Amir Teicher:
“Mendelizing Pedigrees”

in: Eric Hounshell, Ruth Amstutz (eds.):

cache 03

SHADOW OF THE TREE

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MENDELIZING PEDIGREES Deaf-mute Family

In 1934, an expert advisor *(Gaureferent)* on racial research for the National Socialist Teachers League (NSLB) by the name Hermann Römpp, published a paper for high school teachers outlining the basic mechanisms of Mendelian inheritance. Römpp began by explaining that

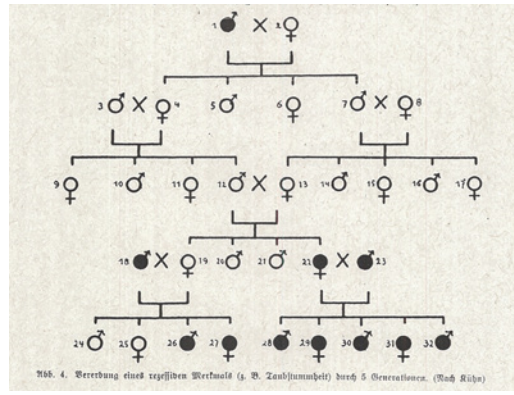
"A recessive disposition [...] can reappear after dozens of generations, if it is recombined with another recessive disposition."

Hermann Römpp: "Mendelismus" [Mendelism], in: *Der praktische Schulmann* 10 (1934), p. 45.

He illustrated this phenomenon by attaching to his paper a pedigree, which, he argued,

"demonstrates this in an especially meaningful way. The family forefather 1 of the entire clan was deafmute (deafmutism is inherited recessively!), the family foremother 2 was healthy. All of their children and grandchildren (3 to 17) showed no sign of deaf-mutism; but some of them certainly contained the recessive disposition for this disease, hidden. Now, when the blood-related grandchildren 12 and 13 married, a deafmute appeared among their offspring. Obviously, two recessive dispositions, hitherto hidden, were joined, and that led to deafmutism."

Hermann Römpp: "Mendelismus" [Mendelism], in: *Der praktische Schulmann* 10 (1934), p. 44.



Hermann Römpp: "Mendelismus" [Mendelism], in: *Der praktische Schulmann* 10 (1934), p. 45.

Data or Theory?
A pedigree of deaf-mutism, presented as if it depicts a real-life family.

A careful observer familiar with Mendelian genetics may note certain peculiarities in the accompanying pedigree. Above all, it seems too perfect to represent a real-life family. It elegantly covers all possible matings related to recessive inheritance, with most couples having exactly four children – the most convenient number for illustrating Mendelian ratios – children whose traits are then distributed in strict accordance with Mendelian expectations. An examination of the source for Römpp's pedigree reveals that, indeed, this pedigree was construed as a scheme, or a theoretical model, of Mendelian inheritance, not as a record of an existing family. Römpp's narrative style, however, gives no indication that this is the case. On the contrary, as he represents it, the pedigree purportedly corroborates the veracity of Mendelian theory by showing how it manifested itself in real life.

MENDELIZING PEDIGREES Empirical Data or Theoretical Models?

