diversity Web, 2006; Wild Singapore, 2006). The female plumage is typical of this family of birds in being cryptic and designed for camouflage as she alone looks after the eggs and chicks. The rather drab female is a dull brown-golden colour (Genome Sequence Centre, 2006) with a partly pale red face and throat (Delacour, 1951).

Red Jungle Fowl utilize a variety of habitats, but are thought to prefer extensive, undisturbed mixed forests for foraging as well as breeding (Ali and Ripley, 1989). This sub-species occupies most tropical and sub-tropical habitats throughout its extensive range including mangroves scrubland and plantations, Red Jungle Fowl seem to prefer flat or gently sloping terrain, forest edges and secondary forest (Animal Diversity Web, 2006; delHoyo *et al.*, 2001). It is found from sea level up to around 2,500 meters (delHoyo *et al.*, 2001) from rain forests to dry lands in Southeast Asia.

Red Jungle Fowl live in small flocks during the non-breeding season which extends from the summer through the autumn and winter (Delacour, 1951). They have a hierarchical social system with a pecking order for both males and females. At the onset of breeding season in the spring, each of the stronger cock maintains a territory with three to five hens (Delacour, 1951). During the breeding season, the male birds announce their presence with the well known "cock-a-doodle-doo" call that is similar to that of the domestic cousin, but somewhat shriller and with a more abrupt ending. This call is uttered

principally at dawn before sunrise and at dusk before sunset (Ali and Ripley, 1989). Like most pheasants, Red Jungle Fowl roost in trees singly or in pairs. Collias and Collias (1967) found the average number of birds using single roost to be only about five.

Hens produce 4-7 eggs per clutch, which are incubated for 18-20 days by the female only (delHoyo *et al.*, 2001; Animal Diversity Web, 2006). At twelve weeks of age, the young are chased out of the social group by their mother, go off to join another group or form their own group (Animal Diversity Web, 2006).

Red Jungle Fowl is generally considered common and widespread despite habitat loss and poaching within its range (Wild Singapore, 2006; World's Galliformes, 2006). The bird is affected relatively little by habitat loss because it can occupy a variety of habitats, including secondary vegetation and man-made habitats such as rubber and oil-palm plantations and planted fields on forest edges (delHoyo *et al.*, 2001).

Red Jungle Fowl are threatened by habitat destruction, poaching, egg collection, predation, and genetic hybridization, (Ali and Ripley, 1989; Peterson and Brisbin, 1999). Leopards, mongooses, jungle cats, yellow-throated martens, various hawks and eagles, great horned owls, lizards and snakes all are potential predators of Red Jungle Fowl. Snakes, lizards, rodents, small carnivores probably consume eggs and chicks (Johnsgard, 1986). However, genetic contamination through interbreeding with domestic and feral chickens poses the greatest threat, pushing pure wild Jungle Fowl to the verge of extinction (Animal Diversity Web, 2006; World's Galliformes, 2006). Eclipse plumage, one indication of pure stock, is now seen only in population in the western and central regions of the species' geographic range. It is, therefore, feared that high density human populations with associated domestic chickens could contaminate the Red Jungle Fowl genetically, thereby threatening the purity of the species (Wild Singapore, 2006; Brisbin, 1997). Red Jungle Fowl are classified as least concern (LC) in the IUCN Red List of 2007 (IUCN, 2008).

There have been no previous reports of Red Jungle Fowl in Pakistan including southern part of Azad Jammu and Kashmir (Roberts, 1991) and

nothing is known about its status and distribution in Pakistan. This study was a preliminary investigation of the distribution, population status and habitat utilization of Red Jungle Fowl in Deva Vatala National Park (DVNP), AJ&K. The results are intended to provide a basis for conserving this sub-species and establishing a basis for conducting further studies.

## MATERIALS AND METHODS

### Study area

The study was conducted in the Deva Vatala National Park, which is located in sub-division Burmala, district Bhimber in south-east Azad Jammu and Kashmir (Fig.1) in Pakistan. The area was up-graded as national park from game reserve in 2007 and encompasses 2,993 ha. The park is surrounded by River Tuvi and occupied Kashmir in the east on Line of Control. Elevation ranges from 306m to 411m and temperature ranges from 5 to 46°C. Maximum rainfall is in the months of July and August (GoAJ&K, 1985). The study area has got many small ponds each with a *Ficus* tree at the bank.

