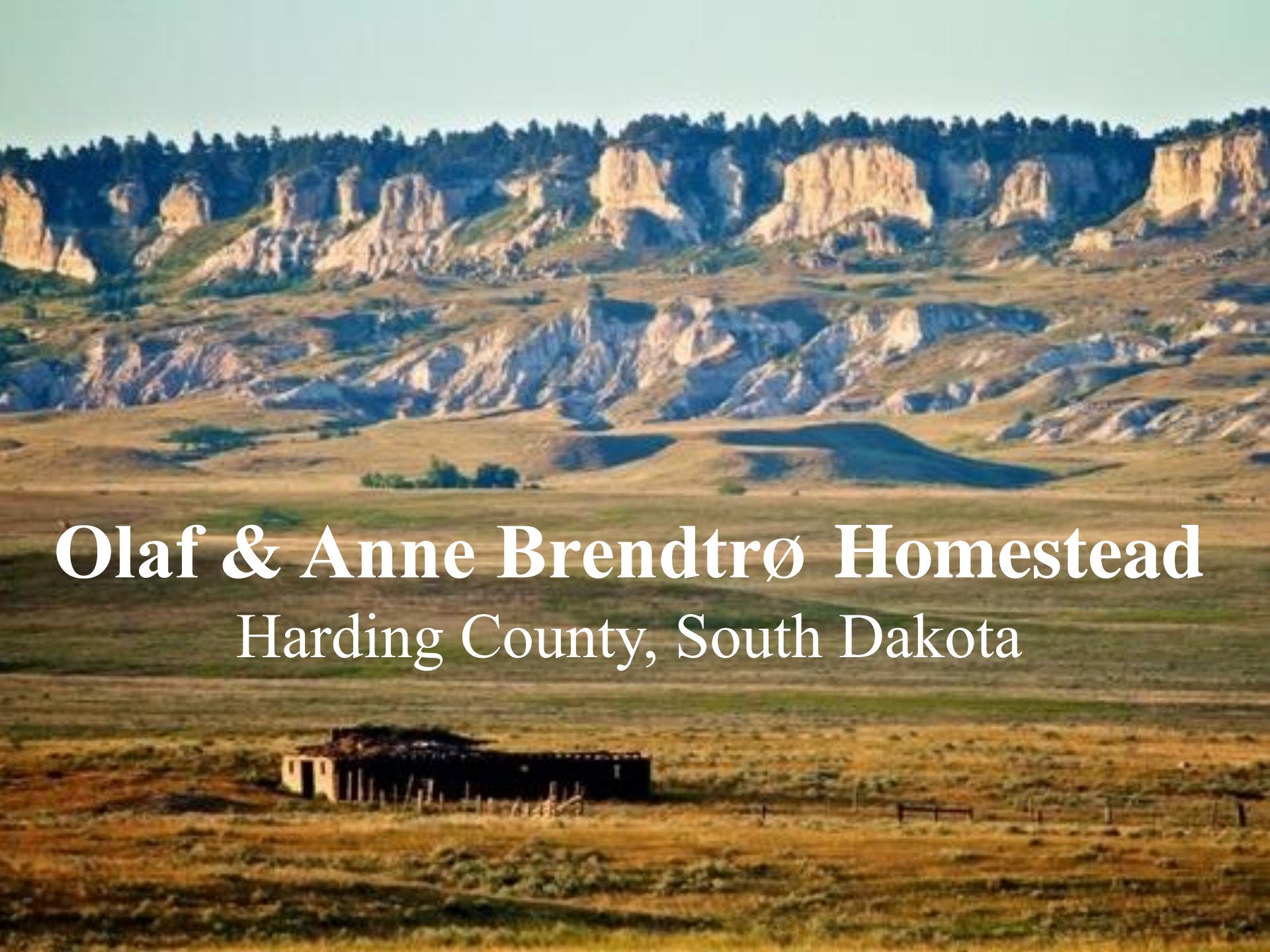


Resilient Brains

A photograph of an elderly man and a young child walking away from the camera on a paved path through a park. The man, wearing a light blue shirt and jeans, holds the child's hand. The child, wearing a red sweater and dark pants, walks slightly ahead. They are surrounded by lush green trees and bushes. Sunlight filters through the leaves, creating bright highlights on the path and the subjects.

