passerine birds because the latter utilize this floral source to quench their thirst or hunger. Hence, *C. arborea* occupies a key position in sustaining bats and birds during dry season.

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Gender difference in phosphate transport by the mouse intestine

Gender differences in transport of endogenous and exogenous compounds have been recently reviewed[1]. However, in the intestine only calcium transport seems to show such sex-related variations[2]. In a bid to see if phosphate transport also exhibits similar variation, we studied the transport of this anion in everted intestinal sacs of mice.

Monitoring phosphate transport in everted gut sacs of mice was performed according to the methods described previously[3,4]. Briefly, male Swiss albino mice (25–30 g) of 3 months age were used for all the experiments. They were fed *ad libitum* with commercial feed (Ca = 1%, P = 0.6%) obtained from Gold Mohur Animal Feeds, Bangalore, for one week before the experiments. After overnight fasting, the mice were killed under ether anaesthesia. The abdominal cavity was opened and the entire small intestine from the pyloric end to the terminal ileum was detached carefully from the mesentery and kept immersed in ice-cold physiological saline.

After flushing out the contents with ice-cold saline, the intestine was everted gently with a steel rod and sacs of 6 cm length were prepared according to the method of Wilson and Wiseman[5]. After filling with 0.5 ml of the incubation medium (serosal fluid) and weighing, each distended sac was placed in 5 ml of the incubation medium (mucosal fluid) contained in a 25 ml Erlenmeyer flask. The contents of the flask were oxygenated for 1 min with 100% oxygen and tightly stoppered. The flask was then incubated at 37°C for 1 h in a metabolic shaker bath (Techno India Ltd, Pune, India) at a frequency of 100–110 shakes/min.

At the end of the incubation period, the sacs were removed from the flasks, blotted and weighed again. The serosal fluid was drained through a small incision into a test tube. The emptied sac was then shaken gently to remove the adhered fluid and the tissue was weighed again.

The incubation medium contained NaCl (135 mmol/l), KCl (11 mmol/l) and $CaCl_2$ (0.04 mmol/l) dissolved in 2 mmol/l phosphate buffer containing KH_2PO_4 and Na_2HPO_4 at pH 7.4.

The method of Chen *et al.*[6] was used to estimate inorganic phosphate. Volume changes caused by water transport were taken into consideration by weighing the empty and full sacs before and after incubation.

The fall in the phosphate content of the mucosal medium was treated as uptake of phosphate by the sac, while the rise of phosphate content of the serosal medium was taken as the release of phosphate by the sac. All the values are expressed in µmol/g tissue wet wt/h. Statistical comparisons were carried out using Students *t* test.

The present study indicates a clear sex difference in phosphate transport in mice (Table 1). However, this difference is noticeable only in the initial 6 cm segment of the intestine which corresponds to the duodenum. Since the plasma phosphate level did not show any difference, it is presumed that phosphate absorption in the other segments compensates for the shortfall in duodenal transport of phosphate observed in female mice. Age[7],

Table 1. Phosphate uptake and release by various segments of mouse intestine

	Phosphate uptake		Phosphate release	
Segment	Male	Female	Male	Female
1	9.1 ± 0.25	4.5 ± 0.23*	5.2 ± 0.20	2.5 ± 0.1*
2	1.3 ± 0.40	1.8 ± 0.50	1.0 ± 0.33	1.2 ± 0.15
3	4.0 ± 0.10	4.2 ± 0.10	2.8 ± 0.40	2.4 ± 0.50
4	4.8 ± 0.20	5.2 ± 0.30	2.8 ± 0.20	3.2 ± 0.30
5	7.0 ± 0.70	6.0 ± 0.80	4.2 ± 0.12	3.8 ± 0.25

All values are expressed as mean ± SEm of six observations in each group. Values marked * in the female groups are significantly less ($P < 0.005$) than those in males.

