

# Twins Reared Apart: A Forgotten Case / Twin Research Reviews: X-Inactivation and Female Co-Twin Discordance for Hemophilia; Transplantation for Breast Reconstruction; Chimerism and Telomere Attrition in Dizygotic Twins; Divergent Life Histories in Twins Reared Apart / Current Concerns: High ACT-Scoring Twins; Dating a Twin; When Gender Identities Diverge / The Holland Twins

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A forgotten story of monozygotic twins reared apart is described. The pair, born in 1941 in Fribourg, Switzerland, were separated due to switch-baby incident in the hospital. This caused one twin to be raised as a singleton by an unrelated family, and the other twin to be raised as a 'dizygotic' twin with an unrelated child. This is followed by reviews of recent twin research and case studies of X-inactivation and hemophilia, breast reconstruction, chimerism and life histories. The final section of the article includes human interest pieces on academic twins, dating twins, transsexual twins and athletic twins.

**Keywords:** twins reared apart, x-inactivation, hemophilia, chimerism

Amram Scheinfeld's classic book, *Twins and Supertwins* (1967), contains infinite bits of intriguing twin-related information. Chapter 4 concludes with the amazing story of a pair from Fribourg, Switzerland. Identical twins, Philippe and Paul Joye, were born on July 4, 1941, in the Hopital de la Misericorde. Ernstli Vatter was also born on that day and in the same place. Some time after their birth, a nurse mistakenly exchanged Paul and Ernstli, sending them home with the wrong set of parents. Philippe and Ernstli (called Paul by his family) were raised as fraternal twins by a mother and father, while Paul (called Ernstli by his family) was raised as a singleton by a widower. (In fact, Philippe and Ernstli were unknowingly raised as virtual twins — same-age unrelated siblings.) Ernstli had an older sister, while the 'twins' were the only

children in their family. The 'twins' spoke French, while Ernstli spoke German. Both mothers were completely devoted to their sons. Mrs Joye relished the striking physical and behavioral differences between her two boys.

The three children enrolled in the same school when they turned five. Soon, teachers and pupils began to notice the striking physical similarities of two of the boys — Philippe and Ernstli. On the day that the children were to participate in a parade, Mme. Joye reminded her husband to bring his camera to take a picture of their son's double — people in their small town were aware of the boys' resemblance and found it amusing. But when M. Joye saw Ernstli he was shocked. In a conversation with the boy's mother, he learned the details of the child's birth, and the fact that he displayed the same

gentle manner as one of his twin sons. Shortly thereafter, Mme. Joye noticed that both Philippe and Ernstli were missing two lower incisors, whereas Paul had all four of his.

The process of establishing the zygosity of the true twins is chronicled in a fascinating series of medical papers by a team of renowned Swiss geneticists. The recent discovery of the Rh (rhesus) blood group by Landsteiner and Wiener, in 1940, proved to be significant in this case. Rh-typing showed that Paul could not have been born to his legal mother, and could not have been the identical brother of his alleged twin (Klein, 1990). A series of physical

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assessments, including fingerprints, electrocardiograms and electroencephalograms, revealed far greater concordance between the boys reared apart than the boys reared together. A final, conclusive procedure involved reciprocal skin grafts — grafts between Philippe and Ernstli healed perfectly, while those between Philippe and Paul, and between Ernstli and Paul were rejected (Franceschetti et al., 1947–

1948; McIndoe & Franceschetti, 1949–1950). The medical papers cited here include wonderful photographs and charts taken during the course of this investigation.

The boys were returned to their biological families when they were seven. The exchange was difficult for them at first, and the advantages and disadvantages of removing them from loving homes can be debated.

Eventually, the boys adjusted, but the situation remained heart-wrenching for the two mothers. Mme. Joye's moving story is chronicled in her 1954 memoir, *He Was Not My Son*. Her words present another side to this incredible natural experiment in nature and nurture.

Colleagues with further details of these twins are encouraged to contact Dr. Segal, at [nsegal@fullerton.edu](mailto:nsegal@fullerton.edu).

## Twin Research Reviews

### X-Inactivation and Female Co-Twin Discordance for Hemophilia

Monozygotic (MZ) co-twin differences are always fascinating. Bennett et al. (2008) recently described discordance for hemophilia A in MZ female co-twins. Hemophilia A results from a mutation in the factor VIII gene, located on distal chromosome Xq28. This recessive gene, expressed in males who carry it, results in joint bleeding and recurrent soft tissue. Females who are heterozygous at the relevant loci are phenotypically normal. However, skewed X-inactivation can cause a heterozygous female to express the trait.

The female twins in question were born to a normal father and carrier mother. Medical attention was sought when one infant twin developed excessive bruising and bleeding from minor incidents. Blood studies revealed skewed X-inactivation toward the paternally derived X chromosome in this twin, whereas her unaffected twin sister showed random X-inactivation. This is the first reported case of hemophilia A discordance in MZ twins.

### Transplantation for Breast Reconstruction

Plastic surgeon Dr. Joseph Murray was responsible for the first successful kidney transplant between MZ twins, in 1954. Subsequent to that achievement, many other transplants have

occurred between MZ co-twins; for example, ovarian tissue and skin grafts. Most recently, Allen et al. (2008) reported three successful breast reconstructions involving MZ female twins. Three twins who had mastectomies for breast cancer had reconstructions using transplanted tissue from their unaffected co-twins. The three cases described in this report are the first such patients to undergo such a procedure. It was suggested that, in the future, composite tissue will allow successful transplants to take place between dizygotic (DZ) co-twins.

