

and 40.95 (beak-clapping) and 0.82, 1.20, and 1.08 (vocalization).

Table 2 (bottom line) shows that the ten duck fetuses also showed a marked increase in rate of bill-clapping and vocalization during the 30-second aural stimulation period. (The increases in rate of bill-clapping and vocalization are both statistically reliable at $p < .01$ according to the Wilcoxon paired replicates test.) Nine of the ten duck fetuses contributed to the increased rate of bill-clapping and all of the fetuses contributed to the increase in rate of vocalization during the aural stimulation period. The five unstimulated control fetuses did not show an increase in rate of bill-clapping or vocalization. Their average rates per minute for the three consecutive periods were 58.94, 42.80, and 53.54 for bill-clapping and 1.5, 2.0, and 2.6 for vocalization.

Both the chick and duck fetuses almost always vocalized between, but not during, each burst of their respective parental calls, as if they were responding to the offset of the auditory stimulation. On the other hand, beak- and bill-clapping occurred during, as well as between, bursts of the maternal calls.

Though this evidence indicates the presence of auditory sensitivity in highly developed chick and duck fetuses, further research is required to determine the limits of the sensitivity in terms of developmental age and type of auditory stimulation, and to answer the question of whether prenatal exposure to auditory stimulation actually affects the postnatal behavior of the fetus.

Shortly after hatching, naive chicks

and ducklings can discriminate the maternal call of their own species in simultaneous discrimination tests involving the maternal calls of other species (9). Also, with reference to the post-natal elicitation of the following-response, naive ducklings and chicks are more reactive to the maternal call of their own species than to the maternal call of other species (9). The present results raise the interesting possibility that the auditory discriminative capacity of chicks and ducklings is operative prior to hatching.

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References and Notes

1. G. Gottlieb and Z.-Y. Kuo, *J. Comp. Physiol. Psychol.*, in press.
2. G. Gottlieb, *J. Comp. Physiol. Psychol.* **56**, 86 (1963); *Science* **139**, 497 (1963); *Nat. Hist.* **74**, 12 (1965).
3. J. J. Peters, A. R. Vonderahe, T. H. Powers, *J. Exptl. Zool.* **139**, 459 (1958).
4. G. W. Paulson, *Exptl. Neurol.*, in press.
5. G. Gottlieb, *Anim. Behav.* **11**, 290 (1963).
6. Malpositioned fetuses were not used. Canding, cutting the shell, insertion of electrodes, and recording were performed under controlled conditions of temperature and humidity, and extraneous auditory and vibratory stimulation was specifically avoided.
7. The original chicken maternal (leading) call was obtained by N. Collias [*Animal Sounds and Communication*, W. E. Lanyon and W. N. Tavolga, Eds. (American Institute of Biological Sciences, Washington, D.C., 1960)], and the original duck maternal (exodus) call was obtained by G. Gottlieb [*Nat. Hist.* **74**, 12 (1965)].
8. Sound level measurements were made on scale B of a calibrated General Radio sound level meter, with a standard sound pressure reference level of 0.0002 μ bar (a pressure of 0.0002 dyne/cm²) at 1000 cy/sec.
9. G. Gottlieb, *J. Comp. Physiol. Psychol.*, in press.
10. Supported by NIH research grant HD-00878 and the North Carolina Department of Mental Health. Patricia Bush provided valuable assistance in the execution of the experiment and the analysis of the data.

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Cesium-137 in Alaskans

The latest report from the Hanford group on cesium-137 body burdens in Alaska [H. E. Palmer, W. C. Hanson, B. I. Griffin, L. A. Braby, *Science* **147**, 620 (1965)] is of the greatest interest; the more detailed publication of their studies should be still more so. The authors report that cesium-137 levels in Eskimos and Indians have continued to increase, as was expected, and will probably increase still further in the coming year. These increases have meaning only when compared to some bench-mark value, however, and the lack of such a standard in this report seems to be an important omission.

The Federal Radiation Council has established a Radiation Protection Guide for the average body burden of cesium-137 of a population at 1000 nanocuries. The RPG for individuals is 3000 nanocuries. One of the villages studied by the authors (Anaktuvuk Pass) has already exceeded the RPG for populations, and one person (not included in the average) was found in this village with a burden of 3000 nanocuries, the RPG for individuals. The comparison of the current measurements with FRC standards is particularly important in view of the authors' comment that "the amounts of Cs¹³⁷ in caribou meat and Alaskan natives can be expected to increase next year."

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