(Fig. 1, A) occupied the right half of the uterus with its placenta being the most expansive. The other two foetuses (B, C) were accommodated in the left half of the uterus, the larger of the two (B) having a bigger placenta than that of the other foetus C. Sections of the ovaries of the mother revealed two corpora lutea in the left ovary and a single one in the right, indicating that the triplets are triovular. The differences in size and stage of development of the triplets may be due to delayed or deferred implantation of the left horn. This would mean that the ovulation took place simultaneously in both the ovaries and the blastocysts might have arrived later into the left horn of the uterus than in the right. The other interpretation to explain the inequality in the stages of development of the foetuses is that all the three blastocysts might have arrived simultaneously into the respective horns of the uterus but the milieu in the left horn did not permit as large a growth as in the right horn, probably due to vascular and nutritional insufficiency. However, the three foetuses do not exhibit retarded growth and the sections of the foetuses are normal when compared with those of the foetuses from single or twin pregnancies. That deferred implantation may be the more probable cause is further strenghthened by the fact that in another pregnant uterus, the right half was larger containing a bigger foetus and the left half had a smaller embryo; the ovary of this female also showed corpora lutea. If both the blastocysts had implanted simultaneously, they would have reached the same growth stage but as the left blastocyst probably arrived later, the right one had developed into a more advanced stage. The asymmetrical appearance of the uterus, however, is not of common occurrence and the reason for delayed implantation, if it occurs, is not known.

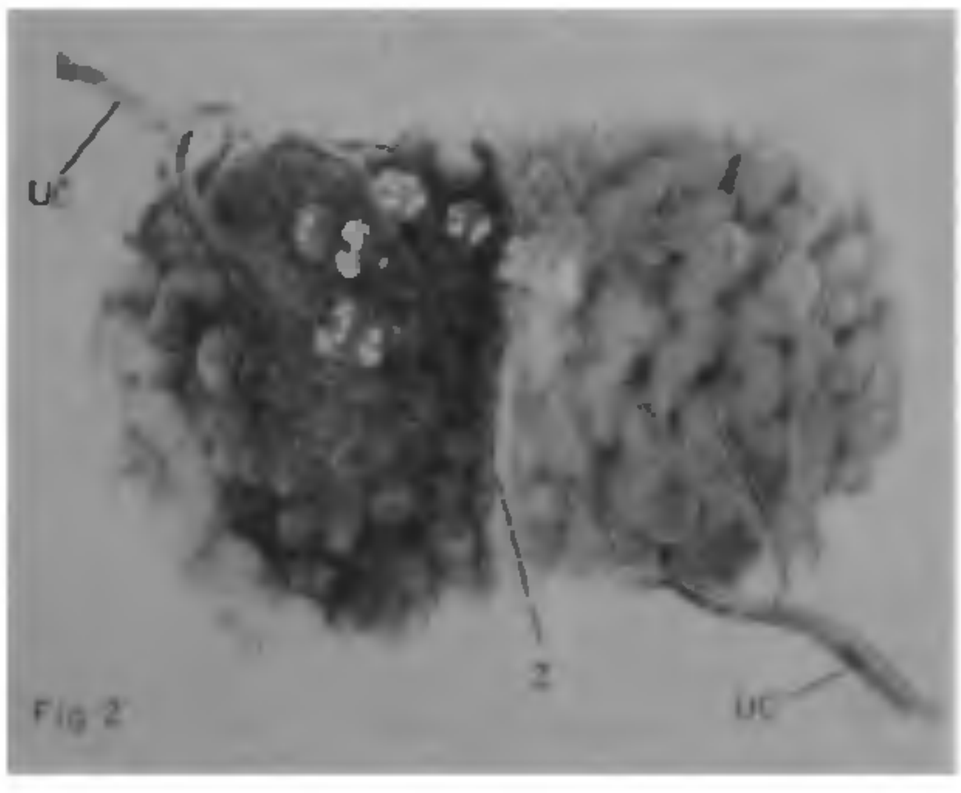

FIG. 2. Photograph of the placenta injected with Indian ink. Z. Zone of separation of the two placentae. ×2 (2¾″/3¼″).

