

### 3. *The Biology and Pathology of the Twinning Phenomenon*

#### BIOLOGY OF THE TWINNING PHENOMENON: EMBRYOGENESIS AND TERATOGENESIS

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The twinning phenomenon has always interested the great public, the artists, and naturally the scientists. Isidore Geoffroy St. Hilaire has established a classification still now valid. This classification considers the different types of double monsters, which are found in nature in all classes of vertebrates, including man.

To explain the twinning phenomenon, the experimental realizations have progressed by successive bounds after the preliminary attempts of different authors. Now, when it is question of experimental duplication, anybody thinks of H. Speeman for the amphibians, of H. Lutz for the birds, of F. Seidel for the rabbit, and of A. Tarkowsky for the mouse. Now, it is possible to conceive a twinning resulting from the separation of the first blastomeres (amphibian, rabbit, mouse) and a twinning whose origin consists in the fissuration of the blastoderm (bird, mammal). All these experiments confirm the unicist theory. If a total or partial regulation of the excedents may be experimentally realized, no argument can however support this theory in the realization of the double monstrosity.

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#### MONOZYGOTIC HETERO-CARYOTIC TWINNING

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Since the first publication in 1961, cases of monozygotic heterocaryotic twinning have been repeatedly found and a total of 14 observations can now be analysed. The mechanism involved in this type of

twinning is yet uncertain and eventually is not identical in each case, the main uncertainty being to decide whether the chromosomal error affecting one of the twins is related, directly or indirectly, to the process of monozygotic twinning per se.

Regarding the time of occurrence, the error seems to occur at few days of development at the most and, in one case at least, was contemporary to the first division cleavage. Considering the possibility of twins of different sex (e.g., one XY and one XO) the monozygotic heterocaryotic twinning could be considered as a potential equivalent of a fecundation in species in which the XO is a fertile female.

Evolute implications shall be discussed.

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#### CONJOINED (SIAMESE) TWINS: REMEDIABLE CONGENITAL HANDICAP

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Two decades of surgical advances have given successful safe deliveries and restorative separation procedures for these malformations. Softening of earlier more awesome terms of definition has been greatly influenced by the lovely living examples from the above-mentioned measures in uninjured mothers and children once joined, now healthy individuals. *Siamese Twins* are now defined "Twins born with their bodies joined together in any manner". *Human Teratology*, "The study of (unnatural, strange, extraordinary in a way to excite wonder), serious malformations, or marked deviations from normal type of structure, esp. in man", remains of world interest today and man now looks for repair of any handicap and promotion of normal activities by the indi-