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# ELA JOURNAL

The Quarterly Newsletter of Ela Foundation for Nature Conservation through Education and Research

## Editorial

Satish Pande

Water scarcity is the order of the time. Maharashtra is the second largest Indian state with sixty percent population living in rural areas. It is estimated that almost thirty percent of the state land is experiencing degradation, because of its location in the hot semi-arid eco-region; and about twenty six percent of the state area is drought prone. The rain falling in the coastal region of Kokan and in the western parts of the Sahyadri Mountains simply erodes the soil as it flows in the sea. The main cause of degradation of land cover is soil erosion, which in turn negatively affects agricultural yield, live stock grazing, storage capacity of the water reservoirs and forestry; ultimately causing a disastrous effect on the watershed potential of the region.

There are about fifteen hundred and five watersheds in the state belonging to five river basins. A great water stress is experienced by the people inhabiting all such regions. The estimated per capita surface water availability is of 592 cu m in the state. The monsoon received by the various districts of the state is variable and there are hundred drought prone talukas. The Deccan Plateau forms the major bio-geographic zone of the state, in terms of area, and in spite of poor rainfall and sub-optimal ground water availability; it is subject to a long standing insult of over-exploitation of water.

Of the total global water, only two and a half percent is fresh water, of which, thirty percent is available as ground water and remaining is stored as ice. People in rural areas depend on wells, hand-pumps, canals, ponds, rivers and springs for drinking water, most of which is not purified. However, the urban dwellers receive purified water for drinking. It should be noted that even if the entire population of the state is provided enough water, (200 liters per day per person), it would mean that less than two percent of the total rainwater from annual state rainfall will be sufficient. But for this to happen, we need excellent water harvesting and conservation measures. One of the major action plans is to make the surface soil more pervious to water seepage by carving serial contour

trenches, constructing small check-dams and planting trees, at all available places and locations. All these measures intend to slow down the speed of flowing water and augment seepage. If this strategy is supplemented by water reuse and conservation, this long term game yields sure shot results. There are several such examples in rural Maharashtra, where people have succeeded in increasing their ground water levels.

Ela Foundation has started this experiment in Ela Habitats. Seventy percent of trees planted in Ela Habitat, during the monsoon, by our members have survived. We have now initiated drip watering measures and mulching, to help these trees grow. The space vacated by non-survivors will be used for fresh plantations. Trenching activity has started and we hope to augment our ground water.

Apart from the sinking levels of ground water in the Deccan, several surface water bodies are experiencing pollution due to pesticides, sewage run off and industrial effluents. This has posed an unprecedented risk on the populations of amphibians that breed in fresh water. Today, the croaks of frogs are not easily heard in urban landscapes and the once deafening sounds of these noisy creatures are now silenced to a great measure, even in our rural regions. In this issue, we have two papers on these forgotten but important indicators of clean fresh water, the amphibians. The only long term solution for reducing the various risks to our eco-systems, including the aquatic habitats, is education. In this issue, we report one such novel attempt of reaching people, using the aid of art for conservation awareness. I can only hope that if such awareness programs are conducted in our rural regions, the children from our villages will be sensitized for the protection of our natural surroundings, which are very close and vey real to them. For a large segment of our urban folk, nature is a virtual reality.

On a lighter tone, Deepawali is here. Wish you all a Happy Deepawali! May your life fulfill with peace, happiness and light of knowledge.



## A report of *Duttaphrynus scaber* Schneider (1799) (Anura: Bufonidae), with Abnormal Toes, from Gavase, Kolhapur District, Maharashtra

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### Abstract:

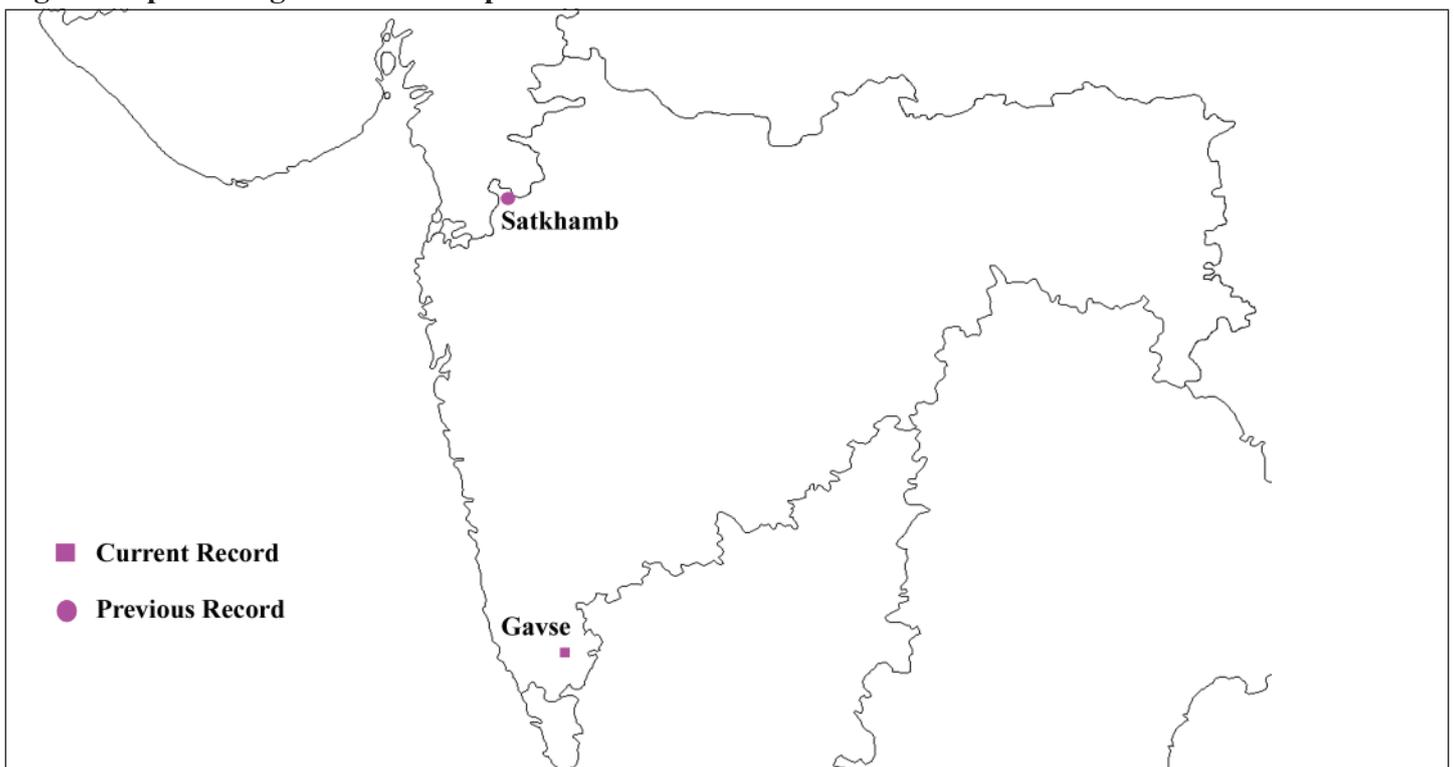
A toad, *Duttaphrynus scaber*, with hind limb abnormality was collected from Ajara-Amboli road. This is the first report of the species from southern Maharashtra and a second report of this species from the state. This short note is aimed to add to the existing information of species distribution along its range.

