

News, Views and Comments

Born Apart, but Raised Together: Twins Delivered in Different Countries/Twin Research Reviews: Hallermann-Streiff Syndrome in Monozygotic (MZ) Twins; Effects of Technology on Conjoined Twin Separation; Reciprocal DIEP Transplantation Between MZ Twins; Guidelines for Multifetal Management/Media Reports: Book by World's Oldest Auschwitz-Birkenau Twin Survivor; Passing of Ian Wilmut; Zhores Medvedev Was an Identical Twin; More Gay Fathers with Twin Sons; Twins and Siblings Admitted to Medical School; First and Fourth Records for Major League Baseball Twins

Nancy L. Segal

Department of Psychology, California State University, Fullerton, California, USA

Abstract

The circumstances and subsequent life events of the first twins to have been born in different countries are examined. Given that both twins were born in the United Kingdom, their common citizenship was never questioned. In contrast, twins born in Canada to a legally married gay transnational couple — composed of one American and one Israeli — were assigned as citizens of different nations and their parents were regarded as if unmarried. This essay is followed by reviews of research on the Hallermann-Streiff syndrome in monozygotic (MZ) twins, the effects of technology on conjoined twin separation, reciprocal deep inferior epigastric perforator (DIEP) transplantation in MZ twins and new guidelines for managing multifetal pregnancies. Finally, media reports on a book by the world's oldest Auschwitz-Birkenau twin survivor, the passing of Dr Ian Wilmut, the identical twinship of Zhores Medvedev, another case of gay fathers with twin sons, twins and siblings admitted to medical school, and the first and fourth records for major league baseball twins are presented.

(Received 9 October 2023; accepted 9 October 2023; First Published online 15 November 2023)

Born Apart, but Raised Together: Twins Delivered in Different Countries

As a consultant for *Guinness World Records* (GWR) in 2014, 2020 and 2023, my task has been to update published twin-related milestones and identify new ones. I have discovered many surprising and intriguing events during this process, but one situation is particularly outstanding: On July 1, 2012, Donna Keenan of Northumberland, in England, delivered her firstborn twin, a son she named Dylan Joseph. Donna's early labor explains why that birth took place in her living room; however, Dylan's twin sister, Hannah Rose, was still waiting to be born. Plans were made to immediately

transfer Donna to Borders General Hospital in Melrose, Scotland, where Hannah arrived approximately 90 minutes after her twin brother (BBC, 2021).

I spent several hours searching the internet to determine whether these twins were the first transnationally born pair and they appeared to be. This unusual event was included as one of my new records — a first-time occurrence — on the list I forwarded to GWR, and it was published in the 2016 volume.

Discovery

Several weeks after the release of GWR 2016, identical twin Heidi Hilane Gannon, of Welshpool, Wales, gave her then 12-year-old son William the latest volume of GWR for Christmas. When William examined the entry describing Dylan and Hannah's birth, he asked his mother to confirm the story she had always told him, namely that on September 23, 1976, Heidi and her twin sister, Jo (Katherine Joanne) Baines, had been born in different countries — Wales and England, respectively. Heidi confirmed the story, took a photograph of the telltale page, and posted it on Facebook under the headline 'Sorry, Guinness Book of Records, but You're Wrong'.

Corresponding author: Nancy Segal; Email: nsegal@fullerton.edu

Cite this article: Segal NL. (2023) Born Apart, but Raised Together: Twins Delivered in Different Countries/Twin Research Reviews: Hallermann-Streiff Syndrome in Monozygotic (MZ) Twins; Effects of Technology on Conjoined Twin Separation; Reciprocal DIEP Transplantation Between MZ Twins; Guidelines for Multifetal Management/Media Reports: Book by World's Oldest Auschwitz-Birkenau Twin Survivor; Passing of Ian Wilmut; Zhores Medvedev Was an Identical Twin; More Gay Fathers with Twin Sons; Twins and Siblings Admitted to Medical School; First and Fourth Records for Major League Baseball Twins. *Twin Research and Human Genetics* 26: 381–388. <https://doi.org/10.1017/thg.2023.46>

© The Author(s), 2023. Published by Cambridge University Press on behalf of International Society for Twin Studies.