For the purpose of collecting data, the study area was divided into four localities: Chhumb, Deva, Burmala and Vatala. These localities contain a few streams that become active during the rainy season. Chhumb is located at 306m-381m elevation towards east of the study area. It contains hilly area as well as flat areas covered by mixed natural vegetation. The dominant tree species include *Launea coromendaliana*, *Zanthoxylum armatum*, *Acacia nilotica*, *Butea monosperma*, *Mangifera indica*, *Cassia occidentalis*, *Dalbergia sissoo* and *Calotropis procera*. Shrubs include *Lantana camara* and *Ziziphus mauritiana*. The dominant herbs are *Silvia spp.*, *Saccharum spontaneum* (Sroot) and *Trichodesma indica*.

Deva is located at an elevation range of 306m to 381m. Natural herbal flora includes *Salvia spp.*, *Saccharum spontaneum*, *Trichodesma indica*, *Dalbergia sissoo*, *Butea monosperma*, *Mangifera indica*, *Acacia nilotica*, *Aesculus indica* and *Acacia modesta* are important tree species whereas *Lantana camara* and *Ziziphus mauritiana* are dominant shrub species.

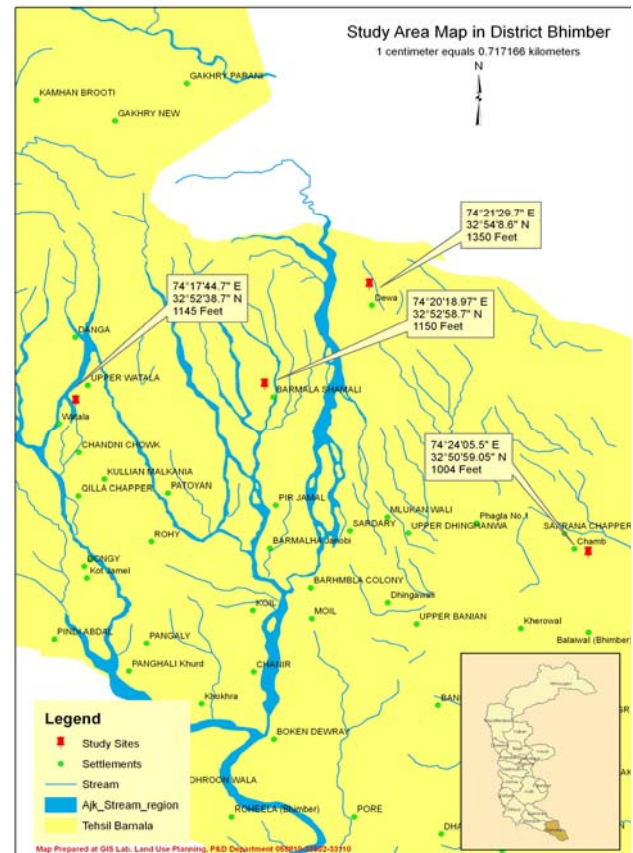


Fig. 1. Map of Deva Vatala National Park showing study sites.

Burmala is totally hilly area at an elevation of 350m-411m with seasonal streams. The whole area consists of thick vegetation including *Salvia spp.*, *Saccharum spontaneum*, *Dodonea viscosa*, *Lantana camara* and *Dalbergia sissoo* with patches of grasses.

Vatala ranges from 350m-396m altitude. This area consists of thick vegetation of *Dodonea viscosa*, *Lantana camara*, *Dalbergia sissoo* and *Mangifera indica*.

Major wildlife species of the study area include Nilgai, Jackal, Hare, Porcupine, Grey Partridge, Black Partridge, Indian Peacock, water birds (Shovelers, Coots, Mallards, etc.) and Indian Python (GoAJ&K, 1985).

### Study methods

Calling site counts method was used along the transect walk of fixed length (1 km) (Burnham

*et al.*, 1980). The calling site counts method is only reliable technique for estimating populations of pheasants (Gaston and Hunter, 1981). Each calling sites means four birds (one male, three females) as Red Jungle fowl is a polygamous species. Sighted birds were also counted during walking along transects. About two hours were spent at each transect at sunrise for noting the number of birds (Garson *et al.*, 1992). Population density in each locality was estimated on the basis of number of calling sites and sighted birds per area surveyed in km<sup>2</sup> (Awan *et al.*, 2004).