**Keywords:** Species distribution, brachydactyly.

A toad specimen was recently collected from the vicinity of village Gavase on Ajara-Amboli road (16.103°N, 74.124°E, 685 m ASL, Fig. 1) on 19<sup>th</sup> July 2013 at about 21:45 hrs. The specimen showed brachydactyly in both hind limbs. The collected specimen was preserved in



Fig. 1: Map showing localities of reports of *D. scaber* from Maharashtra State



**Fig. 2: Photographs of live specimen collected at Gavse – A: Dorsal View, B: Ventral View & C: Lateral View.** (All photographs by Anushree Jadhav)



absolute ethanol and deposited in the museum of Zoology Research Laboratory in MES' Abasaheb Garware College (AGCZRL Amphibia175). Morphometry of the specimen was done as per Dubois and Ohler (1999), with the help of Ocean IP 54 Digital Vernier calliper. This data was used for comparison of the collected specimen with morphometric measurements of three specimens given by Padhye *et al.* (2013). The gender of the collected specimen was confirmed by taking lateral abdominal incision and inspection of gonads.

The specimen was confirmed to be an adult female of *Duttaphrynus scaber* Schneider, (1799) (Fig. 2) with the help of descriptions in Dubois and Ohler (1999), based on the following characters: Small toad (SVL 28.92 mm) with broad head i.e. Head length (HL 8.20 mm) lesser than head width (HW 9.31 mm); Snout slightly longer than eye (SL 3.19 mm; EL 2.62 mm); inter-orbital space concave, larger (IUE 3.48 mm) than upper eyelid (UEW 2.42 mm) and inter-narial distance (IN 1.87mm); distance between front of eyes (IFE 5.08 mm) is less than two thirds of distance between back of eyes (IBE 8.79 mm); Rounded nostrils closer to the tip of snout (NS 0.64 mm) than to eye (EN 2.76 mm); Parotids glands present, rounded, with horny spines and warts, very prominent, slightly longer (PL 2.91 mm) than wide (PW 2.07 mm), shorter than distance between them (PD 4.70 mm); Canthal, supraorbital, postorbital, parietal and slight preorbital ridges present; Co-ossified skin absent; short arm (FLL 6.53 mm) longer than hand (HAL 5.89 mm); Fingers long, slender (TFL 3.86 mm); Relative length of fingers, shortest to longest is I<II<IV<III; Finger tips rounded, without grooves; Fingers without webbing or

any dermal fringe; Tibia more than three times longer (TL 9.74 mm) than wide (TW 2.23 mm) and longer than thigh (FL 9.30 mm); Foot length (FOL 10.12 mm); Tips of toes rounded, not enlarged, without grooves; Webbing formula: I0-1III1-2III2-3½IV3½-1V; Dermal ridge along toe V absent; Subarticular tubercles prominent, rounded, all present; Inner metatarsal tubercle elongated, prominent; Tarsal fold absent; Outer metatarsal tubercle present, prominent rounded; numerous tubercles on the sole of the foot and toes.

In the collected specimen, toes of both hind limbs showed brachydactyly (Fig. 3) i.e. short toes with normal number of metatarsal bones but number of phalanges reduced (Meteyer, 2000). The first toe of right foot (T1) and third, fourth and fifth toes (T3, T4 & T5) of left foot were abnormal. The locality of collection had short shrubs, few trees, road side gutter and paddy fields in surrounding areas. Gurushankara *et al.*, (2007) have described morphological abnormalities in natural populations of common frog species inhabiting the agro-ecosystems of central Western Ghats. The morphological abnormalities recorded in their study included abnormal limbs with hemimelea: short tibia-fibula; brachydactyly: short toe; ectrodactyly: missing digit; ectromelea: incomplete limb with missing lower portion as well as a tumour on the femur. They also reported eye abnormalities and bulging abdomen. Rajshekhar *et al.*, (2010) have shown brachydactyly in *D. melanostictus*. The limb and eye deformity in *D. scaber* has been reported by Arvind and Gururaja (2011).

Detailed morphometrics of specimen collected at Gavse, as given in Dubois and Ohler (1999), are given in Table 1,

**Fig. 3: Brachdactyly in circles A - Right foot (T1) and B – Left foot (T3, T4 & T5)**

(All photographs by Anushree Jadhav)



while comparative morphometrics of specimen collected at Gavase and data from Padhye *et al.* 2013 are given in Appendix 1.

It is a common species listed as Least Concern in view of its wide distribution, tolerance of a broad range of habitats, presumed large population, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category (Dutta & Manamendra-Arachchi, 2004).