Shortly thereafter, Heidi's friend, an editor of a local online newspaper, saw the item and decided to publish the story. It was subsequently picked up by television shows, newspapers and radio programs — and eventually *GWR*. *GWR* contacted me, and a correction was made once their staff verified this new information. No other pair has since come forth to challenge that record. Given the widespread dissemination of the original story in 1976 and the revised record in 2016, it is likely that twin births in different countries are extremely rare. Neither twin was angry at the error — Jo confessed to feeling 'miffed', but admitted that the story opened up a 'lovely conversation' (Baines, personal communication, June 23, 2023). Both twins expressed sympathy for the Keenans whose 'record' was taken away.

I was surprised I had missed the 1976 story, which had had considerable press when the twins were born, and periodically thereafter as they grew up. On their tenth birthday, a local newspaper printed a photograph of the twins standing on opposite sides of the Powys-Shropshire border — Heidi in Wales and Jo in England, handing each other birthday cards (Drury, 2016; Gannon, personal communication, June 23, 2023). Apparently, the word combination and/or word order I used in my internet searches were not optimal.

The twins had been born apart because of unexpected events at Heidi's delivery (Roberts, personal communication, June 25, 2023). Carol, who had previously given birth to a daughter, was 22 years of age when the twins were conceived. However, physicians had not suspected a multiple birth, so it was not until Heidi was born prematurely (10 days ahead of her due date) at the local hospital in Welshpool that a second baby was detected. (Carol had felt 'bumps' during her pregnancy and while she had questioned her doctor about twins, he had dismissed this possibility.) It was necessary to deliver the second twin at a better equipped hospital because of her transverse presentation. Jo was born 18 miles away and one hour and forty-five minutes later at the Royal Shrewsbury Hospital in Shrewsbury, England. Both twins were generally healthy, with birth weights of 5 pounds, 4 ounces (Heidi) and 6 pounds, 8 ounces (Jo). Jo received oxygen and while Carol was informed that Jo might show some cognitive difficulties, Jo has proven the doctors wrong.

Carol remained in the hospital for the required 10 days following delivery. During her stay a nurse entered the room and asked, 'Do you realize you are going to be famous? I'm going to phone the newspapers.' An extensive series of interviews, articles and appearances followed.

Heidi and Jo

I asked *GWR* to put me in touch with the twins and they did. It was then that I learned of the uncertainty surrounding their zygosity (Gannon, personal communication, 2016). Heidi and Jo's faces are very similar, but their height difference of three to four inches, and some health-related disparities has made them question their twin type, especially since puberty when the differences became clearer. In fact, over the years, Jo truly believed that she and Heidi were not identical twins. I arranged for DNA testing which verified what their mother, Carol (Roberts) Munro, had always believed — that her twin daughters were a monozygotic (MZ) pair. Carol had been told that her girls were identical based on their single placentation — of course, that fact does not definitively define MZ twins because the separate placentas of DZ twins are fused nearly 50% of the time. Still, some doctors and others who have known them expressed doubt about the twins being MZ; one of Jo's professors dismissed the

possibility of monozygosity, given their height difference (Baines, personal communication, June 23, 2023). Interestingly, Carol is left-handed, as is one of her brothers, a trait that has been linked to twinning by some investigators (see Segal, 2017). Like approximately 25% of MZ twins, Heidi is left-handed, while Jo is right-handed. In addition, their hair whorls show a reversed direction and Heidi has a double crown.