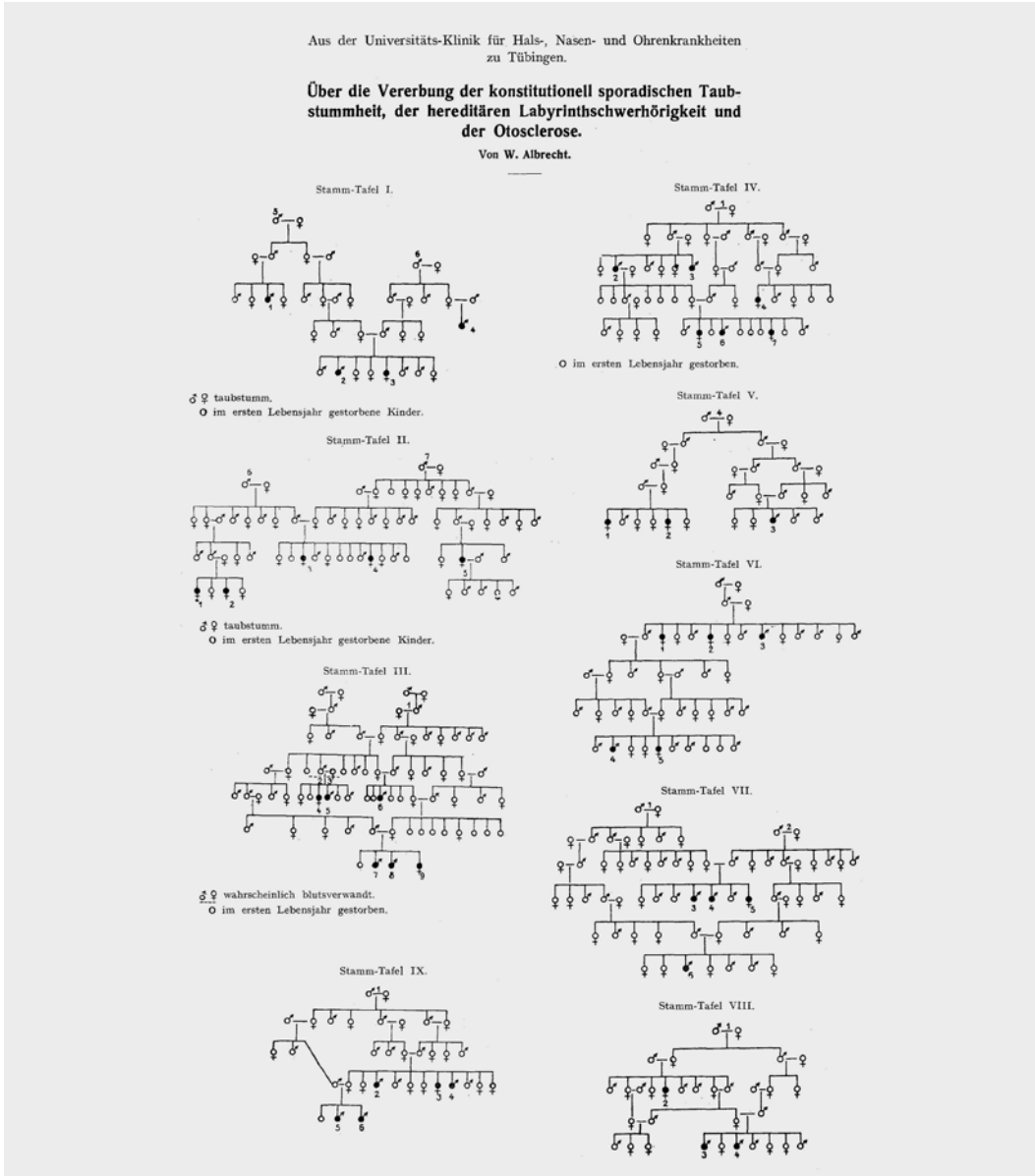
Literature of human Mendelian inheritance often conflates theoretical models (how inheritance "should" work according to the Mendelian paradigm) and actual observations on maladies in families. This conflation is at times so severe that non-expert readers simply cannot tell whether a given pedigree chart is "real" (that is, observation-based) or fictional (a theoretical model).

The disciplinary dynamics that underlie this are manifold. At the very outset, the mere drawing of a pedigree is heavily impregnated with theoretical considerations which relate to a researcher's guiding analytical framework. One needs to choose which relatives to depict and whom to omit, what additional data should be given on each person and what may be discarded as irrelevant, how many generations need to be shown, and, of course, whether the resulting pedigree is meaningful at all.

Moreover, since genetics is, in many senses, a game of chance – any given offspring may inherit his/her mother's/father's genes in equal probabilities – Mendelian patterns only emerge when many pedigrees are accumulated and considered together. Only a few of these display the expected distributions of traits that theory projects. It is these few, however, who are chosen as representative examples to be printed and reproduced in textbooks and pedagogic materials. The messiness and manifoldness that characterizes the original data is thereby easily lost from sight or remains buried in professional publications.

