

PRELIMINARY STUDIES ON INNATE BEHAVIOUR OF OPENBILL STORK, *ANASTOMUS OSCITANS*

¹Anuja A. Desale, ²R.B.Singh,

¹Assistant Professor, ²Associate Professor and Research guide
Department of Zoology, S.D.S.M. College, Palghar-401404 (M.S.). India

ABSTRACT

Innate behaviour of Openbill stork, *Anastomus oscitans* was studied in Palghar consecutive for three year from 2015 to 2017 where the birds are coming regularly for breeding purpose. Palghar is the newly carved district place of Maharashtra and very near to Mumbai. Observations were made in wild condition on different activities like preening, neck movement, flapping, fighting, movement, yawning, regurgitation and feeding. Preening and neck movement behaviour frequencies were highest and constituted about 70% of the total activities recorded. In this paper an attempt is being made to enumerate the innate activities of Openbill stork.

Key Words: Openbill stork, innate behaviour.

INTRODUCTION

The Asian Openbill stork, *Anastomus oscitans* belongs to the family Ciconiidae, is a resident colonial breeder in tropical southern Asia from India and Sri Lanka east to Southeast Asia. They breed near water bodies (Ali and Ripley 1983 and Hancock, et al_ 1992) and colonial in large mixed heronries sometimes several thousand pairs. Breeding season is mainly July to September in north India. November to March in the south; December to April in Ceylon; dependent on monsoon and water conditions. (Ali and Ripley 1972). High breeding densities are found near rivers, with regular flooded grass land (Cramp and Simmons 1977 and Goriup and Schulz 1991).

The nest site selection in birds can be an important determinant of reproductive success by affecting losses caused by predators and weather the two most important causes of nest failure (Nolan, 1963; Ricklefs, 1969 a). The self-maintenance activities are those that serve to remove sources of irritation, extraneous materials, care for the body surface and plumage, and counteract the effects of muscular activity (Potts 1976). Maintenance activities are concerned with locomotion and general health and efficiency of the body (Marler, 1956). They have been used in comparative studies to help determine the taxonomic relationships between several species (Andrew 1956, Morris 1958, and McKanney 1965). According to Van Lersel and Bol (1958), McKinney (1965), Dunham (1960) the studies on self-maintenance activities also provide basis for the study of sexual and agnostic behavior since many displays contain elements derived from body maintenance activities.

All observations on the behavior of Openbill stork were carried out at Palghar railway station. Innate behaviour of Openbill stork was observed from various time intervals throughout the day between 2015-2017. In this paper authors attempted to enumerate diurnal innate activities in breeding season like preening, neck movement, flapping, fighting, movement, yawning, regurgitation and feeding.

MATERIALS AND METHODS:-

The study area of Asian Openbill storks was Palghar district, Maharashtra. Geographic coordinates of Palghar-Latitude: 19°41'48" N Longitude: 72°45'55" Elevation above sea level: 17 m = 55 ft. Colonies of Asian Openbill storks at Palghar railway station were the study sites and regular observations were made at different time intervals of the day on different behavioral aspects. Observations were made with the help of binocular and Camera and naked eyes. (Fig. 1) Whole day was divided into class intervals of 10 minutes each. We kept observing one bird continuously for 10 minutes in one observation period. In another 10 minutes observations were shifted on different bird like this full day was covered from dawn to dusk. Then the average of all the observations of one hour was used as the frequency of that particular period. Finally the average of whole day was taken as the frequency of that particular activity for calculation purpose.



Figure 1. Colonies of Openbill storks at Palghar Railway station.

RESULT AND DISCUSSION

Preliminary innate activities of Openbill storks were observed during three subsequent breeding seasons between 2015 to 2017. It was observed that breeding season lasted for 6 months in Palghar area from Ist week of May to Ist week of November. During the breeding seasons different innate diurnal activities of Openbill Stork were recorded like preening, neck movement, flapping, fighting, movement, yawning, regurgitation and feeding. The frequencies of each activity recorded at different time intervals are given in Table 1 A to 1 C and Figure 2 A to 2 D.