A total of 34 line transects, each of one km long, were laid in study area during the study period. During the walk on line transects, in addition to visual sightings, evidences like foot prints, feathers, pellets and scratches were noted and photographed.

## RESULTS AND DISCUSSION

### Population estimation

Total estimated population of Red Jungle Fowl at four study sites was 109 individuals for an overall density of 7.87 birds/km<sup>2</sup> (Table I). Chhumb had the maximum number of calling sites *i.e.* seven with calling sites density of 1.25/km<sup>2</sup>. The estimated population of Red Jungle Fowl at Chhumb was 34 individuals (Table I) that supported 32% of total estimated population (Fig. 2). While walking along transect, six Red Jungle Fowl were sighted in this area. Indirect evidences such as pellets, tail feathers, one arched feather, foot prints and scratches on dry manure were also observed. Maximum calls counted at this site were 46 during the breeding season. The minimum number of calls counted was 21. Six birds were sighted in Chhumb at two different points at 349m elevation.

At Deva locality, five calling sites were identified for a calling site density of 1.56/km<sup>2</sup> and population density of 6.25 birds/km<sup>2</sup>. Two birds were observed in this locality. A maximum of 45 calls were noted during the breeding season with the minimum number of calls was 21 recorded during the rainy season. Deva consisted of a number of small seasonal streams. Indirect evidences such as pellets, foot prints and feathers were also observed in this area. The estimated population of Red Jungle

Fowl at Deva was 22 birds and it contained 22.9% of total estimated population at all sites during the study (Fig. 2). This locality contained the least number of birds probably because of low water availability.

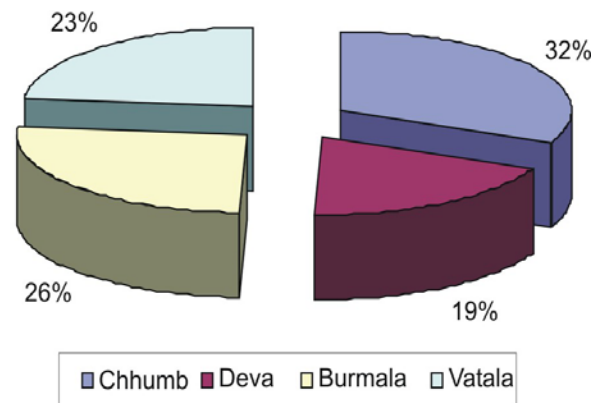


Fig. 2. Estimated population of Red Jungle Fowl at different localities/sites during 2008.

The Burmala locality had six calling sites for a density of 1.87 calling site/km<sup>2</sup> and population density of 8.75 birds/km<sup>2</sup>. The estimated population of Red Jungle Fowl at Burmala was 28 birds (Table I) and this locality contained 26% of total estimated population at all four locations (Fig. 2). Four birds were observed at this locality including a female with three chicks. The maximum number of calls heard was 56 during the breeding season; the minimum number of calls was 21. Signs of the presence of Red Jungle Fowl such as pellets, arched feather, white tuft feather and scratching on dry manure were also observed and photographed.

At Vatala study location, six calling sites were found for a calling density of 3.75/km<sup>2</sup> and a population density of 15.63 birds/km<sup>2</sup>. The estimated population of Red Jungle Fowl was 25 birds (Table I), which is 23% of the total estimated population at all four locations (Fig. 2). One bird was seen in this locality. Fresh pellets and feather were also observed as indirect evidence of their presence. A maximum 44 calls were heard during the breeding season; the minimum call record was 24 during non-breeding season.