Most twins who question their twin type celebrate joyously upon learning they are MZ. I recently received a videotape from female twins who reacted with extreme joy when their laboratory report stated 'identical'. Jo and Heidi admitted to feeling 'a little more special' knowing they are MZ twins. These responses make sense at both proximal and ultimate levels of analysis. Specifically, there is universal fascination with MZ twins' striking physical and behavioral resemblance. In addition, MZ twins, on average, share closer social relations than fraternal twins. From an evolutionary perspective, Hamilton's (1964) kin selection theory posits that natural selection favors alleles predisposing individuals to act in ways that favor the transmission of those alleles into future generations. Perceptions of similarity in another closely related individual may trigger feelings of altruism and identification, although people do not make 'genetic calculations' at conscious levels. These processes may explain the greater closeness between MZ than DZ twins, and the celebratory nature with which twins embrace diagnoses of monozygosity. I am unaware of comparable elation by twins to news that they are dizygotic. The importance for twins and their families of knowing twin type with certainty has been emphasized in the professional literature. Questions of identity may remain unresolved in the absence of such information (Craig et al., 2015).

Plans were in place for me to meet the twins and their mother in Wales, in 2020, following an invited lecture series at the University of Aberystwyth, but the COVID-19 epidemic intervened and both events were postponed. Fortunately, my Aberystwyth presentations and the twins' meeting were scheduled for June 2023. I documented my visit to Aberystwyth in a recent article in *Twin Research and Human Genetics*, with the promise of describing my meeting with the twins in a subsequent issue (Segal, 2023a) and I do so below. Photographs of the twins taken when they were aged 10 years and during my visit are displayed in Figures 1 and 2.

During and after dinner, Heidi and Jo discussed their twinship, family life, interests and education, information which is presented above. Jo had completed college, Heidi studied nursing for two years but did not complete the training. Jo was married, Heidi was divorced but in a significant relationship. The twins had each given birth to two children. Jo has worked in the educational field, while Heidi left nursing, worked at several different jobs, then obtained national vocational qualification (NVQ) for childcare. Childcare is an area Heidi enjoys and in which the twins occasionally collaborate under Jo's supervision. I was intrigued to learn that both twins' faces can open each other's cell phones — Heidi has a Samsung and Jo has an Apple iPhone. Several years ago, I performed a similar experiment with MZ male twin students and discovered that one twin could unlock his co-twin's laptop computer with his eyes.

Citizenship

Heidi and Jo are both citizens of the United Kingdom (UK) despite their birth in Wales and England. Jo enjoys the same rights and privileges as her Wales-born twin sister and they hold the same passport — given how the UK is structured, citizenship differences



Figure 1. Jo (L) and Heidi at about age eight years on Sports Day. Photo courtesy of Carol Roberts.

do not exist among people born in Wales, England, Scotland or Northern Ireland. All four nations have the same age, residency and registration requirements for voting, and Jo could run for elected office in Wales if she chose to. The only difference is that Jo indicates her English birth on formal documents and could play soccer for either a Welsh or British team, whereas Heidi could not (Gannon, personal communication, 2022; Roberts, personal communication, June 25, 2023).

The situation of twins born in different UK countries offers a stark contrast to that of the twins I described in *Gay Fathers, Twin Sons: The Citizenship Case That Captured the World* (Segal, 2023c). Andrew Banks, an American citizen, and Elad Dvash, an Israeli citizen, met in Tel Aviv in 2008 and married in Canada in 2010. They had twin sons via egg donation and surrogacy in 2016, and according to Canadian documents, both fathers were recognized as the legal parents of both children. However, difficulties began when they decided to relocate to Los Angeles, California and visited the U.S. Consulate in Toronto to obtain passports for their children. Instead of the routine process they had anticipated, they

faced cruel and invasive questioning by the government official as to who fathered the children and whether the twins were related. It turned out that one of the two best quality embryos had been created with Andrew's sperm (Aiden) and the other by Elad's (Ethan). Ultimately, only Aiden received a U.S. passport, whereas Ethan was given a six-month tourist visa since he lacked a biological connection to an American citizen. This decision was a serious misapplication of the law by the consular officer, as I explain in my book.

