burrowing into sediments containing other females or males; males showed the same preference but to a lesser degree (Table, column 3). Both sexes are therefore gregarious, but females more so than males. The difference between males and females is highly significant ($\chi^2 = 43.56$, 1 d.f., $p < 0.001$). The experiment has been repeated many times with similar results.

Prompted by the demonstration of female sexual attractants in adult *Portunus* and *Gammarus*[10,11], we tested for a pheromone that would initiate gregarious behaviour using extracts of animals and water in which animals had been immersed; but the results were too variable and often not significant. At present we do not know how *Corophium* detects sediments containing previously burrowed animals. It may sense the physical presence of U tubes or actually recognise burrowed animals. We are investigating these matters further.

In summary, male and female *Corophium volutator* are gregarious, females being more so than males. Isolated animals behave differently to animals in groups. These results add weight to the view[1] that gregarious behaviour may be as common amongst adult mobile invertebrates in the sea as it is amongst the settling larvae of sedentary species.

Zusammenfassung. Untersuchungen im Laboratorium zeigen, dass besonders die weiblichen schlammbewohnenden Amphipoden, *Corophium volutator* (Pallas), in Scharen leben. Isolierte Tiere verhalten sich anders als Tiere in Gruppen. Wegen der grossen Streuung ergaben die Untersuchungen über das Vorkommen eines als Scharenreiz wirkenden Pheromons keine eindeutigen Ergebnisse.

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Cell Migration in the Intestine of Indian Desert Gerbil (*Meriones hurrianae* Jerdon) and its Relationship with the Radiosensitivity of the Animal

A correlation between the transit time of intestinal cells (time taken by the cells to travel from the crypt to the tip of villus) and radioresistance has been established in certain mammals. Considerable work that has been done on the effect of radiation on the Indian desert gerbil, *Meriones hurrianae* Jerdon, in this laboratory, indicates that the animal is comparatively highly radioresistant. The present investigation seeks to study the cell migration time from the crypts to the tips of the villi in the intestine of gerbil and to see if it is correlated to its radioresistance.

Material and methods. The animals, weighing 65 ± 5 g, were collected from the vicinity of Jaipur. They were acclimatized to the laboratory conditions for at least 1 week before the experiment. The animals were sacrificed in pairs from 1 to 120 h (12 autopsies in all) after a single i.p. injection of tritiated thymidine (H^3T), specific activity 6.0 Ci/m*M*, at a dose level of 25 μCi per animal. Small pieces of jejunum were fixed in Bouin's fluid and paraffin sections were spread on gelatin-coated slides. They were coated with nuclear emulsion (Kodak NTB2), using dipping method, and kept in the securely wrapped box for exposure at 4 °C for 6 weeks. The sections were developed and fixed following the normal autoradiographic procedure. They were stained with haematoxylin and eosin for studying the migration of labelled cells.

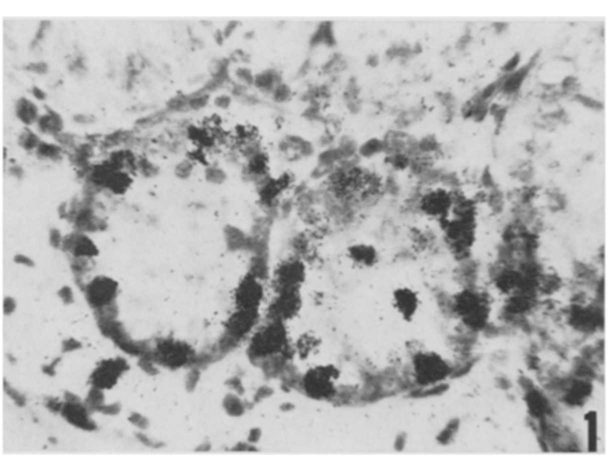

Fig. 1. Intestinal crypts 2 h after administration of tritiated thymidine showing labelled cells. ×400.

Results and discussion. At 2 h, many labelled cells are noted within the crypts, most of them confined to the basal region (Figure 1). At 4 h, the labelled cells are seen moving out of the crypts (Figure 2). The migration of cells in subsequent stages becomes slow. At 48 h, most of them are still seen in the lower region of the villi, with only a few of them having ascended about $^1/_3$ of the villous height. Thereafter the movement proceeds at varying rates. The labelled cells take approximately 120 h to reach the tips of the villi (Figure 3). Figure 4 shows the transit time in the small intestine of gerbil as compared to some other rodents.