### Divergent Life Histories in Twins Reared Apart

*Twin Research & Human Genetics* is devoted to human twin studies, yet the following case of twin wolves should be of interest. The original report by Carmichael et al. (2008) is worth reading.

MZ twinning in mammals is rare, occurring in approximately 3.5/1,000 births (Machin & Keith, 1999). MZ twinning does, however, occur routinely among nine-banded armadillos and mulittas (Segal, 2000). Twin gorillas and chimpanzees have been found, but they have proven to be dizygotic (Segal, 2000). Interestingly, one set of MZ twins identified from among 200 domestic dogs (*Canis familiaris*) has been described (Neff et al., 1999). It is now possible that the

first pair of MZ twin grey wolves (*Canis lupus*) has been identified.

Tissue samples were taken from 2,025 individual wolves in the North American Arctic. The samples were genotyped and a match was made between two wolves that were identified in very different locations in Canada's Northwest Territories — one in the Cape Bathurst region and the other in Banks Island. The samples from these particular individuals were obtained 9 months apart. It was determined that the genotypes originated in Banks Island, rather than in a mainland wolf population. Even though Banks Island wolves are less variable than those on the mainland, the chance that two genetically identical non-twins could be produced was considered to be slight. Inbreeding was also ruled out, partly due to its rarity.

The investigators were excited about this case because 'these apparent identical twins experienced divergent life histories, with one identical remaining in its natal island population while the other migrated over sea ice to the mainland' (p. 330). Hopefully, a follow-up study will examine the wolves' different life history factors and associate them with current differences in their behavioral and physical characteristics. A search through the literature on human reared apart twins would be helpful.

## Current Concerns

### High ACT-Scoring Twins

The ACT (American College Test) is an entrance exam completed by an estimated two million students. Only about 500 students obtain a perfect score of 36 each year. It would be noteworthy, but perhaps not unusual, if a set of identical twins obtained matching high scores, due to known genetic influence on academic achievement. It is, therefore, more remarkable that fraternal twin brothers, Ron and Jake Tauscher, both obtained scores of 36 (Ortiz, 2008). The twins' dizygosity seems certain, given that one twin is six feet tall and the other twin is six feet, six inches tall. The twins also have diverging interests — one plans to study medicine, while the other plans to study mathematics. Of course, these different majors would only reflect, not decide, the twins' zygosity.

### Dating a Twin

'Social Q's' is a weekly *New York Times* column that deals with readers' awkward social situations.' A recent letter from 'Maria' was of particular interest. Maria had a brief relationship with an identical twin that ended when he left the country — and for 'more sordid reasons'. Meanwhile, she met his identical twin brother who

appeared to be the 'nice version' of the pair. She felt that the relationship was becoming romantic and questioned the Social Q's columnist with reference to whether she should tell this twin about her past association with his brother. The columnist advised her to be truthful, and to assure the second twin that she wished she had met him first. (It is unclear how much dating history information the two twins had exchanged.) I was especially struck by the respondent's remark that Maria was 'catnip to this particular genetic material.' This observation is consistent with studies showing that partners assort positively on certain traits; for example, general intelligence, traditionalism, height and weight. It is, therefore, not surprising that the woman would be attracted to both twins. However, it also agrees with the experiences of individuals married to identical twins — these spouses claim that small differences in looks and demeanor spell big differences in attraction and liking (Segal, 2007).

### When Gender Identities Diverge

'Modern Love' is another regular column in the Sunday *New York Times*.

In a moving and insightful essay, the process of changing sexes from female to male is told through the voice of a twin sister (Rood, 2008). Kate Rood describes growing up with her sister Emma (now brother Eli), and the differences that emerged as they approached their twenties. It was then that Emma's feelings of being born as the wrong sex intensified, causing her to take steps to transform her body into that of a man.

Kate writes that while they are no longer sisters, their identity as twins has remained unchanged. They continue to remain very close and supportive of one another. Kate also notes that Eli — eager to have children one day — was reluctant to have a hysterectomy, even though the hormone treatments would prevent conception. Kate suggests that he is jealous of the sea horse, the only animal species in which the male gives birth — hence, the title of her essay; see the reference list (females deposit their eggs in the male's brood pouch.) Kate generously decided that she will offer her own eggs to her brother should he and a partner choose to become parents. The twins are not identical, so the relationship between father and child would be that of uncle and niece or nephew. That appears to be close enough.

## The Holland Twins

The tragic life of former athlete Pershing Holland, following the death of his identical twin brother, Woodrow, is sensitively captured in a recent essay by John Ed Bradley (2008). The Holland twins were born in 1919 and raised in Cartersville, Louisiana, close to the town of Plain Dealing where they attended

high school. Superb athletes, they were star football players in high school and recruited for the Louisiana State University (LSU) Tigers. Both twins served in World War II until March 1945 when Woodrow was killed on an island near the Philippines. His twin brother, Pershing, was known to drink

heavily in the years that followed, eventually leaving his family in Alabama to return to Plain Dealing. It seems that life for Pershing was never the same without his twin. The original story deserves to be read; it is available at <http://www.nytimes.com/2008/09/14/play-HOLLANDS.html>.

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