The results indicated that the largest population of Red Jungle Fowl (32%) was at

**Table I. Population density of Red Jungle Fowl at different locations/sites during 2008.**

S.No.	Locality	No. of calling sites	Area surveyed (km <sup>2</sup> )	Calling site density (calling sites/area surveyed (km <sup>2</sup> ))	Population (calling sites + direct sighting)	Population density (No. of birds /km <sup>2</sup> )
1	Chhumb	07	5.6	1.25	34	6.07
2	Deva	05	3.2	1.56	22	6.25
3	Burmala	06	3.2	1.87	28	8.75
4	Vatala	06	1.6	3.75	25	15.63
Total population = 109						7.87

Chhumb locality and the smallest population (19%) was at Deva locality. The other two localities: Burmala and Vatala had 26% and 23% of the total estimated population, respectively at all four locations.

Population density of Red Jungle Fowl in Chhumb, Deva, Burmala and Vatala localities was 6.07, 6.25, 8.75 and 15.63 birds/km<sup>2</sup>, respectively for an overall density of 7.87 birds/km<sup>2</sup> in the study area. Studies conducted elsewhere on Red Jungle Fowl had shown different estimates of population density. Das (2006) estimated 5.39 birds/hectare in Rajaji National Park, India by using Distance 5.0 programme. However, Collias and Collias (1967) estimated a density of 100 birds/km<sup>2</sup> in Dholkhand range of Rajaji National Park on the basis of average flock size and average distance between roosts. Bump and Bohl (1961) estimated a density of Red Jungle Fowl (*Gallus gallus*) about 25-50 birds/km<sup>2</sup> in the Shivalik (India) during winter. The difference in bird density in different studies could be due to the use of different study methods and probably also due to habitat quality of study areas and many other factors such as season, annual variations and observer differences.

#### *Distribution pattern*

The Red Jungle Fowl in Deva Vatala National Park were generally observed in areas having *Lantana camara*, *Ziziphus mauritiana* and grassland. Other dominant plant species in its habitat include *Saccharum spontaneum*, *Dalbergia sissoo*, *Butea monosperma* and *Acacia nilotica*. Habitat areas containing *Lantana camara* and *Ziziphus mauritiana* species seem to be ecological indicator for Red Jungle Fowl in the study area, providing microhabitat, shelter, nesting sites and

escape cover. The species showed preference for area with a mix of slopes and plains. The open grassland patches in forests were also good for male to exhibit themselves better to attract females (Ali and Ripley, 1989). Habitat preference is a dynamic process as the natural systems are also dynamic. Many species are confined to specific habitat types (Winkler and Leisler, 1985), but some are versatile probably due to their greater plasticity in food and habitat choice and lack of competitors.

#### CONCLUSIONS

1. During the present study a population of 109 Red Jungle Fowl was estimated in four localities in the study area.
2. Chhumb locality was the prospective habitat having 32% of the estimated population followed by Burmala (26%), Vatala (23%) and Deva (19%).
3. The Red Jungle Fowl occupied an altitudinal range between 350m - 415m in Deva Vatala National Park, preferring sloping and densely vegetated areas, especially grassy patches
4. Plant species such as *Ziziphus mauritiana*, *Lantana camara*, *Saccharum spontaneum*, *Dalbergia sissoo*, *Butea monosperma* and *Acacia nilotica* were dominant in the habitat of Red Jungle Fowl.
5. Habitat areas containing *Lantana camara* and *Ziziphus mauritiana* seem to be ecological indicator for Red Jungle Fowl in the study area, providing microhabitat, shelter, nesting sites and escape cover.
6. Human disturbance by local hunters, shepherds and grass cutters has pushed Red Jungle Fowl back into the most dense

- shrubby areas of the park.
7. Further detail studies on population status and ecological/biological aspects of Red Jungle Fowl are needed for better management of this important bird in AJ&K.
  8. Deva Vatala National Park is the only area in AJ&K that supports population of Red Jungle Fowl and the protection and conservation of this park by concerned management agencies is critical to the survival of Red Jungle Fowl.