Larry K. Brendtro, PhD
Augustana Academy for Seniors



Olaf & Anne Brendtrø Homestead

Harding County, South Dakota



Our lives are fashioned by random events.

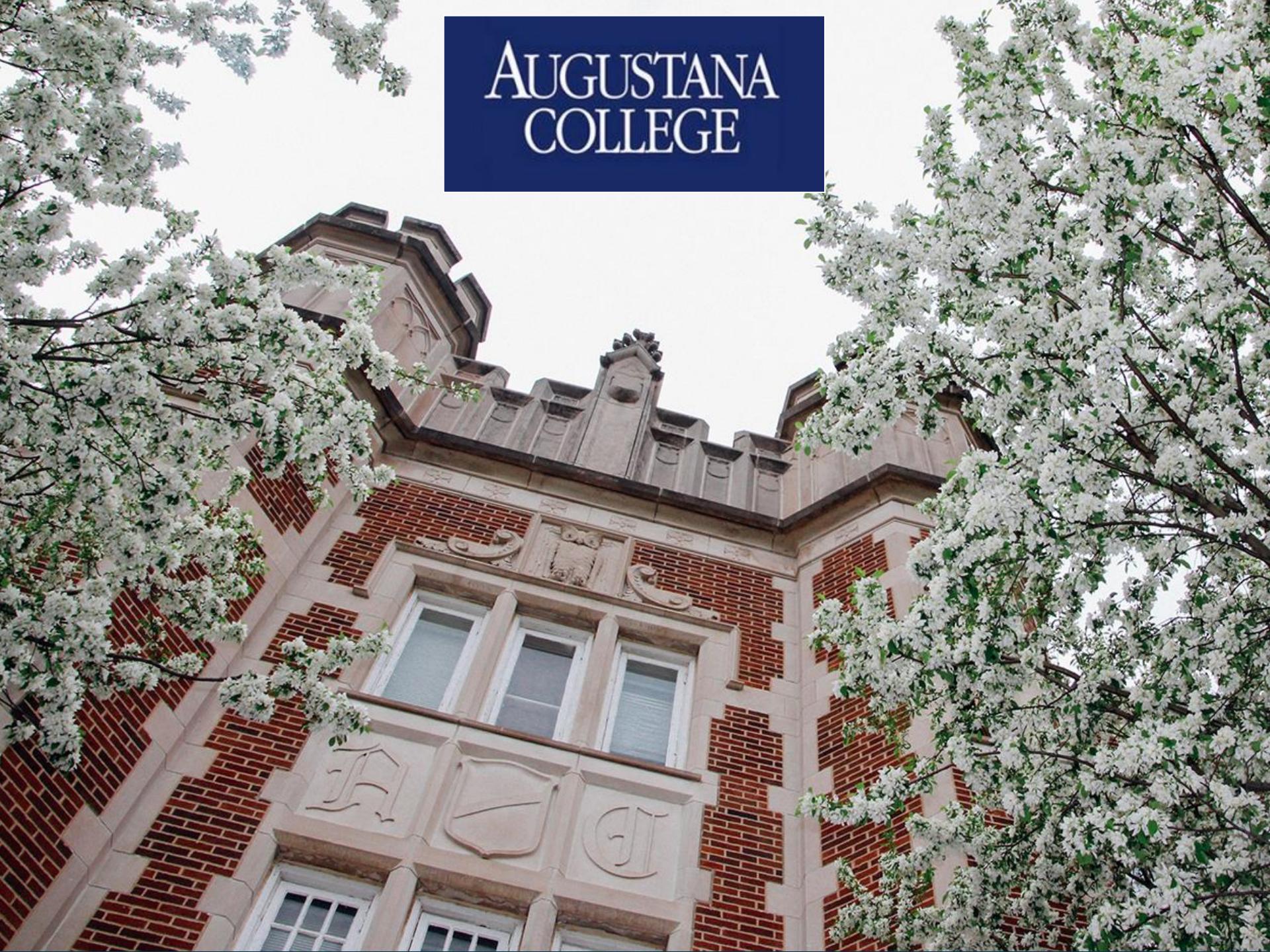
ALFRED BANDURA



VESTRE RIDARDS KIRKE



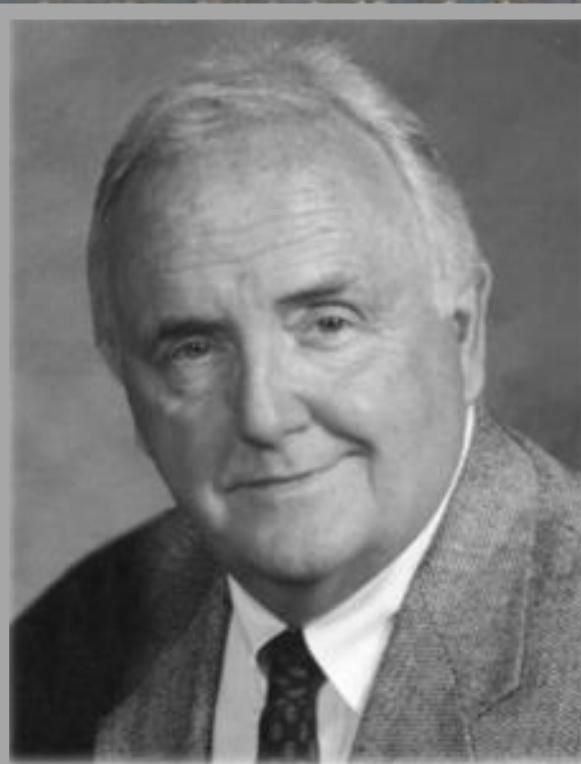
Nesodak Bible Camp
Lake Enemy Swim

A photograph of a three-story brick building with a decorative stone facade. The building features a central arched entrance with a stone archway containing the letters "AUG". Above the entrance is a stone plaque with a crest and the letters "AUG". The building has multiple gabled roofs with decorative stone cornices. In the foreground, there are large branches of white-blooming trees, likely cherry or apple blossoms, framing the building.

AUGUSTANA
COLLEGE



CHILDREN'S CARE HOSPITAL & SCHOOL





Why did you go into this field?



MUNIVERSITY OF MICHIGAN

Fresh Air Camp

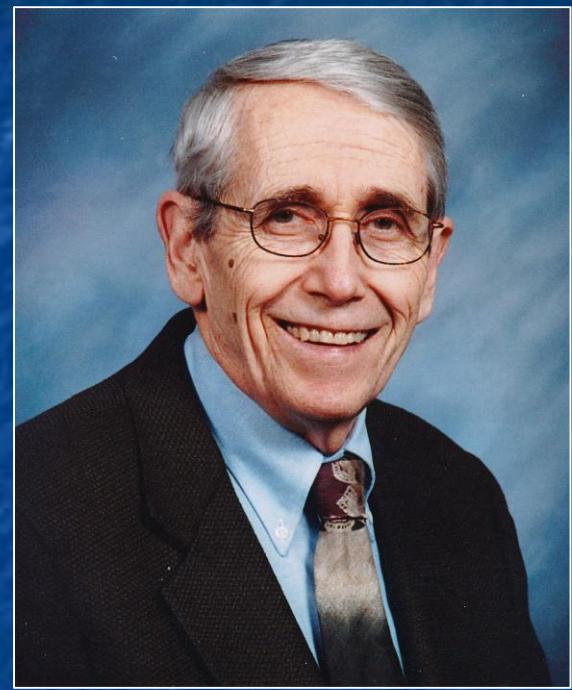


There is no such
thing as a bad boy.