Fortunately, both parents had the courage and determination to fight on behalf of Ethan, assisted by attorneys from Immigration Equality and the Sullivan and Cromwell law firm. In 2020, their lawsuit against the U.S. State Department and Secretary of State settled favorably, allowing Ethan to become a U.S. citizen. It seems incredulous that the twins born in different countries (Dylan and Hannah; and Heidi and Jo) did not differ in citizenship status, whereas Aiden and Ethan who were born in the same country, just four minutes apart, were citizens of different countries until they turned four years old. Andrew and Elad's efforts on Ethan's behalf



Figure 2. MZ twins Jo Baines (L: born in England) and Heidi Gannon (born in Wales) at the Royal Oak Hotel in Welshpool, Wales, June 23, 2023. Photo credit Nancy L. Segal.

were rewarded, both for their son, for their family and for families like theirs. These parents eased the way for other transnational same-sex couples whose children were delivered abroad — policy changes were put into place as regulations were revised.

Twin Research Reviews

Hallermann-Streiff Syndrome in Monozygotic Twins

New insights and hypotheses are often available from unique case reports involving MZ twins. Only the second case of Hallermann-Streiff Syndrome (H-SS) in MZ female twins was recently reported (Sims et al., 2023). H-SS is a rare condition of the eyes, affecting fewer than 200 people worldwide. There are seven characteristic features associated with this syndrome, among them congenital cataracts, short stature and a beaked nose. However, one of the co-twins displayed corneal descemetocoele, a rare and serious outcome from herniation of the Descemet membrane (Agarwal, 2021); this feature had never before been observed to co-occur with

H-SS. This membrane has a key role in corneal structure and homeostasis, and in the maintenance of corneal transparency (de Oliveira & Wilson, 2020). The twins were born at 32 weeks' gestation to a Filipino couple whose family showed no evidence of congenital ocular conditions or facial abnormalities. At age four weeks the twins were referred to physicians for suspected retinopathy of prematurity, at which time H-SS was detected; both twins showed all seven features of the condition. Given that both twins showed a normal chromosome microarray, the underlying cause of the condition remains unknown; their parents underwent some genetic counseling, then declined to pursue it further. The early detection and treatment for H-SS is encouraged; both twins showed some visual improvement by age four years.

Effects of Technology on Conjoined Twin Separation

The first reported attempt at conjoined twin separation occurred in 1689, in Basel, Switzerland, on Elizabeth and Catherine Mayerin

(Shafarenko et al., 2022), omphalopagus-conjoined twins (twins sharing portions of the gastrointestinal system and abdominal wall). The surgeon was Johannes Fatio, although credit for the successful procedure, which took nine days to accomplish, is often given to a physician named Koenig. The first conjoined twin separation performed using modern techniques took place in 1953, on twins Carol Anne and Catherine Anne Mouton. Since then, advanced techniques, multidisciplinary teams and surgical expertise have vastly improved the nature and outcomes of these operations. However, Shafarenko et al. (2022) noted that sophisticated technology is now playing a significant role in this field. Specific approaches include improved imaging, tissue expansion, mesh assisted closure and three-dimensional modeling. An informative table listing the various forms of conjoined twinning and the unique anatomical challenges posed by each one is provided in Shafarenko et al. (2022).

Reciprocal DIEP (Double Deep Inferior Epigastric Perforator) Transplantation Between Monozygotic Twins

The only known successful vascularized composite allotransplantation (transplantation of multiple tissues, such as skin, muscle, tendon, nerve and bone, as a functional unit; Cendales, 2023) for recurrent cancer was recently reported (Selber et al., 2021). The patient, a 56-year-old woman weighing 110 pounds and standing 5 feet, 2 inches tall, was diagnosed with an aggressive tumor. As her physician was reviewing various treatment options and outcomes with her, the patient's companion questioned him about the possibility of transplantation. When he indicated that this would only work with MZ twins, she announced that she was the patient's identical twin sister. This seemed unlikely, given that the woman weighed 170 pounds with a height of 5 feet, 10 inches. The twin sister explained that she suffered from a hormone-secreting pituitary adenoma that had been undiagnosed for many years that was responsible for her gigantism and mild acromegaly and caused the twin's marked differences in appearance. Genetic testing confirmed that the two women were MZ twins, which was critical for avoiding immunosuppression that might be required post-transplantation.