As per the published records, *D. scaber* is distributed from Trivandrum in Kerala (Daniels 2005) to Ahwa, Gujarat (Padhye *et al.*, 2013) in Western Ghats. It also occurs outside Western Ghats at Chennai, Tamil Nadu; Banjara Hills - Hyderabad, Andhra Pradesh; Sambalpur District in Odisha and Shoolpaneshwar wildlife sanctuary, Gujarat. Recently the species has been recorded from north-eastern state of Manipur (Mathew & Sen 2009; 2010). Outside India, the species is reported from Sri Lanka (Dutta & Manamendra-Arachchi 1996; Padhye *et al.* 2013).

This species is generally present from sea level to 300m asl. This terrestrial species inhabits a number of habitat types including wet evergreen tropical forest, tropical dry forest, dry scrubland, grassland, coastal marshes and rural farmland areas. Adults are generally found under ground cover, or during the breeding season they are found in grasslands close to water-bodies. Larvae are aquatic and occur in stagnant waters (Dutta & Manamendra-Arachchi, 2004). Grampurohit *et al.*, (2008) have studied kinship influenced larval growth and metamorphic traits of this

species. Their findings demonstrated that, in *D. scaber*, kinship plays a role in driving the metamorphic traits in a context-dependent manner. They also showed that effects of kinship are expressed selectively under adverse ecological situations such as overcrowding. Deforestation for commercial purposes, pollution of land and water-bodies with agrochemicals and the loss of suitable habitat to urbanization are major threats to this species (Dutta & Manamendra-Arachchi, 2004).

Our report is the second record of *D. scaber* from Maharashtra and the first record from the southern region of Maharashtra state. Earlier it was known only from village Satkhamb from Surgana Taluka of Nasik District of Maharashtra (Padhye *et al.*, 2013). The presence of species at two extreme locations of Western Ghats of Maharashtra suggests that the species might also be present in localities between the two ends of Maharashtra. Hence, our paper also highlights the lacunae in the field studies from Western Ghats of Maharashtra.

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#### **Author Contribution:**

NM and AB collected the specimen, ADP identified the specimen, NM did the morphometry, NM and ADP prepared the MS.

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most limit of Western Ghats, with its advertisement call analysis. *Journal of Threatened Taxa* 5(11): 4579-4585.

**Table 1:** Morphometrics (in mm) of specimen collected from Gavase

AGCZRL Amphibia, Female Gavase, Maharashtra	
SVL	28.92
HL	8.40
HW	9.31
SL	3.19
EL	2.62
MN	6.26
MFE	4.27
MBE	1.23
IUE	3.48
UEW	2.42
IN	1.87
IFE	5.08
IBE	8.79
NS	0.64
EN	2.76
TYD	1.65
TYE	0.54
PL	2.91
PW	2.07
PD	4.70
FLL	6.53
HAL	5.89
TFL	3.86
F1	1.86
F2	2.13
F3	3.86
F4	2.50
FL	9.30
TL	9.74
TW	2.23
FOL	10.12
TFOL	13.72
T1	2.05
T2	4.47
T3	6.03
T4	9.95
T5	6.74

**Appendix 1:** Comparative morphometrics of specimen collected at Gavse and data given by Padhye et al. 2013.

Voucher Number	AGCZRL Amphibia 41	AGCZRL Amphibia 42	AGCZRL Amphibia 98	AGCZRL Amphibia 173
Gender	Male	Male	Female	Female
Place of collection	Supdahad, Gujarat	Supdahad, Gujarat	Thrissure, Kerala	Gavse, Maharashtra
Snout to vent length	24.2	25.5	36	28.92
Head length	7.4	7.8	11.8	8.4
Head width	8.5	8.8	12.8	9.31
Inter narial distance	1.5	2	3.2	1.87
Snout length	0.9	1.1	1.7	3.19
Eye diameter	2.6	2.8	3.8	2.62
Inter orbital distance	2.7	2.9	3.4	3.48
Width of upper eyelid	1.8	2.3	3.1	2.42
Tympanum dia. (horizontal)	1.1	1.2	2.3	1.65
Eye-tympanum distance	0.8	0.9	0.3	0.54
Forelimb length	17.3	17.9	20.7	16.28
Hindlimb length	28.1	28.6	41.6	32.76
Femur	6.6	7	11.7	9.3
Tibia	8.4	8.5	11.6	9.74
Foot	13.1	13.7	18.3	13.72
Length of parotid gland	1.8	2.2	3.5	2.91
Width of parotid gland	1.8	2.2	3.3	2.07