There are both heterosexual and isosexual twins in the slender loris and there is no free-martin effect as the placental circulation of the foetuses is distinct[2]. In the triplets reported in this paper, foetuses A and C are males and foetus B is a female as confirmed by the histological details of the foetal gonads. The maternal and foetal circulations are separate and the epitheliochorial placentae of the foetuses have no vascular anastamosis as borne out by the photograph of the placenta injected with Indian Ink (Fig. 2). Indian ink injected into the umbilical artery of one of the foetuses did not enter the placenta of the adjoining foetus as seen in Fig. 2.

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Dept. of Zoology, K. M. KADAM.
Bangalore University, M. S. SWAYAMPRABHA.
Bangalore 560 001.
September 2, 1977.

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EFFECTS OF TOTAL BODY SUB-LETHAL DOSE OF GAMMA-IRRADIATION ON ASCORBIC ACID LEVELS IN PIGEON TISSUES

THE drop of ascorbic acid in irradiated tissues has been the subject of several studies[1–4]. It has been suggested that extent of the drop in the ascorbic acid level after irradiation may be a measure of the severity of emergency situation[1]. It has also been observed that X-irradiation of ascorbic acid in aqueous solutions results in a loss of 1·7 to 2·4 μmoles of ascorbic acid after 1000 rads[2]. In biological system however, lipid peroxides formed due to irradiation are believed to inhibit the microsomal synthesis of L-ascorbic acid[3]. Many reports are available concerning effects of total body irradiation on levels of ascorbic acid in different tissues of mammals[3–5]. To our knowledge no such data are available on effects of radiation on birds. The present study deals with effects of sub-lethal dose (400 rads) of gamma-irradiation on ascorbic acid levels in tissues of pigeon.

Thirty-five pigeon (*Columba livia intermedia* Strickland) of both sexes weighing approximately 270 g were fed with a mixture of equal amounts of bajra and sorghum

and tap water *ad libitum*. Animals were exposed to total body gamma-irradiation with Cobalt-60 (Theratron Junior). The radiation factors were 1·25 MeV and dose rate 99 rad/min. The animals were irradiated from the dorsal side with sub-lethal dose of 400 rads. The method of Roe[6] was used for the determination of ascorbic acid. Liver, major pectoralis muscle, kidney and spleen were removed, dissected free of fat and homogenised at 4 C with the required amount of 6% TCA and ascorbic acid was determined.

The results on the changes in the levels of ascorbic acid in the different tissues of pigeon following gamma-irradiation is shown in Table I. The distribution of ascorbic acid in control group was maximum in spleen followed by liver, kidney and muscle. The ascorbic acid was significantly decreased in muscle ($P < 0·01$) and insignificant decrease however, was observed in liver, kidney and spleen 24 hr after irradiation.

X-irradiation. Anderson and Harrison[10] however, have noted that only slight destruction of ascorbic acid occurred in minced rat muscle exposed to 22,000 rads *in vitro*. In the present study even at sub-lethal dose (LD 50/30 of pigeon is 900 ± 50 rads) the ascorbic acid levels decreased significantly in muscle and kidney. Various explanations are proposed for the reduction of ascorbic acid in different tissues after irradiation. However, the following category may fit in our finding. (i) Possibly cell ascorbic acid might be destroyed by the production of oxidizing radicals of water during irradiation in the cell[11], (ii) impairment in the synthesis of ascorbic acid may occur due to the excess production of lipid peroxides after the whole body irradiation[5] and (iii) that the irradiation activates the pituitary -adrenal system which may bring down the levels of ascorbic acid as shown by Patt *et al.*[12] and Waxler *et al.*[4].