FLOYD STARR

PhD Dissertation
at Starr, 1965

President of Starr,
1967-1981



ARTHUR OLSEN



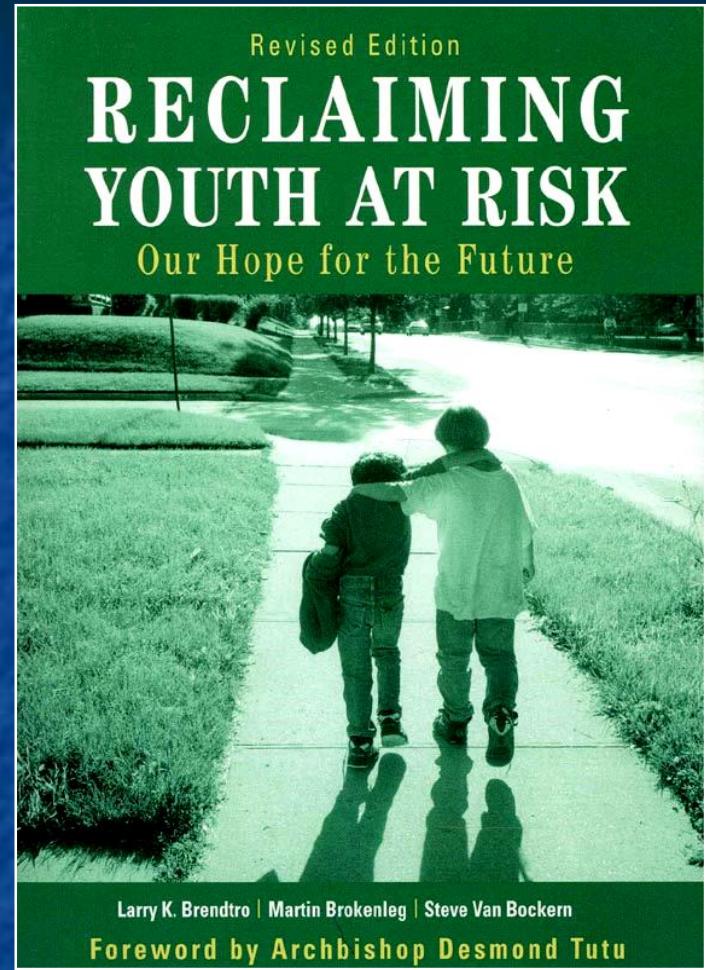
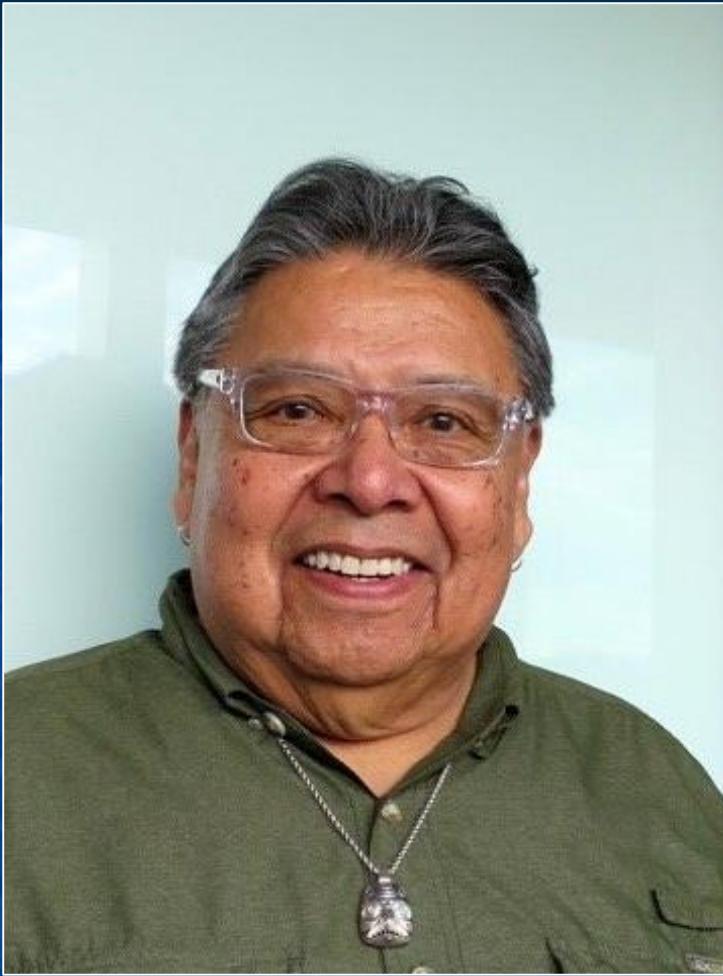
Philadelphia, April 22-25, 1980