## NOTE ON THE NATURAL CROSSBREEDING IN FAMILY RHACOPHORIDAE, ANURA, AMPHIBIA

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Amphibian fauna of Maharashtra State is rich and diverse, with 53 species. (Padhye & Ghate 2013) and the family Rhacophoridae is represented by 6 species in Maharashtra. Rhacophorid frogs exhibit different reproductive strategies. In some species adults produce foam nests. Foam nests with eggs have been reported in genera such as *Rhacophorus* and *Polypedates*. The eggs develop into free swimming tadpole stages that metamorphose to juveniles. On the other hand, genera like *Raorchestes* have direct development (Aravind & Gururaja, 2010).

*R. malabaricus*, with average length of 10 cm, is one of the largest frogs in its family. Nesting behavior of *Rhacophorus malabaricus* has been studied by Sekar, (1989) while Courtship and nesting behavior of the Malabar gliding frog, *Rhacophorus malabaricus* is well studied by Kadadevaru & Kanamadi, (2000). According to them, after three to four heavy rains males and females emerge from hibernation. Males give calls to attract females. The females select a suitable leaf / twig of a tree overhanging a water body for making the nest, after the amplexus formation. Female rubs the back of the male by her hind limbs during amplexus. The male releases seminal fluid and agitates it to form the foam nest. Female deposits eggs in the foam and then covers the foam with leaves to complete nest making (Kadadevaru & Kanamadi, 2000). If the place or environmental conditions are not suitable for the nest these frogs make terrestrial foam nests. Females select the sloppy surface near the water body for spawning and use leaf litter to cover the foam. Modification of the reproductive mode from arboreal to terrestrial may be an adaptation to the changed environmental conditions. (Kadadevaru & Kanamadi, 2000).

In *Polypedates maculatus*, another common species of tree frog with average length of 7–8 cm, the male makes nest by beating its legs and agitating the seminal

fluid and then female lays eggs in that nest. Male starts calling to attract a female and clasps the attracted female. After amplexus formation, seminal fluid is released when female is appropriately stimulated to lay eggs. Eggs are deposited in the foam generated by male. The foam-nest is semiglobular in shape and sticky and gets attached to the substrate. Fresh foam is white, becoming dirty white or brown with time. Trees overhanging water tanks and pools are used as spawning sites (Girish & Saidapur 1999).

Though natural breeding and nesting behavior of the *R. malabaricus* and *P. maculatus* is similar, the advertisement calls differ from each other and therefore cross breeding is usually avoided wherever these species are sharing a common habitat.

During the biodiversity surveys at Amboli, observations on breeding behavior and vocalizations of *Rhacophorus malabaricus* were carried out on June 11, 2013, (00:48:40 am). The weather was cloudy, humid with heavy rains. Two frogs were observed making a foam nest on the wall of the water tank above the water level. This tank was in wild conditions in the garden of Forest Department at Amboli (15° 57'N, 73° 59'E), District Sindhudurg,

Maharashtra State. After having a closer look, it was realized that the male and female in the amplexus were belonging to two different species. The male in the amplexing pair was *Rhacophorus malabaricus* and female was *Polypedates maculatus*. Female of *P. maculatus* rubbed the back of the male *R. malabaricus* by her hind limbs, male released and spread seminal fluid to form the foam, by beating its legs and then female deposited eggs in the foam.