TABLE I

Concentration of free ascorbic acid mg/100 gm fresh weight tissues of control and gamm-irradiated pigeons after 400 rads

Post-irradiation time (hours)	Liver	Muscle	Kidney	Spleen
Control	30·0 ± 1·50	10·0 ± 0·90	21·0 ± 2·10	33·0 ± 2·90
1-hour	28·0 ± 3·00	8·0 ± 0·80	18·0 ± 1·70	31·0 ± 3·00
24-hours	25·6 ± 1·30	6·0 ± 0·30[c]	15·3 ± 1·50	29·3 ± 2·80
48-hours	24·3 ± 2·30	4·3 ± 0·20[d]	12·3 ± 1·10[c]	27·8 ± 2·70
72-hours	23·3 ± 2·10[a]	1·3 ± 0·10[d]	10·3 ± 1·30[d]	26·0 ± 2·30

The levels of significance a — $P < 0·05$, c — $P < 0·01$, d — $P < 0·01$.

After gamma-irradiation (48 hr) the significant decrease was noted in muscle ($P < 0·001$) and kidney ($P < 0·01$). On the other hand, after 72 hr of irradiation the ascorbic acid levels decreased significantly in muscle ($P < 0·001$), kidney ($P < 0·001$) and liver ($P < 0·05$) as compared to normal non-irradiated tissues (Table I).

Ascorbic acid is known to take part in cellular respiration, protein synthesis and other metabolic functions. There have been many reports on reduced contents of ascorbic acid after irradiation in mammals. Kretzschmar and Ellis[9] have noted that the ascorbic acid of muscle and plasma are decreased immediately after irradiation and show marked decrease in adrenal ascorbic acid as well. Oster *et al.*[3] have found that mid-lethal whole body X-irradiation (710 *r*) may directly reduce the ascorbic acid content in different tissues of rat of the Long-Evans strain. Stripe *et al*[5] have also observed that the synthesis of ascorbic acid by rat liver extract was impaired after whole body

It is concluded from the present study that the sub-lethal dose (400 rads) of gamma-irradiation caused significant changes in the ascorbic acid level in the muscle and kidney of pigeon.

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Department of Zoology, University School of Sciences, Gujarat University, Ahmedabad 380 009, India,
P. K. GADHIA.
V. C. SHAH.

August 26, 1977.

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SOME NEW RECORDS OF CRUSTACEA FROM KASHMIR

THE available literature on the hydrobiology of Indian Waters pertains mostly to the plains; the highland waters of Kashmir (over 5000 ft. a.s.l.) have received very little attention. Only a few studies[1-5] regarding the planktonic forms of lakes and stray ponds have been made and these too are, by and large, of a preliminary nature. There seem to be no reports of similar studies on springs, some of which form chief sources of potable water and are of great tourist attraction. A series of studies has been undertaken to investigate the hydrobiology of the various water bodies of Kashmir of which the present contribution forms a part.

During the limnological studies of Beehama spring, 24 km to the North-East of Srinagar, the following plankters were collected :

ROTIFERA

1. *Trichotria tetractis* Ehrenberg.
2. *Euchlanis dilatata* Ehrenberg.

CRUSTACEA

Cladocera

3. *Simocephalus elizabethae* King.
4. *Pleuroxus similis* Vaura.
5. *Chydorus sphaericus* O. F. Muller
6. *Alonella exigua* Lilljeborg.

Copepoda

7. *Macrocyclops albidus* Jurine.
8. *Eucyclops speratus* Lilljeborg.
9. *Bryocamptus* sp.

Although all the nine species are first reports from the springs of Kashmir, the following two Cladoceran species and one Copepod species are being recorded for the first time from this part of the country.