The operation, which took place in two stages and over 4 days, proved successful. The first author noted that, 'There is a sense of destiny and reestablishing order in the universe that comes from reuniting two identical twins, separated in life only by a tragic diagnosis' (Selber et al., 2021, p. 1132).

Guidelines for Multifetal Management

The American College of Obstetricians and Gynecologists (ACOG) recently issued an updated practice bulletin for managing multifetal births (ACOG, 2021). Following a review of trends in multiple birth rates, the increased morbidity and mortality of multiple birth infants was noted, as well as the finding that some interventions have not produced more favorable outcomes. Their conclusions and recommendations are organized into three categories: Level A: based on strong scientific evidence; Level B: based on limited or inconclusive scientific evidence; and Level 3: based on consensus and expert opinion.

The significant conclusions and recommendations are too numerous to summarize in full, so a selective sampling is provided. Level A: (1) Ultrasonic examination should begin at sixteen weeks' gestation and occur subsequently at two-week intervals to monitor possible twin-to-twin transfusion. (2) Progesterone treatment does

not reduce the chance of premature birth so should not be administered.

Level B: (1) Women who underwent pregnancy reduction from twins to triplets had a lower frequency of birth complications, compared with women who carried triplets to term. (2) Chorionicity should be established as early as possible — within the first trimester or start of the second trimester. Level C: (1) All women carrying twins or more, regardless of age, should undergo screening for chromosomal abnormalities. (2) Women with unremarkable monochorionic-monoamniotic twin pregnancies can have their twin delivered at 32 to 34 weeks' gestation.

Media Reports

Book by World's Oldest Auschwitz-Birkenau Twin Survivor

On July 14, 2023, I flew to Melbourne, Australia to attend a book launch. It seemed incongruous to fly 18 hours each way for a two-hour event, but I felt compelled to go. Ninety-nine-year-old Annetta Able, the world's oldest surviving twin from the Auschwitz-Birkenau concentration camp, in Poland, was the author of *The Mosaic of My Life*. Her achievement was to be celebrated by 120 family members and friends, on July 16, at the Hamerkaz Centre in Elsternwick. I offered to speak and my request was accepted — I had met Annetta and her late identical twin sister, Stepha, in 1985 on the occasion of the 40th anniversary reunion of the twins' liberation by Soviet forces. Annetta and Stepha did not visit the camp, but they attended the three-day public hearing on Dr Josef Mengele's crimes that followed, held at Yad Vashem ('A Memorial and a Name'), in Jerusalem.

I visited the twins in 2004, in Melbourne, to interview them for my book, *Indivisible by Two: Lives of Extraordinary Twins* (Segal, 2005). I saw them again in 2014 when I was a speaker at a Melbourne conference on twins. The situation was different in 2023 because Stepha had passed away in 2019, leaving Annetta on her own. The dedication to her new book acknowledges the pivotal role her twin sister had played in her life and in her memories, as does the tribute she kindly wrote for my annotated photograph collection, *The Twin Children of the Holocaust: Stolen Childhood and the Will to Survive* (Segal, 2023b). I was delighted to have played a small role in her book celebration (Gocs, 2023). A picture of Annetta seated next to me is displayed in Figure 3.

Passing of Ian Wilmut

Dr Ian Wilmut, the British scientist who cloned Dolly the lamb in 1996, passed away on September 10, 2023, at the age of 79 (Risen & Holpuch, 2023). Dolly was the first mammal to be cloned from an adult cell. News of her July 1996 birth was delayed until 1997 to be certain that the infant lamb would survive. The announcement was met with awe at what science could accomplish, as well as fears that the procedure would be applied to humans. Hundreds of news articles and science programs followed, many equating clones and twins. My colleague, law professor Owen Jones, asked me to contribute a paper to appear in a special issue of the journal *Jurimetrics* that would present the perspective of a twin researcher.