Crossbreeding of these two species was observed and video recording as well as photography was done using semi SLR and DSLR cameras (Canon and Fuji digital camera). The foam nest formed by this cross breeding pair was observed for next 8 days in the same habitat without disturbing it and was found to have unfertilized and hence undeveloped eggs. It is unusual for these frogs to crossbreed and this is probably the first photographic record of this unusual behavior.

**Uncommon cross breeding in amphibians (Image 1 and 2) showing the frogs in amplexus; Female of *P. maculatus* (Image 3) and male of *R. malabaricus* (Image 4) in the water storage tank in the garden of Forest Department at Amboli.**

Image: 1



Image: 2



Image: 3



Image: 4



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## Deities and their carrier vehicles: An Ethno-ornithological perspective.

### Gruda

Suruchi Pande

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In Hindu mythology and religion, Garuda – the eagle is respected as the carrier vehicle of Lord Vishnu and is often depicted and worshiped with him. In temples, we often find stone or wooden sculptures of Garuda. Garuda is believed to be the king of birds and is honoured because of his valour.

Interestingly, in the ancient art of strategic warfare, the army was arranged on the battle field in the shape of an eagle, the so-called *garuda-vyuha*. In the *Yogasanas* there is a unique posture known as *garudaasana*. The *Suparna Chiti* was a type of a fire altar with the shape of an eagle with wings spread. The text ‘Shulba Sutra’ (600 BC) describes geometrical measures of this altar.

Several folktales are woven around Garuda in various states of India. The ‘Guru Grantha Sahib’, religious scripture of Sikhs (voluminous text composed during the period of various Sikh masters from 1469 to 1708 AD) says,

“*jiu khaga raja bado ahiraaja samaaja kai kaata letaa kari leene ||*”

“The king of birds (an eagle) (easily) cuts the king of snakes in to pieces.”

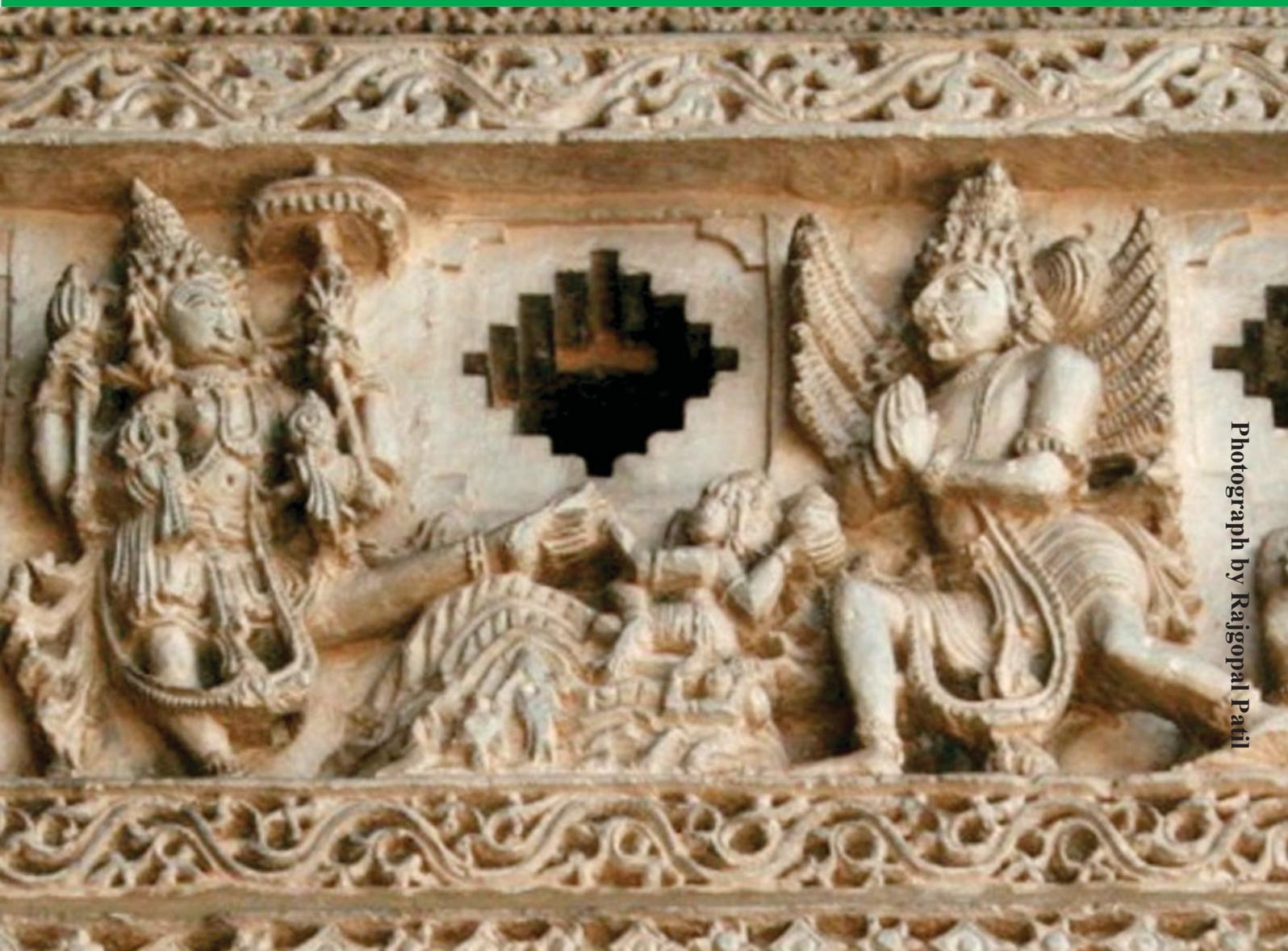
We find 57 synonyms of Garuda in the Mahabharata (400 BC – 400 AD), for example, *Suparna* – one who has beautiful wings; *Pannagashin* – one who devours snake; *Sumukha* – one who has a beautiful face and *Surucha* – one who is good looking. If we carefully analyze them, we appreciate that they are not merely synonyms but descriptions of various contemporary species of eagles in India.