On top of selection bias and the necessary reduction of supposedly irrelevant information, once pedigrees are printed in textbooks, pedagogic considerations become supreme. Spouses, children, or grandparents who seem irrelevant to the guiding interpretative framework are quickly discarded. Plausible suppositions – for example, that the origin of a certain familial malady was a distant grandmother who had been an asymptomatic carrier of a defective gene – turn into factual statements. These may appear as descriptions attached to the text, or as signs integrated into the pedigree (most often: the signaling out of those who were presumably carriers or recessive dispositions), or finally, as solutions to exercises for the novices ("why were [...] afflicted by [...]? True! The great-grandparent was a carrier of [...]" – a reasonable hypothesis disguising itself as a proven fact). Taken together, the consequence of all these processes is that pedigrees in textbooks offer a selective, highly processed, theory-laden depiction of findings on familial inheritance.

Lastly, at the same time that pedigrees are gradually transformed to align with genetic theory, this theory is also commonly presented in the format of imagined pedigrees. These pedigrees, just like Römpp's chart, exemplify genetic dynamics by neatly covering all types of genetic mating and their expected consequences. The result is the aforementioned inability of later observers – professional scientists, doctors, educated readers, students, and the lay public – to distinguish empirical evidence from theoretical expectations. In many senses, the consolidation of Mendelian theory, and its great propagandistic appeal for twentieth century governments, geneticists, and eugenicists, owe much to this pedagogical blurring process.



Aus der Universitäts-Klinik für Hals-, Nasen- und Ohrenkrankheiten zu Tübingen.

Über die Vererbung der konstitutionell sporadischen Taubstummheit, der hereditären Labyrinthschwerhörigkeit und der Otosclerose.

Von W. Albrecht.

Stamm-Tafel I.

♂ ♀ taubstumm.
O im ersten Lebensjahr gestorbene Kinder.

Stamm-Tafel II.

♂ ♀ taubstumm.
O im ersten Lebensjahr gestorbene Kinder.

Stamm-Tafel III.

♂ ♀ wahrscheinlich blutsverwandt.
O im ersten Lebensjahr gestorben.

Stamm-Tafel IV.

O im ersten Lebensjahr gestorben.

Stamm-Tafel V.

Stamm-Tafel VI.

Stamm-Tafel VII.

Stamm-Tafel VIII.

Stamm-Tafel IX.

Walther Albrecht: "Über die Vererbung der konstitutionell sporadischen Taubstummheit, der hereditären Labyrinthschwerhörigkeit und der Otosclerose", [On the Inheritance of Constitutionally Sporadic Deaf-muteness, Hereditary Labyrinthine Hearing Loss and Otosclerosis], in: *Archiv für Ohren-, Nasen- und Kehlkopfheilkunde* 110/1 (1923), pp. 15–48.

Step 1: Accumulating pedigrees.
Some of the pedigrees that appeared throughout a paper by otolaryngologist W. Albrecht about the Mendelian inheritance of deaf-mutism. The sum of these pedigrees (and others, not shown here) corroborated for Albrecht that deaf-mutism was probably inherited as a recessive trait.

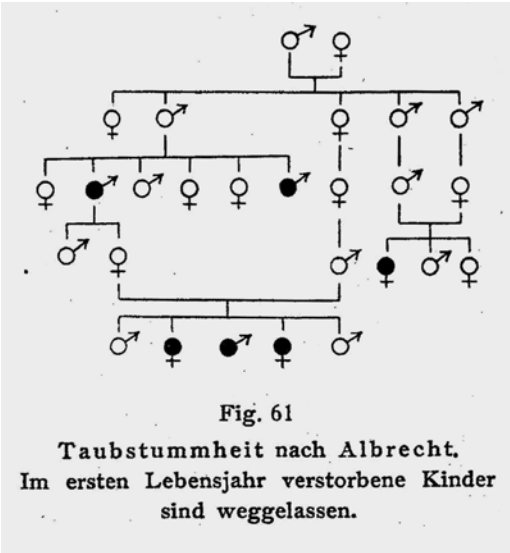


Fig. 61
Taubstummheit nach Albrecht.
Im ersten Lebensjahr verstorbene Kinder sind weggelassen.