Council for Exceptional Children





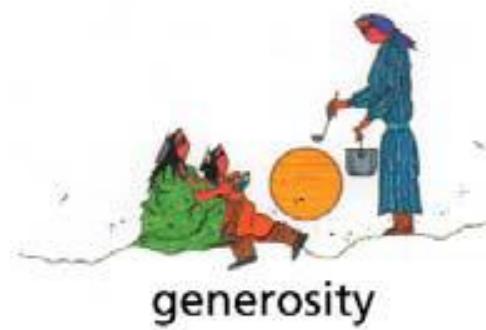
The Three Augie Amigos
Professors Brendtro, Van Bockern, & Brokenleg



Most indigenous cultures deeply revere children.

MARTIN BROKENLEG

Circle of Courage



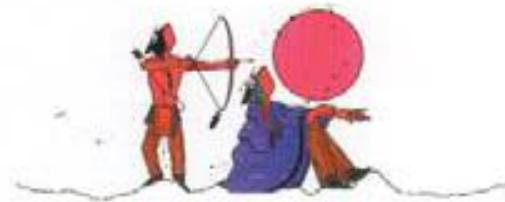
independence



belonging



mastery



Belonging



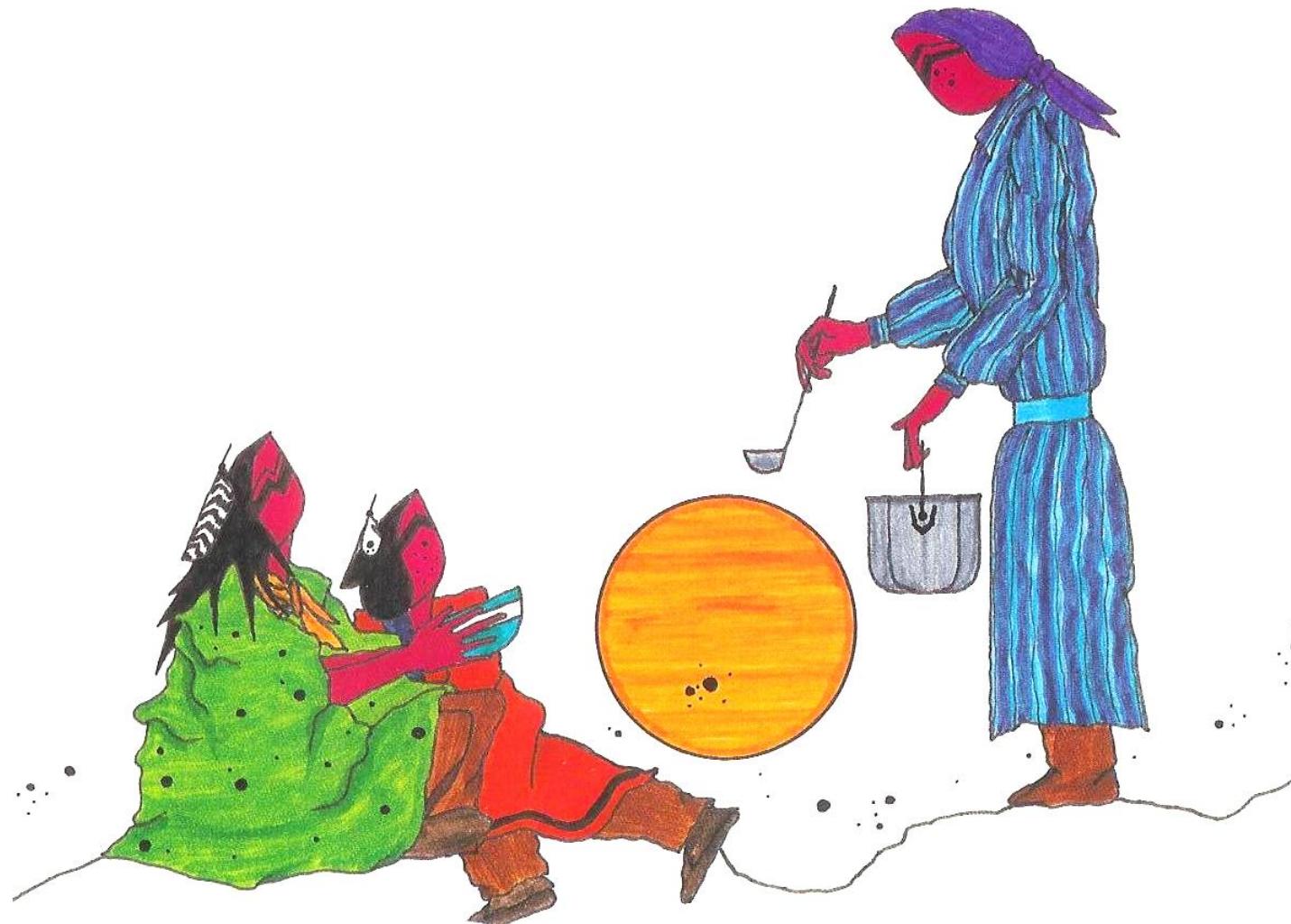
Mastery



Independence



Generosity