There are references to an eagle from Rigved (1400 BC) where it was described as *Suparna*. The ‘Purana’ (4<sup>th</sup> c. AD) literature is full of praise



Photograph by Rajkumar Singh

Lord Vishnu and Garuda in a temple from Varanasi.



Photograph by Rajgopal Patil

### Lord Vishnu and Garuda depicted in a sculpture at Halebid - Belur, Karnataka.

for Garuda. It is said,

*“suparna: patataam shreshtho daaruna: pannagaashana: |”* (Vishnu Purana; 1.21.18 / date believed to be before 500 AD or 4<sup>th</sup> c.)

“The beautiful-winged one is superior among birds, he is fierce and devours snakes.”

The name of ‘Garuda Purana’ (about 10<sup>th</sup> c.) itself illustrates the religious importance of Garuda. Lord Shrikrishna says that He is Garuda amongst the birds. (‘Bhagavata Mahapurana’ – 11.16.15 date believed to

be before 1000 AD or 6/7<sup>th</sup> c.; and ‘Bhagavadgeeta’ – 10.30 which is the part of Mahabharata text). Garuda is not only linked with Indian Hindu thought but is an inseparable part of its very fabric, linking the way of life of people with nature in general and birds in particular and the traditions are still alive.

Birds in Astronomy 3

## Corvus – The Crow

**Mujtaba Lokhandwala\***

President, Jyotirvidya Parisansta, Pune

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Corvus is a small constellation in the southern sky. Its name is Latin for crow. It includes only 11 stars visible to the naked eye (brighter than magnitude 4.02) and is not included among brightest constellations. It was one of the 48 constellations listed by Ptolemy, (who counted only 7 stars), and still remains one of the 88 modern constellations. In the Indian system of Astronomy classification it is called as *Hastā Nakshatra*, 11<sup>th</sup> in calender series of the 27 *Nakshatras* or Lunar Houses as it is located near the zodiac.