Fritz Lenz: "Die krankhaften Erbanlagen" [The Pathological Hereditary Dispositions], in: Erwin Baur, Eugen Fischer, Fritz Lenz (eds.): *Menschliche Erblichkeitslehre und Rassenhygiene* [Human Heredity and Racial Hygiene], Munich: J.F. Lehmann (1927), p. 213.

Step 2: Choosing a representative pedigree.
In 1927, a popular German textbook on heredity used one pedigree taken from Albrecht's paper (Stamm-Tafel IV, top right in the previous image) to demonstrate that deafmutism was a recessive Mendelian trait. En route, some of the relatives shown in the original pedigree were discarded, seen as irrelevant for propagating the Mendelian paradigm.

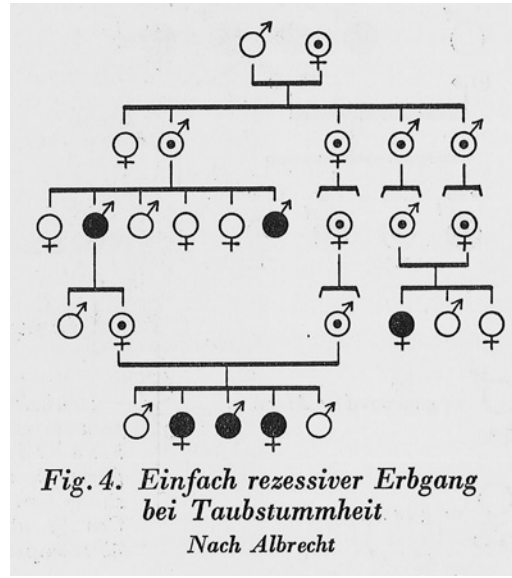


Fig. 4. Einfach rezessiver Erbgang bei Taubstummheit
Nach Albrecht

Arthur Gütt, Ernst Rüdin, Falk Ruttke: *Zur Verhütung erbkranken Nachwuchses. Gesetz und Erläuterungen* [On the Prevention of Genetically Diseased Offspring. Law and Explanations]: Munich: J. F. Lehmann (1934), p. 23.

Step 3: Visualizing Theory.
In 1934, the official *Commentary on the Nazi Sterilization Law* (1933) reproduced Albrecht's pedigree from the 1927 textbook. To emphasize the Mendelian hypothesis, a dot was added to signify which individuals were the purported carriers of the recessive disposition.

Further Readings

Peter J. Aspinall: "How the Use by Eugenicists of Family Trees and Other Genealogical Technologies Informed and Reflected Discourses on Race and Race Crossing during the Era of Moral Condemnation: Mixed-Race in 1920s and 1930s Britain", in: *Genealogy* 2/3 (2018), p. 21.

Robin L. Bennett: "Pedigree Parables", in: *Clinical Genetics* 58 (2000), pp. 241–249.

Jean-Paul Gaudillère: "Exoteric Knowledge and Esoteric Knowledge: Ludwig Fleck, Pedigrees and the Visualization of Pathological Heredity", in: *Medicina nei Secoli* 20/3 (2008), pp. 767–789.

Bernd Gausemeier: "From Pedigree to Database: Genealogy and Human Heredity in Germany, 1890–1914", in: *A Cultural History of Heredity III: 19th and Early 20th Centuries*, Berlin: Max Planck Institute for the History of Science (2005) (= MPIWG Preprint 294), pp. 179–192.

Paul A. Lombardo: "Pedigrees, Propaganda, and Paranoia: Family Studies in a Historical Context", *Journal of Continuing Education in the Health Professions* 21/4 (2001), pp. 247–255.

Mark Shotwell: "The Misuse of Pedigree Analysis in the Eugenics Movement", in: *The American Biology Teacher* 83/2 (2021), pp. 80–88.

Amir Teicher: "How Family Charts Became Mendelian: The Changing Content of Pedigrees and its Impact on the Consolidation of Genetic Theory", in: *History of the Human Sciences* (forthcoming 2024) (Special Issue: *In the Shadow of the Family Tree: The Diagrammatics of Relatedness in Genealogy, Biology and Anthropology as Epistemic, Cultural and Political Practice*).