We have a deep reverence for you, little one,
because even though you may be a problem,
you are a God-carrier.

DESMOND TUTU in *Reclaiming Youth at Risk*

Black Hills Seminars

established in 1994



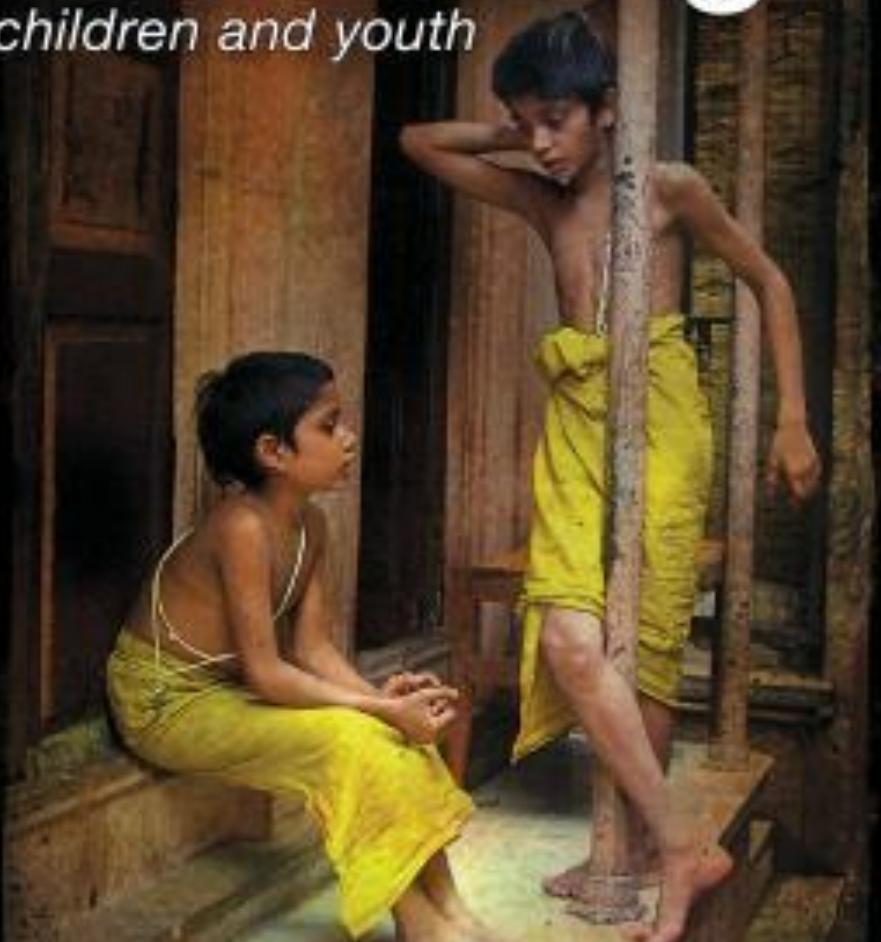
Vancouver Island Seminars

established in 2005



reclaiming

children and youth



Global Circles of Courage

Volume 21, Issue 3, Fall 2012

For 24 years, this journal chronicled the reclaiming youth movement.