Table. 1. A. Innate Activities of Openbill Stork during 2015

Time(hrs)	No. of activities								
	P	NM	FLP	PAC	FT	M	Y	R	FED
6-7	11.9	7.4	2.2	1	1	1.3	1.7	1	1.8
7-8	4.6	2.7	1	1	1	1	1.2	1	1.4
8-9	7.5	3.0	1	1.5	1	1	1.5	1.2	1.3
9-10	9.9	5.9	1	1	1	1.2	1.1	1.4	1.4
10-11	9.2	4.6	1.1	1	1	1	1.3	1	1.2
11-12	12.1	7.9	1.2	1	1	2	1.3	1.3	1
12-1	10.5	5.7	1	1	1	1.2	1	1	1.3
1-2	11.6	7.3	1.1	1	1.8	1	1.6	1	2
2-3	10.9	6.6	1.5	1	1.1	1	1.8	1.2	1.3
3-4	12.9	6.4	1.4	1	1.8	1	1.3	0	0
4-5	6.00	3.7	1	1	1	1	1	0	0
5-6	7.8	4.8	1.5	1	1.8	1	1.2	1	1
6-7	6.1	3.3	1.2	1	1	1	1.3	2	1
7-8	11.3	7.1	1.4	1	0	1	1	1	3
Total	132.3	76.4	17.6	14.5	15.5	15.7	18.3	14.1	17.7
Average	9.45	5.45	1.25	1.035	1.10	1.12	1.30	1.00	1.26

Table. 1. B. Innate Activities of Openbill Stork during 2016

Time	No. of activities								
	P	NM	FLP	PAC	FT	M	Y	R	FED
6-7	8.4	4.3	1.2	1	1	1	1.5	1	1.7
7-8	8.6	4.6	1.5	1	1	1	1.7	1	2
8-9	7.9	4.2	1.7	1	1	1	1.5	1	2
9-10	10.1	6.2	1.8	1	1.1	1.1	1.1	1.5	1.6

10-11	9.3	5.2	1.3	1	1.2	1	1	1	1
11-12	10.4	5.3	1.8	1.4	1	1.1	1.8	1.2	1.3
12-1	15.4	8.4	1.4	1	1.3	1	1.5	1.5	1.3
1-2	10	4.5	1.6	1	1	1	1.3	1	1
2-3	10	3.5	2	1	1	1.1	1.4	1.5	3
3-4	11.5	6	1.2	1	1.1	1.1	1.2	1	1.6
4-5	5.0	6.3	1.2	1	1.2	1	1.7	1	1
5-6	10.4	4.8	1.6	1	1	1	1.2	1.3	1.4
6-7	9.9	4.9	1.2	1	1	1	1.1	1	1.5
7-8	9.6	4.3	1	1	1	1	1.5	1.5	1.5
Total	136.5	72.5	20.5	14.4	14.9	14.4	19.5	16.5	21.9
Average	9.7	5.1	1.4	1.02	1.06	1.02	1.39	1.17	1.56

Table. 1. C. Innate Activities of Openbill Stork during 2017.

Time	No. of activities								
	P	NM	FLP	PAC	FT	M	Y	R	FED
6-7	12.5	4.2	1	1	1.2	1	1.5	1	1
7-8	9.3	9.3	1.3	1.5	1.2	1	1.4	1	1
8-9	11.0	13	1.4	1.2	1.4	1.2	1.8	1	1.5
9-10	9.4	10	1.2	1	1	1	1.4	0	0
10-11	13.1	17.2	2.7	1.1	1.2	1.1	2.7	1	1.5
11-12	10.5	7	2.5	1	1	1.2	1.6	1	0
12-1	5.5	3	2.3	0	1.6	1	1.3	2	1.6
1-2	10.7	6	2.3	1	2	1	1.1	1	1.5
2-3	15.2	4	1	1	1.2	1.1	4	1.5	2.5
3-4	15.4	7.2	3	1	1	1	3.2	1	1.5
4-5	16.4	8	2.3	0	1	1.5	1.6	1.2	1.4
5-6	17.7	10.2	1.7	1	1	2	3.2	1	1.5
6-7	17.3	12.6	2.2	1	1.4	1.1	1.3	1	2
7-8	11.1	15	1.6	0	1	1	2	1	2
Total	175.1	126.7	26.5	11.8	16.2	15.2	28.1	14.7	19
Average	12.50	8.59	1.89	0.84	1.22	1.15	2.00	1.05	1.35

