

fers to the occurrence of ovulation, fertilization, and subsequent implantation, of a second conceptus during an ongoing pregnancy, leading to the generation of two fetuses of different gestational ages within the same uterus. Reports of alleged superfetation in numerous mammalian species, including man, can be found in the literature dating from antiquity. The evidence usually cited in human cases includes the separate delivery, to the same mother, of full-term infants more than 30 days apart, or the birth or abortion of twin infants that are different in birth weight and developmental age. In addition, many reports of dichorial fetus papyraceus in man could also represent superfetation, although the accepted explanation has usually been arrested intrauterine growth. Even though these examples in the literature are numerous, no reference has been found which hypothesizes a physiological mechanism for explaining superfetation.

The most plausible explanation of the pedigree is that a dominantly inherited gene is segregating in the family which is expressed in the fetal placenta where it acts to reverse the normal hormonal inhibition of ovulation. The mutant gene could affect the structure or function of chorionic gonadotropin, the placental steroid sulfatases, or some other placental gene product that is involved in hormone synthesis. Since both the father and the mother contribute to the genotype of the placenta, superfetation could occur among the offspring of both males and females who carry the gene. However, even if a second ovulation did occur, superfetation would be observed only in the event of fertilization and successful implantation.

The frequency of superfetation in man is unknown. It is possible that the so called "father factor" identified in early studies of the inheritance of DZ twinning may be explained by superfetation. If an appreciable proportion of DZ twins can be shown to arise by this mechanism, it would have important implications for twin studies since it would identify a previously unrecognized source of variation in DZ twins. In addition, the origin of dichorial fetus papyraceus and racial differences in the incidence of DZ twinning should be reevaluated with this possibility in mind.

Dr. Walter E. Nance, Department of Medical Genetics, 1100 West Michigan Street, Indianapolis, Indiana 46202, USA

## HEREDITY OF TWINNING IN FAMILIES OF MZ TWINS

L. GEDDA, O. RUSSO, M. CAPONE

*The Gregor Mendel Institute of Medical Genetics and Twin Research, Rome, Italy*

Whereas the existence of some genetic factor underlying the phenomenon of twinning is almost generally accepted with respect to DZ twins, no such agreement exists with respect to MZ twins.

The possible existence of genetic factors underlying MZ twinning has been verified through an analysis of segregation in the sibships of MZ twins and in those of their parents, carried out on a sample of 60 MZ twin pairs (30 M and 30 F).

Haldane's a priori method has been applied, considering the sample as obtained through a complete and through an incomplete ascertainment.

The results may lead to cautiously confirm the hypothesis of some genetic conditioning of MZ twinning.

Prof. Luigi Gedda, Istituto Mendel, Piazza Galeno 5, 00161 Roma, Italy

## THE STUDY OF MULTIPLE-BIRTH FACTORS IN THE FAMILIES OF TWINS

R. P. MARTYNOVA, E. T. LILLYN

*Institute of Cytology and Genetics, Siberian Branch of the Academy of Sciences, Novosibirsk, USSR  
Institute of Medical Genetics, Medical Academy of Sciences, Moscow, USSR*

The study of the influence of hereditary and paratypic multiple-birth factors on the birth, in a given family, of MZ or DZ twins, has hitherto been relatively little considered.

Using multifactorial correlation and regression analyses, questionnaires of parents of 86 MZ and 173 DZ pairs, filled out through personal interviews, were analyzed by means of a computer. The questionnaire included 26 questions. The evaluation of the regression coefficient resulted in the establishment of six factors influencing the birth of MZ or DZ twins, and the study of the correla-

tion coefficient revealed a definite trend in this influence. These factors are, in MZ families, the increase in father's age, the use of contraceptives by the mother, the improvement of nutrition; and, in DZ families, the increase in mother's height, the deterioration of family relations, and mother's manual work.

Prof. R. P. Martynova, Institute of Cytology and Genetics, Siberian Branch of the Academy of Sciences, Novosibirsk 630090, USSR

## DELAYED OVULATION AND MONOZYGOTIC TWINNING IN THE RABBIT

ONDINE BOMSEL-HELMREICH

*Central Station of Animal Physiology, Jouy-en-Josas, France*

The following investigations on the quality of the mammalian egg have demonstrated that delayed ovulation may induce MZ twinning. We delayed experimentally ovulation in the rabbit: follicular maturation was induced by a small quantity of PMSG (Pregnant Mare Serum Gonadotropin, 16 UI four times); coitus, which induces ovulation in the rabbit, was delayed 60 hours after the last injection. From 387 blastocysts obtained after this treatment, 6 (1.5%) were pairs of MZ twins, twinning being otherwise exceptional in the rabbit. Other anomalies of the embryos appeared as well and seem to be related to a deficiency of

quality of the eggs: high embryonic mortality (62% vs. 27% in controls) and chromosomal anomalies (20%) such as trisomies, triploidies, and chimaeras. The relation between MZ twinning, chromosomal anomalies and embryonic mortality induced by delayed ovulation, could be connected and compared with the bad perinatal results frequently observed in human MZ twins.

Dr. O. Bomsel-Helmreich, Station Centrale de Physiologie Animale, INRA, 78350 Jouy-en-Josas, France

## TRIPLET PREGNANCY AFTER TREATMENT WITH CLOMIPHENE ACETATE IN A SUBFERTILE WOMAN

M. PEZZANI

*Department of Obstetrics and Gynecology, General Hospital, Ceperano, Frosinone, Italy*

A 26-year-old subfertile woman with a history of abortions at the seventh-ninth week was treated with Clomid, 50 mg for 5 days. A pregnancy resulted, which ended in the premature birth of a set of alive triplets that sex and blood-group determinations showed to be trizygotic. It is suggested that this production of a multiple ovulation in a woman with luteal deficiency be the result of excessive dosage of Clomid.

Prof. Massimo Pezzani, Via Caragno Vecchia 2, Ceperano, Frosinone, Italy