Thriving

Children Youth Families



Learning

online journal

Since 2015, our work continues through a collaboration with Cal Farley's Boys Ranch, Amarillo, Texas.

Cal Farley's

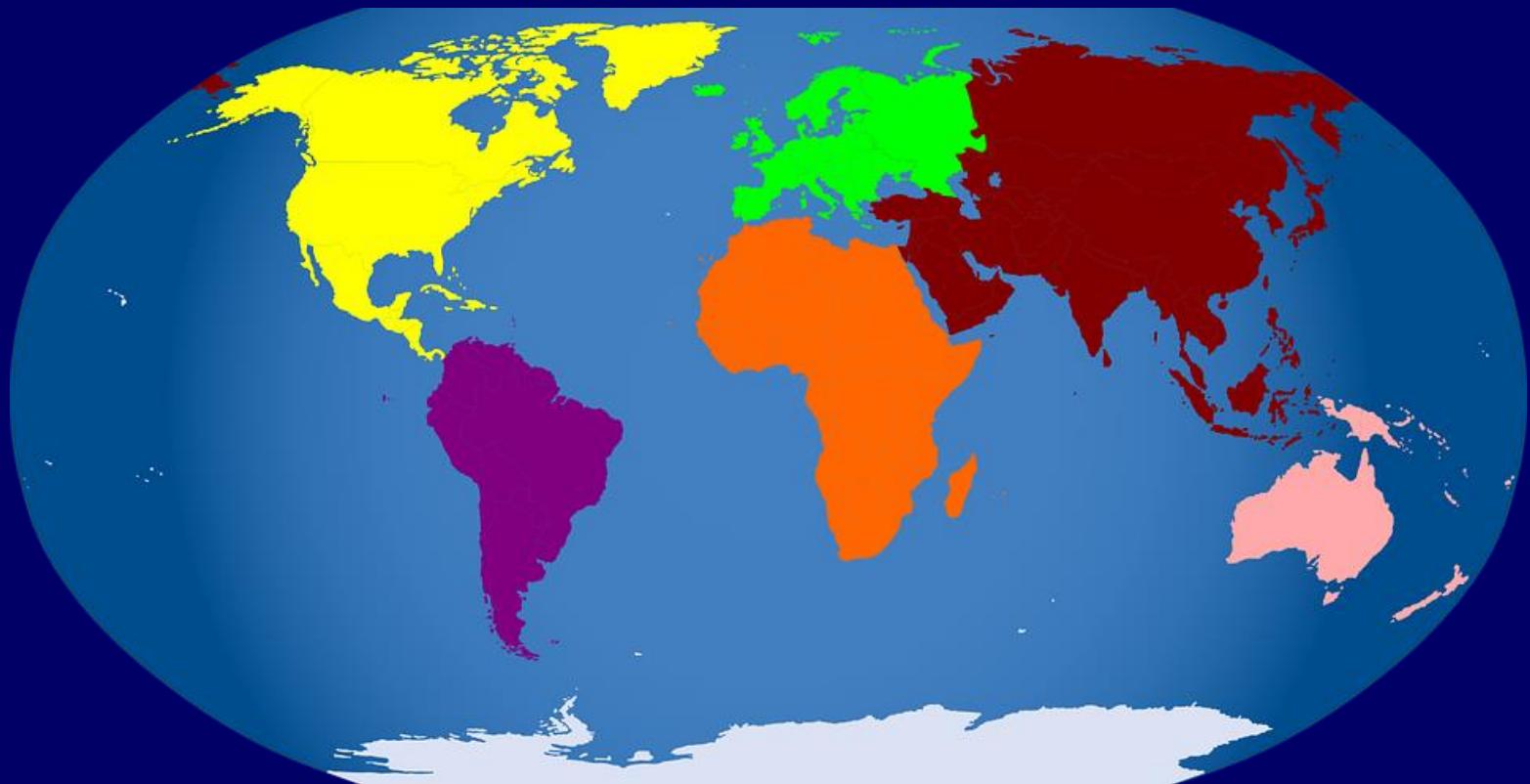
