

# Reports

## Gestation Period and Twinning in Chimpanzees

**Abstract.** The length of the gestation period in 118 births in a colony of chimpanzees was found to be 226.8 days, with a standard deviation of 13.3 and a range of 196 to 260 days. Six pairs of twins were born in 120 parturitions; thus the apparent twinning rate is higher than that in man.

Yerkes and Elder (1) reported that 20 chimpanzee births occurred in these laboratories up to 1 July 1937. Nissen and Yerkes (2) described an additional 29 cases, including one twin birth, for the period ending 1 April 1943. Both papers describe certain behavioral and physiological correlates of parturition. The present report (3) includes the data in the two previous papers and supplements them with information on births that occurred up to 1 August 1958. Among the 125 offspring obtained in these laboratories, there were 106 live single births, 6 single stillbirths, 6 pairs of twins (one pair of which was stillborn), and 1 case in which the gestation period is unknown. The number of pregnancies terminating in live or stillbirths for the 26 mothers varies from 1 to 11, with a median of 3.5. Miscarriages (defined by less than 190 days' gestation) are not included.

The estimated date of conception was calculated according to the method described by Nissen and Yerkes (2), who utilized the beginning of detumescence as a point from which ovulation can be determined. In the 118 parturitions (counting each twin birth only once) for which the duration of gestation period could be calculated, the mean

gestation period is 226.8 days, with a standard deviation of 13.3 and a range of 196 to 260 days. Two of the cases fall more than two standard deviations above the mean; these two gestation periods are 258 and 260 days, with the next highest value being 248 days. It is possible that an error in recording one menstrual cycle for each of these animals resulted in the unusually long gestation periods. If these two cases are omitted from the computations, the mean gestation period becomes 226.2 days, with a standard deviation of 11.8 ( $N=116$ ). The mean gestation period for viable single births only (with twins, stillbirths, and the two doubtful cases omitted) is 227.8 days, with standard deviation of 10.6 and  $N$  of 104. No significant differences were found between male and female offspring in duration of gestation period.

Nissen and Yerkes (2) found that the variability among the several pregnancies of individual chimpanzee mothers was greater than the variability among the averages for the same animals, in contrast to the findings of Hotelling and Hotelling (4) in man and to the statement of Snyder (5) in his review of several species. Nissen and Yerkes attributed the discrepancy to the relatively small  $N$  on which their computations were based. The number of multiparous females has now been increased to 21 (accounting for 111 births), and the direction and magnitude of the discrepancy persist. The mean average deviation in gestation period for the 21 mothers with plural offspring is 7.8 days, while the average deviation of the means for the same animals is 5.3 days.

The duration of early pregnancies tends to be greater than that of later ones, although there is considerable variability among animals in this respect. The median gestation periods for the first six pregnancies (ten or more cases for each median) are 234, 231, 227, 228, 229.5 and 224 days, respectively.

Statistics for birth weights have not changed significantly from those reported by Gavan (6).

The 92 parturitions which occurred in the period from the first colony birth in 1930 until late in 1951 produced one pair of twins; this ratio leads to the conclusion that the rate of twinning in the chimpanzee approximates that of man.

Since November, 1951, however, five additional pairs of twins have been born in 28 parturitions, raising the over-all twinning rate to 5 percent of the births. The reasons for the apparent increase in rate of twinning are not clear, but it is interesting to note that Breitingner (7) predicted in 1951, "Ich möchte glauben, dass, wenn in der Station [Yerkes Laboratories] künftig mehr und mehr ältere Weibchen mit mehreren vorausgegangenen Geburten zur Zucht gelangen, die Zwillingsgeburten eher zunehmen werden." The six pairs of twins were born to mothers ranging from 15 to 31 years of age at the time of parturition and represented the first, second, third, fourth, fifth, and eighth positions in ordinal of birth for the various mothers. An apparent increase in twinning rate in a colony of captive chimpanzees may be interpreted in light of Fischer's (8) theory of twinning as a newly acquired character consequent to man's "domestication" [as opposed to Schultz's (9) view that twinning occurs at roughly the same rate in most primates].

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## References and Notes

1. R. M. Yerkes and J. H. Elder, *Yale J. Biol. and Med.* 10, 41 (1937).
2. H. W. Nissen and R. M. Yerkes, *Anat. Record* 86, 567 (1943).
3. Many investigators through the years have contributed to the collection of these data. H. W. Nissen was primarily responsible for their collection and tabulation. The work has been supported in part by a grant from the National Academy of Sciences-National Research Council sex committee to Nissen, and in part by grants from the National Science Foundation, the Carnegie Corporation, and the Rockefeller Foundation.
4. H. Hotelling and F. Hotelling, *Am. J. Obstet. Gynecol.* 23, 643 (1932).
5. F. F. Snyder, *Physiol. Revs.* 18, 578 (1938).
6. J. A. Gavan, *Am. J. Phys. Anthropol.* 10, 23 (1952).
7. E. Breitingner, *Umschau* 18, 563 (1951).
8. E. Fischer, *Z. induktive Abstammungs u. Vererbungslehre* 54, 127 (1930).
9. A. H. Schultz, in *Primateologia* (Karger, New York, 1956), p. 1005 et seq.

7 November 1958

## Technique for Differential Reinforcement of Rate of Avoidance Responding

**Abstract.** A new avoidance conditioning procedure generates high rates of responding compared with previously used procedures. The effect of manipulation of one of the important temporal parameters in the procedure is reported.

In Sidman's initial series of avoidance experiments (1, 2), rats were given an electric shock through a grid floor at regular intervals unless a lever was depressed by the animal. Each lever depression reset the timer controlling the

**Instructions for preparing reports.** Begin the report with an abstract of from 45 to 55 words. The abstract should not repeat phrases employed in the title. It should work with the title to give the reader a summary of the results presented in the report proper. (Since this requirement has only recently gone into effect, not all reports that are now being published as yet observe it.)

Type manuscripts double-spaced and submit one ribbon copy and one carbon copy.

Limit the report proper to the equivalent of 1200 words. This space includes that occupied by illustrative material as well as by the references and notes.

Limit illustrative material to one 2-column figure (that is, a figure whose width equals two columns of text) or to one 2-column table or to two 1-column illustrations, which may consist of two figures or two tables or one of each.

For further details see "Suggestions to Contributors" [*Science* 125, 16 (1957)].