I asserted that identical twins are clones, but clones are not identical twins, and developed criteria for distinguishing between them (Segal, 1997). I have refined the various criteria over the years (Segal, 1999, 2002, 2006).



Figure 3. Annetta Able (R) and Nancy L. Segal at the Melbourne, Australia book launch, July 16, 2023. Photo courtesy of Michael Able (Annetta's son), *Australian Jewish News*, 28 July, 2023, p. 2.

Zhores Medvedev Was an Identical Twin

I was interested to learn that the late biologist and dissident, Zhores Medvedev, was an identical twin (*Encyclopaedia Britannica*, 2023c). It is likely that this particular birth event explained his interest in genetics. Medvedev's twin brother, Roy, was a Soviet historian (*Encyclopaedia Britannica*, 2023a). The twins were born on November 14, 1925, in Tbilisi, Georgia, which was formerly in the U.S.S.R., but became an independent nation in 1991. The twins appear to be identical based on inspection of their photograph. Zhores passed away in November 2018, one day after his 93rd birthday; his twin brother is still alive.

Zhores was an internationally respected biologist, specializing in protein biosynthesis and the physiology of the aging process. He authored a history of Soviet science that discredited the views of T. D. Lysenko, who rejected the standard field of genetics, replacing it with a pseudo-scientific theory advanced by an uneducated plant breeder during the regime of Joseph Stalin (1922–1952; *Encyclopaedia Britannica*, 2023b). Zhores was forced into exile

in London in 1973, but always remained socially close to his twin brother (Remnick, 1989). Roy also challenged Soviet history and politics, but he was less subject to challenge by the Soviet government; following glasnost, he rejoined the Communist party in 1989. The twins reunited in 1989, in Moscow, on the occasion of Zhores's first return to his home country.

More Gay Fathers with Twin Sons

As I explained in my recent book, *Gay Fathers, Twin Sons: The Citizenship Case That Captured the World* (Segal, 2023c), it is becoming more common for same sex-male couples to conceive children via an egg donor, a surrogate, and a physician who performs in vitro fertilization (IVF). The founder of the well-known skin care line, *Clark's Botanicals*, Francesco Clark, and his partner, Alberto Mihelcic Bazzana, recently became the fathers of opposite-sex twins — Harold Amadeo and Elettra Emilia, were born in July 2023, in Anderson, South Carolina (Caplan, 2023). Each father contributed sperm that created the two embryos — as

such, the twins are genetically related as half-siblings, sharing 25% of their genes, on average. As I explained in my book, this same reproductive procedure also led to the conception and birth of the twins, Aiden and Ethan, whose story I told above, and replays the natural process of superfecundation (Segal, 2023c).

It is important to note that Francesco Clark is paralyzed due to a spinal cord injury he sustained when he was in his twenties. He had always wished for a family and that became possible when he met his partner. Both men are of Italian ancestry. As expected, the fathers are aware of the twins' different emerging personalities.

Twins and Siblings Admitted to Medical School

Three pairs of twins and one pair of non-twin brothers were admitted to the Jacobs School of Medicine and Biomedical Sciences at the State University at Buffalo's medical school class of 2027 (Nelson, 2023). They include Chidalu and Chidera Anameze who appear to be identical; Camryn and Marisa Warren who appear to be fraternal; and Hannah and Josef Iqbal who are a fraternal opposite-sex pair. The brothers are Eric and Stephen Dhillon who differ in age by approximately one year. These twins and siblings variously emphasized both their long-term goal of entering the medical profession and the close relationship they share. It would be informative to know the twin type of other twin pairs who enter medical school together. Based on twin studies of general intelligence, special abilities and occupational interests, it is likely that more identical than fraternal twins would enter the same profession (Knopik et al., 2017; Segal, 2012). While two of the three twin pairs discussed here are fraternal, it is impossible to draw conclusions as to twin type (and genetic contributions) from such a small number. At the same time, this number is considerable for a selective medical school class. I will attempt to have the University of Buffalo's new students entered into the GWR.