Caption Please

**Corvus. All images in this article: Wikipedia**



### Corvus - The Crow Constellation.

Though it lacks prominent objects, there are some interesting objects in Corvus. Delta Corvi, traditionally called Algorab, is a double star divisible with small amateur telescopes. The primary is a blue-white hued star of magnitude 2.9 and is 88 light-years from Earth. The secondary is a purple-tinged star of magnitude 9.

There are no Messier objects in Corvus, however it has the Antennae, a peculiar galaxy, called NGC 4038 and 4039, which consists of two interacting galaxies that are undergoing a collision and appear to have a heart shape. The name originates from the huge tidal tails that project from the ends of the two galaxies,

formed because of the spiral galaxies' original rotation. Both original galaxies were spiral galaxies and are now experiencing extensive star formation due to the interaction of gas clouds. The galaxies are about 45 million light-years from Earth. The Antennae galaxies appear in a telescope at the 10th magnitude object.

Corvus or *Hastā* in India has an interesting folklore associated with it. When the Sun is near *Hastā*, it is time for the returning Monsoons and that time is associated with heavy but short spells of rains, called "*Hastācha Paus*" in Marathi.

## A report of Indian Skimmer *Rynchops albicollis* in Pune

Atharva Amdekar

The Indian Skimmer *Rynchops albicollis* was sighted on 2nd October, 2013 at Kavdipat near Pune - Solapur Highway, Pune, Maharashtra, India. A single individual was sighted at about 8:45 AM which was perched along the banks of the river with other species like Wood Sandpipers, Black Winged Stilts, River Terns and Whiskered Terns. This species, which is a very

rare species in Pune region is known for its ability to skim along the surface of the water, but this activity of the bird was not observed. This individual, due to its comparatively large size, also dominated over other terns and engaged in a few quarrels with them. .



**Rose-ringed Parakeets congregating on the window-grill where cobs were offered during monsoon. (Photograph and conservation initiative by Dr. Chandrakant Shete and Shantanu Shete, Satara.**

## Art for Nature Conservation

**Kajal Patel<sup>1,4</sup>, Sneha Rathod<sup>1</sup>, Tarkik Seth<sup>2</sup>, Priyanka Ambavane<sup>3</sup>, Sneha Rathod<sup>4</sup>,  
Radhika Joshi<sup>4</sup> and Chinmay Kulkarni<sup>4</sup>**

‘Department of Biodiversity, MES’ Abasaheb Garware College, Pune’  
(<sup>1</sup>Paper quilling, <sup>2</sup>Paper mashie, <sup>3</sup>Canvas paintings, <sup>4</sup>T-shirt fabric paintings)

Man has always been inspired by nature and its beauty and has tried to express it in the form of art. Art can be utilized as the best means to learn and express characteristics of various animal and plant species in simple and interesting ways. It can be used as a tool to make people, especially children, aware of the beauty and importance of flora and fauna. We, the students from the faculty of Life Sciences from M. E. S. Garware Colleg, Pune, have recently used an array of art forms such as painting, paper mashie, and paper quilling; T-shirt-paintings, poetry and cartoonist posters to convey key characters of various endangered species to spread conservation awareness during the Wild Life Week.

During the renaissance, French and Italian nuns and monks used paper quilling to decorate book covers and other items related to religion. In India it is increasingly becoming popular and we have used this art form for nature education. We have also utilized the art form of T-shirt paintings because it is widely visible and quickly

spreads conservation awareness. To quote Leonardo da Vinci, ‘A painter should begin every canvas with a wash of black, because all things in nature are dark except where exposed by the light.’ Art is light! Paintings of various bird species on canvas with details of plumages in colour were also used as exhibits to convey their beauty.

Paper mashie is a delicate decorative art which was born in Persia. Use of waste paper is made to make sculptures. This art travelled to India with moguls and it was widely used in Kashmir to make boxes, bowl, vases and even boats. We used it efficiently to convey the key characters and beauty of some animals.

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