

HUMAN CHIMERAS

A recent review on *Natural Human Chimeras* (<https://doi.org/10.1016/j.ejmg.2020.103971>) puts a spotlight on a long known but rarely reported phenomenon. The term chimera, borrowed from Greek mythology, refers to individuals with two genetically distinct cell lines. The author, Madan, begins with high profile media reports of two women and a man whose parentage was disputed based on the 'irrefutable' DNA evidence. Further studies showed that DNA profiles from some tissues of the parents did match those of the children. All three turned out to be chimeras, each was made up of two zygotes of the same sex and each had a normal phenotype. What happens if the two fused zygotes are of different genetic sex? A review of 50 sex-discordant chimeras revealed that most were discovered because of abnormalities of sexual development. However, about a third were discovered by chance and had a normal male or a female phenotype, including fertility in some.

The author gives an overview, with illustrations, of the various ways in which chimeras can arise involving four or three gametes. Origins of individuals with gynogenetic or androgenetic cell lines and of those with diploid and triploid cells are also illustrated. Also the various types of twins that are intermediate between the classical identical and non-identical are discussed.

Blood chimerism caused by transfusion across the fused placentas in dizygotic twins can last into adult life. Using examples from the long known twin-to-twin transfusion in cattle and marmoset monkeys, the author asks whether more than blood cells, for example germ cells, can be transferred in humans, as has been shown in marmosets.

Relatively few human chimeras have been reported in nearly 70 years since the first discovery. As most, including those in serological laboratories, have been discovered by chance, it has been suggested that chimeras may be more common than hitherto thought. If that is so, the reliability of DNA tests comes into question with many medical and social implications. Further multidisciplinary research is required to address the many unanswered questions.