A correlation between the migration time of the intestinal cells and radioresistance has been established by many workers[1-5]. Figure 5 shows the relationship between the transit time and LD_{50} values. It has been very nearly established that the rodents with slower rate of cell renewal, i.e. longer transit time, have longer survival time or greater radioresistance. The germ-free mouse, pocket mouse and multimammate mouse, which have a transit time of 121 h, 151 h and 134 h respectively, are considered to be radioresistant[6,7]. According to this

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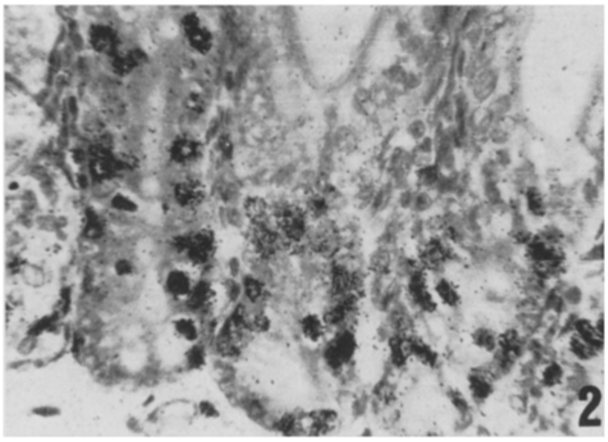

Fig. 2. Intestine 4 h after administration of tritiated thymidine showing the labelled cells moving out of the crypts. ×400.

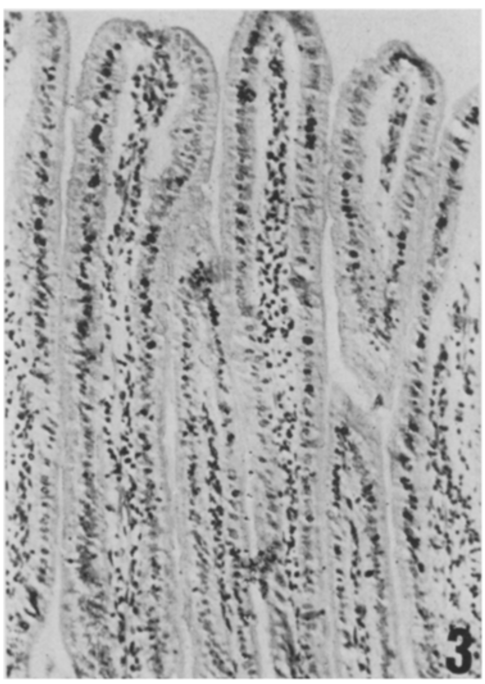

Fig. 3. Intestine 120 h after administration of tritiated thymidine showing the labelled cells at the tips of the villi. ×100.

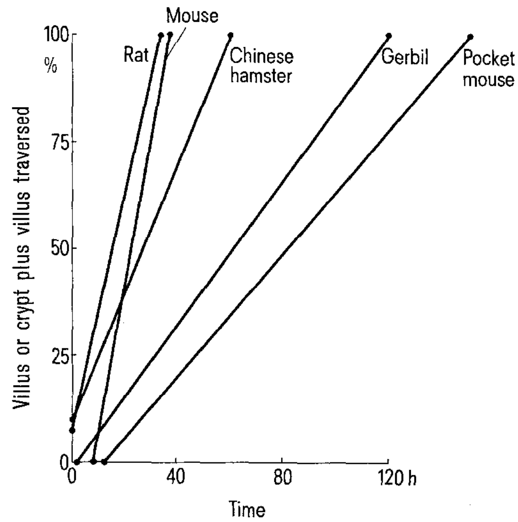

Fig. 4. Transit times in the small intestine of some rodents. The data of rat, mouse and Chinese hamster are after FRY et al.[12,13]; pocket mouse after GAMBINO and TOWNER[6], and that of gerbil after this report.

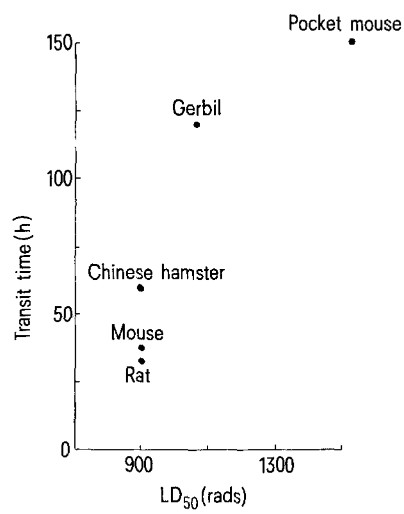

Fig. 5. The transit time of mucosal cells in the small intestine plotted against LD_{50} values in some rodents. The data of various animals are from: rat, WIDNER et al.[14]; mouse (C 57 Brown), BOND and ROBERTSON[15]; pocket mouse, GAMBINO and TOWNER[6]; and gerbil, this report.

parameter, the Indian desert gerbil, which has a transit time of 120 h, should be fairly radioresistant and comparable to germ-free mouse. The LD_{50} value of gerbil (Family Cricetidae) has been reported to be above 1000 R, which indicates a high degree of radioresistance[8,9]. This has also been shown by KAPOOR and SRIVASTAVA[10] and KUMAR and SRIVASTAVA[11].

Résumé. La durée du passage des cellules du fond de la crypte au bout des villosités du jéjunum du gerbillon de l'Inde (*Meriones hurrianae* Jerdon) a été mesurée pendant 120 h. Elle est en relation avec la radiorésistance de cet animal.

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