(P-Preening, NM-neck movement, FL-flapping, P-packing, F-fighting, M-movement, Y-yawning, R- Regurgitation and F- feeding)

Figure. 2. Photos of different activities



A) Preening



B) Neck movement



C) Flapping



D) Yawning

The frequencies of maximum activities in descending order were preening, neck movement, flapping, yawning, fighting, movement, regurgitation, feeding, packing which were 52%, 25%, 9%, 6%, 3%, 2%, 1%, 1%, and 1% respectively. (Fig. 3)

Preening activity was recorded maximum during all the subsequent years, 2015, 2016, and 2017 which was 41%, 41% and 40% respectively. Preening was followed by Neck movement which was 24%, 22% and 29% respectively. These two activities constituted around 70% of the total activities recorded. Fighting, movement, yawning, regurgitation and feeding were minimum in all the 3 years. (Fig. 3)

Figure. 3 (A to C). % Wise Innate Activities of Openbill Stork during from 2015 to 2017.

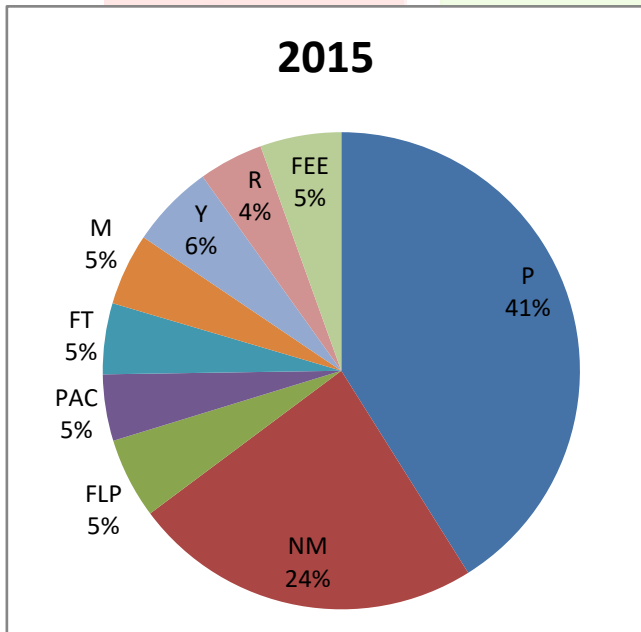


Fig. A

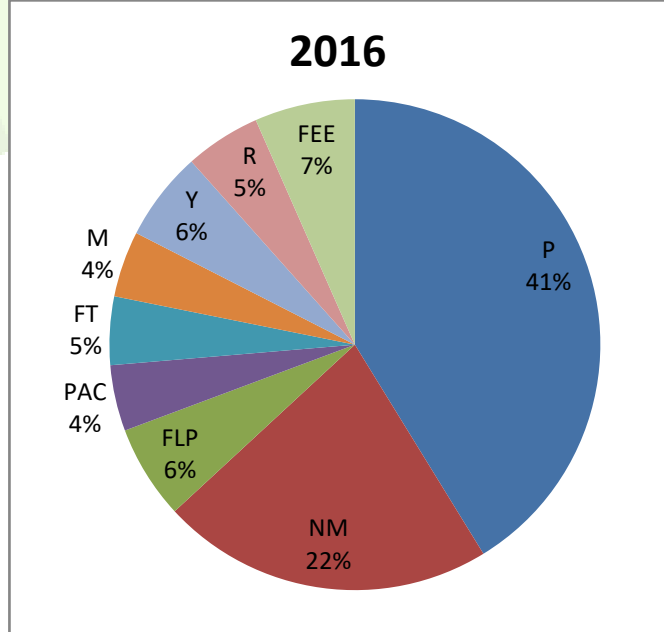


Fig. B

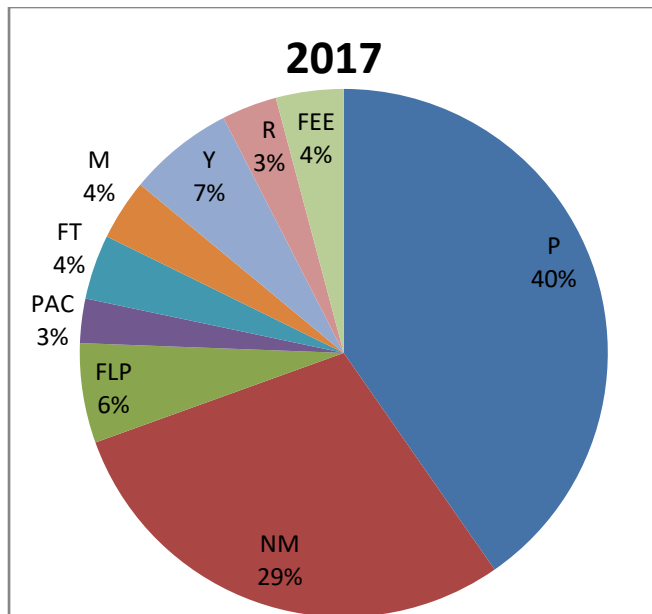


Fig. C

Aerial display, allopreening, copulatory behaviors were observed in Raiganj wildlife sanctuary, west Bengal (Pramanik et al., 2016). In Marottichal and Bhoothathankettu forests self-maintenance activities of Malabar Trogon were observed. (Varghese 1999). Preening is a type of behavior described and studied in many bird species, mainly in captivity, like budgerigars (Zampiga et al. 2004, Griggio and Hoi 2006, Griggio et al. 2010), domestic canaries *Serinus canaria* (Lenouvel et al. 2009), mallards *Anas platyrhynchos* (Delogu et al. 2010), feral pigeons *Columba livia* (Rózsa 1993, Waite et al. 2012), zebra finches *Taeniopygia guttata* (Kulkarni and Heeb 2007), with only few studies in the wild: swallows *Hirundo rustica* (Møller 1991), terns *Sterna* spp. (Van Iersel and Bol 1958, Palestis and Burger 1998), and Asian Paradise Flycatcher, *Terpsiphone paradise* (Singh et al 2017).