A First and a Fourth for Major League Baseball Twins

Identical twins Taylor and Tyler Rogers have set two major league baseball records (Parohinog, 2023): (1) They are the fourth pair of twins to play on the same team — the Giants; the last twin pair to play together were Jose and Ozzie Canseco who played for the Oakland A's (Athletics) in 1990. (2) More importantly, in April 2022, the Rogers twins became the first twin set to have pitched for opposing teams. At the time, Taylor, the left-handed twin, pitched for the Padres, and Tyler, the right-handed twin, pitched for the Giants.

The twins have always shared a close relationship, evidenced by their shared practice sessions and adjacent lockers. It can be advantageous to a sports team if members of the opposing side become confused over which twin is which. Unfortunately, even the Rogers twins' teammates have difficulty at times — which could be a disadvantage — but they appear to be capitalizing on the twins' differences in handedness and facial expressivity to distinguish between them.

References

American College of Obstetricians and Gynecologists (ACOG). (2021). Multifetal gestations: Twin, triplet, and higher-order multifetal pregnancies: ACOG Practice Bulletin, Number 231. *Obstetrics and Gynecology*, 137, 145–162. <https://doi.org/10.1097/AOG.0000000000004397>

Agarwal, R., Nagpal, R., Todi, V., & Sharma, N. (2021). Descemetocoele. *Survey of Ophthalmology*, 66, 2–19. <https://doi.org/10.1016/j.survophthal.2020.10.004>

BBC. (2021, July 9). Twins Dylan and Hannah born in England and Scotland. <https://www.bbc.com/news/uk-england-tyne-18767549>

Caplan, A. L. (2023, July 6). Skincare mogul Francesco Clark — Who was paralyzed in pool nightmare — Welcomes twins with partner. *People*. https://apple.news/AFmVb_XwxSIWqHHYP4N7RkQ

Cendales, L. C. (2023). *Vascularized Composite Allograft Laboratory*. Duke University School of Medicine. <https://surgery.duke.edu/divisions/abdominal-transplant-surgery/research/research-laboratories/vascularized-composite-allograft-laboratory>

Craig, J. M., Segal, N. L., Umstad, M. P., Cutler, T. L., Keogh, L. A., Hopper, J. L., Rankin, M., Denton, J., Derom, C. A., Sumathipala, A., Harris, J. R.; International Society for Twin Studies (ISTS) and International Council of Multiple Birth Organisations (ICOMBO). (2015). Zygosity testing should be recommended for all same sex twins: FOR: A genetic test is essential to determine zygosity. *British Journal of Obstetrics and Gynecology*, 122, 1641. <https://doi.org/10.1111/1471-0528.13639>

de Oliveira, R. C., & Wilson, S. E. (2020). Descemet's membrane development, structure, function and regeneration. *Experimental Eye Research*, 197, 108090. <https://doi.org/10.1016/j.exer.2020.108090>

Drury, J. (2016, January 7). Welshpool twin sisters set to challenge Guinness World Records. *Powys County Times*. <https://www.countytimes.co.uk/news/15835177.welshpool-twin-sisters-set-to-challenge-guinness-world-records/>

Encyclopaedia Britannica. (2023a). Roy Medvedev. <https://www.britannica.com/biography/Roy-Medvedev>

Encyclopaedia Britannica. (2023b). Trofim Lysenko. <https://www.britannica.com/biography/Trofim-Lysenko>

Encyclopaedia Britannica. (2023c). Zhores Medvedev. <https://www.britannica.com/biography/Zhores-Medvedev>

Gocs, D. (2023, July 28). Memoir highlights survivor's amazing life. *Australian Jewish News*, p. 2. <https://www.australianjewishnews.com/memoir-highlights-survivors-amazing-life/>

Hamilton, W. D. (1964). The genetical evolution of social behaviour. I and II. *Journal of Theoretical Biology*, 7, 1–52. [https://doi.org/10.1016/0022-5193\(64\)90038-4](https://doi.org/10.1016/0022-5193(64)90038-4)

Knopik, V. S., Neiderhiser, J. M., DeFries, J. C., & Plomin, R. (2017). *Behavioral genetics* (7th ed.). Macmillan.