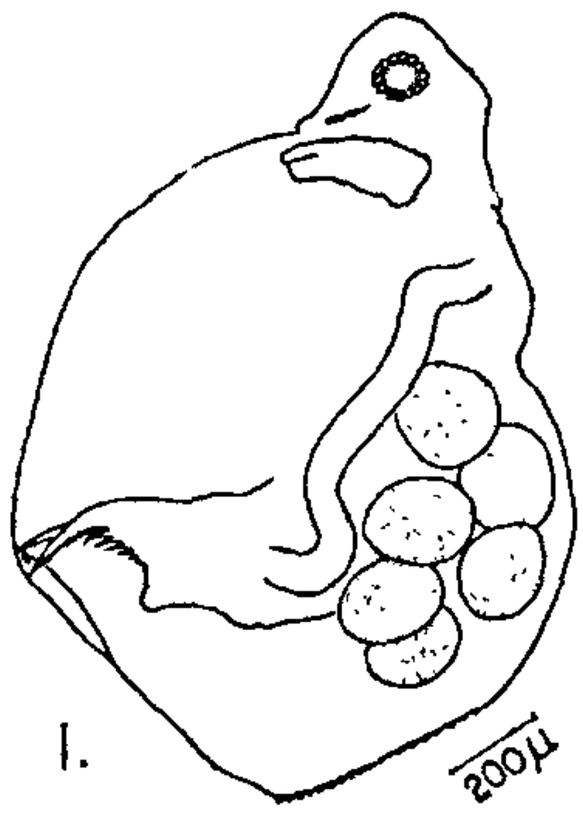
CRUSTACEA

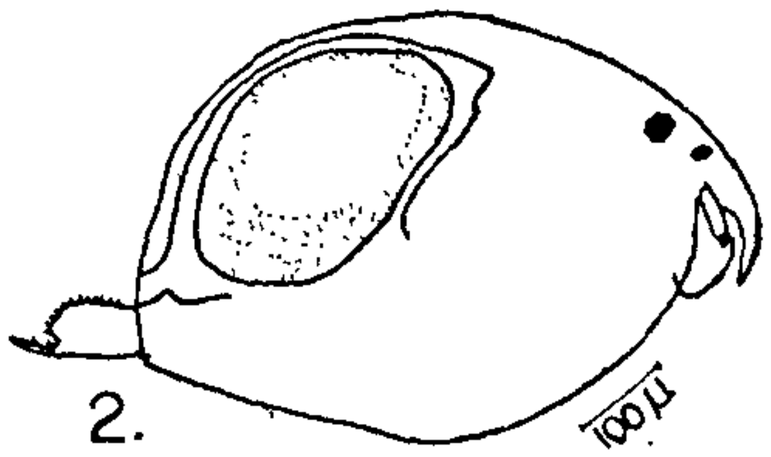
Cladocera

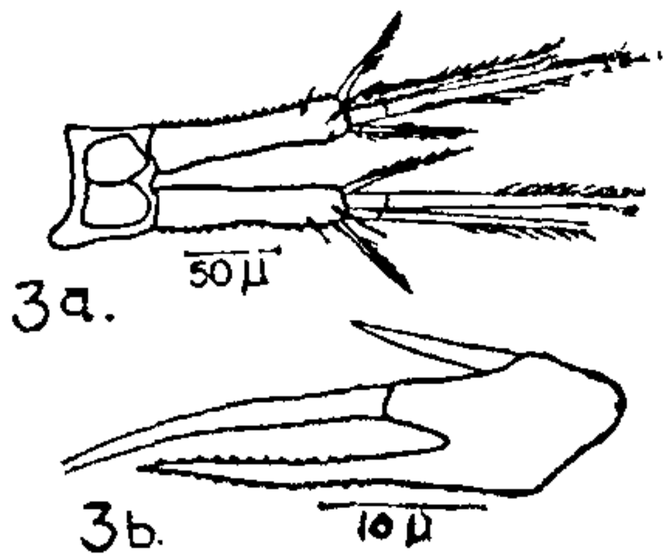
Family : Daphnidae

Simocephalus elizabethae King. (Fig. 1).

A thick shell covers the large heavy body. Valves are large, somewhat quadrate, with rounded angles.







FIGS. 1–3. Fig. 1. *Simocephalus Elizabethae*, female. Fig. 2. *Pleuroxus similis*, female. Fig. 3. (*a*) *Eucyclops speratus*, caudal ramus, female, (*b*) *E. speratus*, leg 5th, female.

Small denticles are present along the postero-dorsal margin of the shell, increasing in size regularly toward the posterior extremity. A few spinules are present in the middle of the ventral