In our observations we found that preening and neck movement activities were highest. They spent more time for preening and neck movement activities which help them in social grooming and prevention from predator. In the first week of May every year Openbill storks landed at Palghar railway station breeding site. Immediately after arrival they started preparation of nests by using the branches of same trees along with the branches of different neighbouring trees. Choice of trees which included Rain tree, Neem, Pipal, Fig, Kagadi, Nilgiri, Jamun and Mango trees (Desale and Singh 2017).

Apart from these activities, It was also observed that Openbill stork were engaged in three more activities 1) flying to neighbouring trees for branches to construct/ maintenance of nest, 2) Foraging all around in the vicinity and 3) Soaring in the thermals. As compared to other birds in the colony, Openbill storks were found very calm.

Conclusion-

In our study at Palghar railway station it was found that Openbill storks migrated to this place for breeding in the first week of May every year and the breeding season lasted for six months from May to November. In the different innate activities at nesting site, Preening and neck movement was highest which about 70% of all the activities. This study will help to understand the energy budget for this bird and in turn their conservation.

References-

- 1) Ali, S. and Ripley, S. D. 1983. Hand book of birds of India and Pakistan. Oxford University Press, Delhi. pp. 110 – 112.
- 2) Ali, S. & S.D. Ripley. 1972. Handbook of the birds of India and Pakistan. Vol.7. Oxford University Press, Bombay. Pp. 218-220.
- 3) Alok Kumar Pramanik, Kalyan Brata Santra and Chanchal Kumar Manna 2016. Parental care and chick development of the asian open-billed stork (*anastomus oscitans*) in the raiganj wildlife sanctuary, west bengal, india, *International Journal of Plant, Animal and Environmental Sciences* :Volume-6(4) 61-71.
- 4) Andrew, R. J. 1956. Normal and irrelevant toilet behavior in *Emberiza* sp. *Br. J. (d-Inrr~Hie. huv.4*: 85-91
- 5) Cramp, S. and Simmons, K. E. L. (Eds). 1977. The Birds of the Western Pale arctic. Vol 1. Oxford university Press pp: 320 – 335 (Cited in Hall et al., 1987)
- 6) Anuja A. Desale, R. B. Singh 2017. Study of Nesting behaviour of Asian Openbill Stork, *Anastomus oscitan*, in Palghar, Maharashtra. *Quest International Multidisciplinary research journal (QIMRJ)* Volume 6(7), 14-20.

