

Maternal Behavior in Males of Various Species

J. Rosenblatt has shown (1) that virgin female rats and males which have been repeatedly exposed to newborn young will care for infants of their own species. Although Rosenblatt classifies the reactions of both sexes as "maternal," it is illuminating to note that males of several mammalian species are strongly "paternal" and normally participate in the care of young. Within the order Rodentia this is true of several species or subspecies of mice in the suborder Myomorpha, genus *Peromyscus* (2). Male *P. maniculatus bairdii* wash and huddle over the young and rebuild the nest if it is destroyed. Male *P. maniculatus gracilis* cooperate with the female in moving the nest and litter if the original site is disturbed by the experimenter. Retrieving by nonparental male *P. leucopus noveboracensis* and cleaning of young by male *P. maniculatus nebrascensis* have been reported. The male Levante vole, *Microtus guntheri* (3) shares with the female parental care of the litter, and males are more prone than females to adopt foster young.

Rosenblatt's control males which had not been exposed to neonatal rats were inattentive to newborn animals and this may signify that in *Rattus* the male is deficient in parental tendencies. Calhoun's field studies (4) do not indicate that the male *R. norvegicus* participates in the rearing of litters.

On a priori grounds it might be anticipated that such behavior would be most highly developed in species whose reproductive pattern includes formation of a pair bond and extended postparturitional association between the partners, and this is not characteristic of *Rattus*.

An additional factor which might be associated with care of young by individuals other than the mother is the existence of a well-structured social group within which the mother carries out her reproductive functions. This feature characterizes the behavior of several species of primates, canids, and cetaceans. The defense of young by unrelated male chimpanzees (5) and baboons (6) is well documented. Nulliparous rhesus monkeys adopt the role of "aunt" (7), and comparable be-

havior has been reported for unmated female porpoises (8). Groups of adult male wild dogs, *Lacoan picta*, have been observed to feed orphaned litters by regurgitation and thus to insure the survival of the pups until they were old enough to run with the pack (9).

Rosenblatt's results show that, for one species of rodent, males can be induced to care for infants if the stimulus situation is properly manipulated, even though the hormonal condition characteristic of the lactating female is not duplicated in the male. However, for some mammals that form protracted mateships or that live in social groups, a tendency to protect and care for dependent, immature individuals may be characteristic of adults in general regardless of sex and parental or reproductive status.

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Tyrosine Transaminase Induced by Cycloheximide

The report by Mavrides and Lane, "Failure of cycloheximide to induce tyrosine transaminase in the anesthetized rat" (1) leads the reader to the erroneous impression that the inductive effect of cycloheximide on liver tyrosine transaminase in normal and adrenalectomized animals, reported by Fiala and Fiala (2) and by Rosen and Milholland (3), is nonexistent.

Taking into account the data of Fiala and Fiala, the data of Rosen and Milholland (which Mavrides and Lane ignore in their report), and the data from experiment No. 3, Table 1, of their own report, which they dis-

miss as erratic and unclear in significance, Mavrides and Lane might have entitled their paper "Inhibition of the tyrosine transaminase response to cycloheximide by pentobarbital anesthesia," because this is the effect that they demonstrate.

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In reply to Fiala and Fiala, the reports of Rosen and Milholland in abstract form contain no claim that the short-term effect of cycloheximide in the amount used by Fiala and Fiala and ourselves, or in any amount, is the induction of tyrosine transaminase.

Kenney, in a recent study (1) of the turnover of tyrosine transaminase in unanesthetized rats, demonstrated that cycloheximide stops degradation of basal tyrosine transaminase without a concomitant increase in its activity either 1 or 4 hours after treatment. Thus, his data fully support our report.

In view of Kenney's data, the use of the title chosen for us by Fiala and Fiala would have been erroneous indeed. They themselves speculate on the possibility of common targets for cycloheximide and hydrocortisone. If their speculation were true, pentobarbital anesthesia should also result in inhibition of the hormonal induction. Such inhibition is absent, as demonstrated in our report and previous work (2). The proposed title is therefore an unfortunate choice.

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