## REFERENCES

- ABSOLUTE ASTRONOMY. 2010. [http://www.absoluteastronomy.com/topics/Red\\_Jungle\\_fowl](http://www.absoluteastronomy.com/topics/Red_Jungle_fowl).
- ALI, S. AND RIPLEY, S. D., 1989. *The compact handbook of the birds of India and Pakistan*. Oxford University Press, Bombay, India.
- ANIMAL DIVERSITY WEB. 2006. <http://www.arkive.org/tracker/http://www.wildsingapore.org/chekjawa/text/f223.htm>
- AWAN, M. S., KHAN, A.A., AHMED, K.B., QURESHI, M.A., MALIK, M.A. AND DAR, N.I., 2004. Population Dynamics of Cheer Pheasant (*Catreus wallichii*) in Jhelum Valley, Muzaffarabad, Azad Kashmir, Pakistan. *Pak. J. Biol. Sci.*, **7**: 789-796.
- BRISBIN, I., 1997. Concern for the Genetic Integrity and Conservation Status of Red Jungle Fowl. *SPPA Bull.*, **2**: 1-2.
- BURNHAM, K.P., ANDERSON, D.R. AND LAAKE, J.L., 1980. Estimation of density from Line transect sampling of biological population. *Wildl. Monogr.*, **72**: 1-202.
- BUMP, G. AND BOHL, W.H., 1961. Red Jungle Fowl and Kalij Pheasants. U. S. Fish and Wildlife Service, Washington, D. C. Special Scientific Report, Wildlife No. 62.
- COLLIAS, N. E. AND COLLIAS, E.C., 1967. A field study of the Red Jungle Fowl in north-central India. *The Condor*. **69**:360-389.
- DAS, N., 2006. *Distribution, status and habitat preference of the Red Jungle Fowl in the Rajaji National Park*. Unpublished M.Sc. Forestry (Economics & Management) Thesis. Forest Research Institute, Dehradun, India.
- DELACOUR, J., 1951. *The pheasants of the world*. Country Life Ltd, London.
- delHOYO, J., ELLIOTT, A. AND SARGATAL, J., 2001. *Hand book of the birds of the world*. Vol. 2, *New World Vultures to Guinea fowl*. Lynx Editions, Barcelona.
- ERIKSSON, J., LARSON, G., GUNNARSSON, U.B., TIXIER, H. B. AND BIOCHARD, M., 2008. *Identification of the yellow skin gene reveals a hybrid origin of domestic chicken*. *Plos Genet*.
- GARSON, P.J., YOUNG, L. AND KAUL, R., 1992. Ecology and conservation of the Cheer Pheasant *Catreus wallichii*: studies in the wild and the progress of a reintroduction project. *J. Biol. Conserv.*, **59**:25-35.
- GASTON, A.J. AND HUNTER, M. L., 1981. *The Himachal Wildlife Project: Report on status and conservation of Wildlife in Himachal Pradesh, Western Himalayas*, University of Maine, Crona, U.S.A.
- GOAJ&K, 1985. *Wildlife in Azad Jammu and Kashmir*. Wildlife Wing, Forest Department Azad Government of the State of Jammu and Kashmir, Muzaffarabad. 53pp.
- IUCN, 2008. *IUCN Red List*. International Union for Conservation of Nature and Natural Resources. Gland, Switzerland.
- GENOME SEQUENCE CENTER, 2006. <http://www.arkive.org/tracker/http://genome.wustl.edu/genome.cgi?Genome=Gallus%20>  
<http://www.arkive.org/tracker/http://www.iucnredlist.org>
- JOHNSGARD, P.A., 1986. *The pheasants of the world*. Oxford University Press, New York
- JOHNSGARD, P.A., 1999. *The pheasants of the world: biology and natural history*. 2nd ed., Smithsonian Press, Washington D.C.
- PETERSON, T. AND L. BRISBIN. 1999. Genetic endangerment of wild Red Jungle Fowl *Gallus gallus*. *Bird Conserv. Int.*, **9**: 387-394.
- ROBERTS, T.J., 1991. *The birds of Pakistan* (Vol-II non-Passeriformes), Oxford University Press. Karachi. 617 pp.
- WILD SINGAPORE, 2006. <http://www.arkive.org/tracker/http://www.wildsingapore.org/chekjawa/text/f223.htm>.
- WINKLER, H. AND LEISLER, B., 1985. Morphological aspects of habitat selection in birds. In: *Habitat selection in birds* (eds. M.L. Cody), pp. 415-435. Academic Press Inc., New York,
- WORLD'S GALLIFORMES, 2006. [www.gbw.org](http://www.gbw.org):Dedicated to the Aviculture and Conservation of World's Galliformes.

(Received 23 July 2009, revised 29 March 2010)