- 7) Dunham. D. W .1960. Maintenance activities of the Rose breasted Grusbeak. Wilson Bull 78:68-78.
- 8) Delogu M., De Marco M.A., Di Trani L., Raffini E., Cotti C., Puzelli S., Ostanello F., Webster R.G., Cassone A., Donatelli I. 2010. Can preening contribute to influenza A virus infection in wild waterbirds? – PLoS ONE, 5: e11315.
- 9) Griggio M., Hoi H. 2006. Is preening behaviour sexually selected? An experimental approach – Ethology, 112:1145–1151.
- 10) Griggio M., Hoi H., Pilastro A. 2010. Plumage maintenance affects ultraviolet colour and female preference in the budgerigar – Behav. Process. 84: 739–744.
- 11) Goriup, P. D. and Schulz, H. 1991. Conservation management of the White Stork. In: Salathe, T. (Eds.).
- 12) Hancock, J. A., Kushlan, J. A. and Kahl, M. P. (1992): Stork, Ibises and Spoonbills of the World. Academic Press, London. pp. 217 – 220.
- 13) Kulkarni S., Heeb P. 2007. Social and sexual behaviours aid transmission of bacteria in birds – Behav. Process. 74: 88–92.
- 14) Lenouvel P., Gomez D., Théry M., and Kreutzer M. 2009. Do grooming behaviours affect visual properties of feathers in male domestic canaries, *Serinus canaria*? – Anim. Behav. 77: 1253–1260
- 15) Manna, C. 2009. Nest-building Behaviour of the Asian Open Billed Stork in the Kulik Bird Sanctuary, Raiganj, Our Nature, 7: 39-47
- 16) Møller A.P. 1991. The preening activity of swallows, *Hirundo rustica*, in relation to experimentally manipulated loads of haematophagous mites – Anim. Behav. 42: 251–260.
- 17) Morris, D. 1958. The comparative ecology of Grass finches (*Erythrurae*) and Mannikins (Amadinae). Proc. 2001. Soc. Lond. 131: 389- 439.
- 18) Marler.P. 1956. Behavior of Chaffinch *Fringilla coelebs*. Behavior (suppl.) 5:1 - 184.
- 19) Mckinney, F .1965. The comfort movements of Anatidae. Behavior 25: 120-27b
- 20) Nolan, V., JR. 1963. Reproductive success in birds in a deciduous forest scrub habitat. Ecology 44:305-313.
- 21) Palestis B.G., Burger J. 1998. Evidence for social facilitation of preening in the common tern – Anim. Behav. 56: 1107–1111.
- 22) Potts, K. J. 1976. Comfort movements of the Kea, *Nestor notabilis* (*Psittaciformes, Nestoridae*) Notornis 23:302-309.
- 23) Ricklefs, R. E. 1969a. An analysis of nesting mortality in birds. Smithson Contrib. Zool. 9.
- 24) Rózsa L. 1993. An experimental test of the site specificity of preening to control lice in feral pigeons – J. Parasitol. 79: 968–970.
- 25) Singh, R. B., Desale, A. A., Gupta, R.V; Keni, S. J. , and Narvankar, S.S. & Kini, P.H., 2017. Nesting site activities in breeding time of Asian Paradise flycatcher, *Terpsiphone paradisi*, at Dandekar College, Palghar, Maharashtra. Paripex -Indian Journal of Research Volume: 6(1) 270-272.
- 26) Van den Bossche 2002. Conserving Migratory Birds. ICBP techn. Publ.12, Cambridge 393 pp.
- 27) Van Iersel J.J.A., Bol A.A.C. 1958. Preening of two tern species. A study on displacement activity – Behaviour, 13: 1–88.
- 28) Aby. P. Varghese 2002. Ecology and behaviour of malabar trogon, *Harpactes fasclatus malabarlcus*, Thesis submitted to Mahatma Gandhi University Kottayam
- 29) Waite J.L., Henry A.R., Clayton D.H. 2012. How effective is preening against mobile ectoparasites? An experimental test with pigeons and hippoboscids flies – Int. J. Parasitol. 42: 463– 467.
- 30) Zampiga E., Hoi H., Pilastro A. 2004. Preening, plumage reflectance and female choice in budgerigars– Ethol. Ecol. Evol. 16: 339–349.