Nelson, K. (2023, August 20). 3 sets of twins and 2 brothers make history for the University at Buffalo's medical school. *CNN*. <https://apple.news/AfxyhZT4R062qhFD2memvQ>

Parohinog, K. (2023). Giants twins Taylor and Tyler Rogers make historic pairing in bullpen. *Cronkite News*. <https://cronkitenews.azpbs.org/2023/03/08/giants-twins-taylor-and-tyler-rogers-make-historic-pairing-in-bullpen/>

Remnick, D. (1989, July 11). Medvedev brothers reunite. *Washington Post*. <https://www.washingtonpost.com/archive/lifestyle/1989/07/11/medvedev-brothers-reunite/30f8a31f-9656-453b-a9f4-b78225f48dc3/>

Risen, C., & Holpuch, A. (2023, September 11). Ian Wilmut, scientist behind Dolly the cloned sheep, is dead at 79. *New York Times*. <https://www.nytimes.com/2023/09/11/science/ian-wilmot-dead.html>

Segal, N. L. (1997). Behavioral aspects of intergenerational cloning: What twins tell us. *Jurimetrics*, 38, 57–67.

Segal, N. L. (1999). Behavioral aspect of intergenerational human cloning: Twin-based perspective. *Twin Research*, 2, 53–57.

Segal, N. L. (2002). Human cloning: A twin-research perspective. *Hastings Law Journal*, 53, 1073–1084.

Segal, N. L. (2005). *Indivisible by two: Lives of extraordinary twins*. Harvard University Press.

Segal, N. L. (2006). Psychological features of human reproductive cloning: A twin-based perspective. *Psychiatric Times*, 23, 20, 22.

Segal, N. L. (2012). *Born together-reared apart: The landmark Minnesota Twin Study*. Harvard University Press.

Segal, N. L. (2017). *Twin mythconceptions: False beliefs, fables, and facts about twins*. Elsevier (Academic Press).

Segal, N. L. (2023a). The 18th International Twin Congress, and a look at twin research in Wales. *Twin Research and Human Genetics*. Advance online publication. <https://doi.org/10.1017/thg.2023.31>

Segal, N. L. (2023b). *The twin children of the Holocaust: Stolen childhood and the will to survive*. Cherry Orchard Books — Academic Studies Press.

Segal, N. L. (2023c). *Gay fathers, twin sons: The citizenship case that captured the world*. Rowman & Littlefield.

- Selber, J. C., Kameni, L., Torres, K., Mericli, A., Chu, C., Schaverien, M., Largo, R., Butler, C., & Gaber, O. (2021). Successful double DIEP syngeneic transplantation across monozygotic twins for total back reconstruction. *Plastic and Reconstructive Surgery*, *148*, 1125–1133. <https://doi.org/10.1097/PRS.0000000000008435>
- Shafarenko, M. S., Clarke, H. M., & Zucker, R. M. (2022). Impact of technology on conjoined twin separation: Are we further ahead? *Plastic and Reconstructive Surgery*, *150*, 880–887. <https://doi.org/10.1097/PRS.0000000000009560>
- Sims, D. T., Mattson, N. R., Huang, L. C., Lee, M. D., Bly, R. A., Gallagher, E. R., Baran, F. M., & Cabrera, M. T. (2023). Hallermann–Streiff Syndrome in concordant monozygotic twins with congenital cataracts, exudative retinal detachments, and one case of corneal perforation requiring keratoplasty. *Cornea*, *42*, 899–902. <https://doi.org/10.1097/ICO.0000000000003286>