Table 2. Characteristics of mice used

Parameter	Male	Female
Age (days)	90 ± 5	90 ± 5
Initial body weight (g)	27 ± 4	26 ± 4.5
Final body weight (g)	33 ± 5	33 ± 6
Serum Ca (mM)	2.4 ± 0.10	2.3 ± 0.12
Serum PO_4 (mM)	2.2 ± 0.02	2.1 ± 0.01

diet[7], vitamin D[8] and other endocrine factors are known to affect the intestinal absorption of phosphate. Since the animals are fed with the standard pelleted mouse diet, it is unlikely that dietary differences are responsible for the observation. Since there is no difference in the age, body weight or weight gain of male and female groups of mice, food intake and age factors may not be responsible for the difference noticed in phosphate absorption (Table 2). Previous observations[2] indicate that there is no difference in the status of vitamin D or its receptors between the sexes. It is possible that sex hormones may play a role in phosphate transport. A fall in serum phosphate level has been reported[9] in patients of metastatic prostate cancer treated with high dose of diethyl stilboesterol, a synthetic estrogen. Testosterone seems to enhance calcium absorption in the duodenum of rats[10], probably through a mechanism distinct from vitamin D-mediated process[11]. Further research is needed to see if phosphate transport, especially by the duodenum, is also influenced by testosterone.

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A unique Late Bronze Age copper fish-hook from Bet Dwarka Island, Gujarat, west coast of India: Evidence on the advance fishing technology in ancient India

There are numerous evidences of the exploitation of marine resources, specially fishing by prehistoric man along the Indian coast. Hora[1] has rightly observed that 'prehistoric man in several parts of the world has gathered sufficient knowledge about fish through observation and made use of it in catching fish for food by the use of hook and line'. People of the Indus Valley Civilization were great seafarers and perhaps established their colonies overseas in Gulf countries[2,3]. While studying painting of fish on the pottery of the Harappan period, Hora[1] concluded that the fish painted on pottery are marine type. Perhaps baskets or traps were in use for catching fish, as a fisherman carrying two such baskets is painted on a potsherd. These records indicate that Harappans were more familiar with marine fishing. The distribution of shell bangles and other shell artifacts in every Harappan site is also indicative of a well-organized marine fishing activity. There are several fish-hooks from Mohenjo-daro[4], Harappa, Chanhu-daro[5], Lothal[6], Padari and many other sites located on coastal belt of Gujarat. Sarkar[7] has suggested great similarity between fish-hooks of the Indus Valley sites and modern ones; and he believes that this feature is suggestive of continuity of cultural trait.

The Sanskrit word *badisha* has been used for fish hook in ancient Indian literature, including the *Mahabharata*[1]. A 12th century AD Indian text *Manasollasa* written by the Chalukya king Someswara, mentions a chapter entitled[1] 'Matsyavinod' (pastime of fishing), and how a king can derive pleasure out of angling[1].

An onshore excavation was undertaken in Bet Dwarka island to obtain the cultural sequence and to understand the man–sea relationship. A large number of pottery items, beads of stone, shell and terracotta were found, besides copper artifacts. The recovered copper artifacts are coins, finger- and ear-rings and a well-preserved fish-hook. The present communication deals with the latter recovered from trench BDK-VI, located on the northern part of the island. A detailed discussion of its dating and a comparative study have been made here.

Bet Dwarka Island is situated in Okhamandal taluka, Jamnagar district, Gujarat. The island is about 3 km plying by boat from Okha port (Figure 1). The island is aligned northwest to southeast in 13 km with an average 4 km in east-west direction. Many archaeological sites have been discovered on this island since 1969 (refs 8–10), with much concentration on the southeastern and eastern coast of the island. A Late Harappan site was discovered in Par village near white tomb, on the northeastern coast of the island. The site is under cultivation and has been disturbed badly. A large number of Late Harappan period pottery has been collected from here.

A small trench (measuring 2 m × 2 m) laid at the highest point (Figure 2) yielded the habitational remains of 95 cm. The