BOYS RANCH

A SHIRTTAIL TO HANG ONTO



CF Learning

International



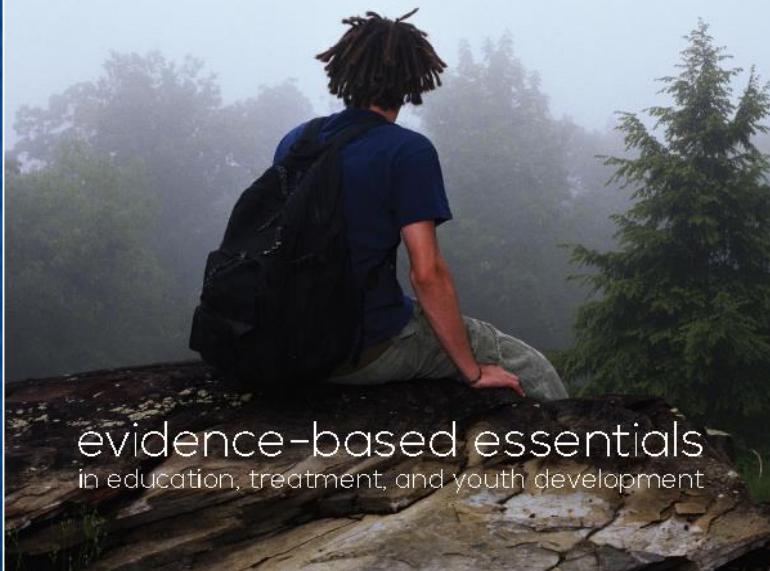
Research

Publications

Training

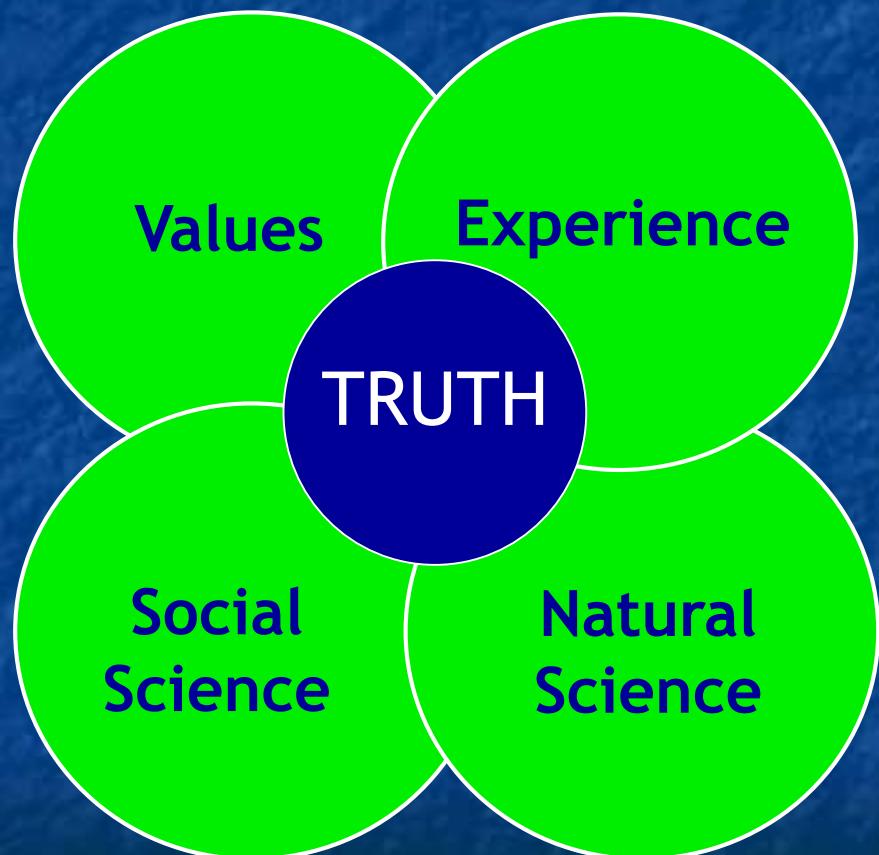
DEEP BRAIN LEARNING

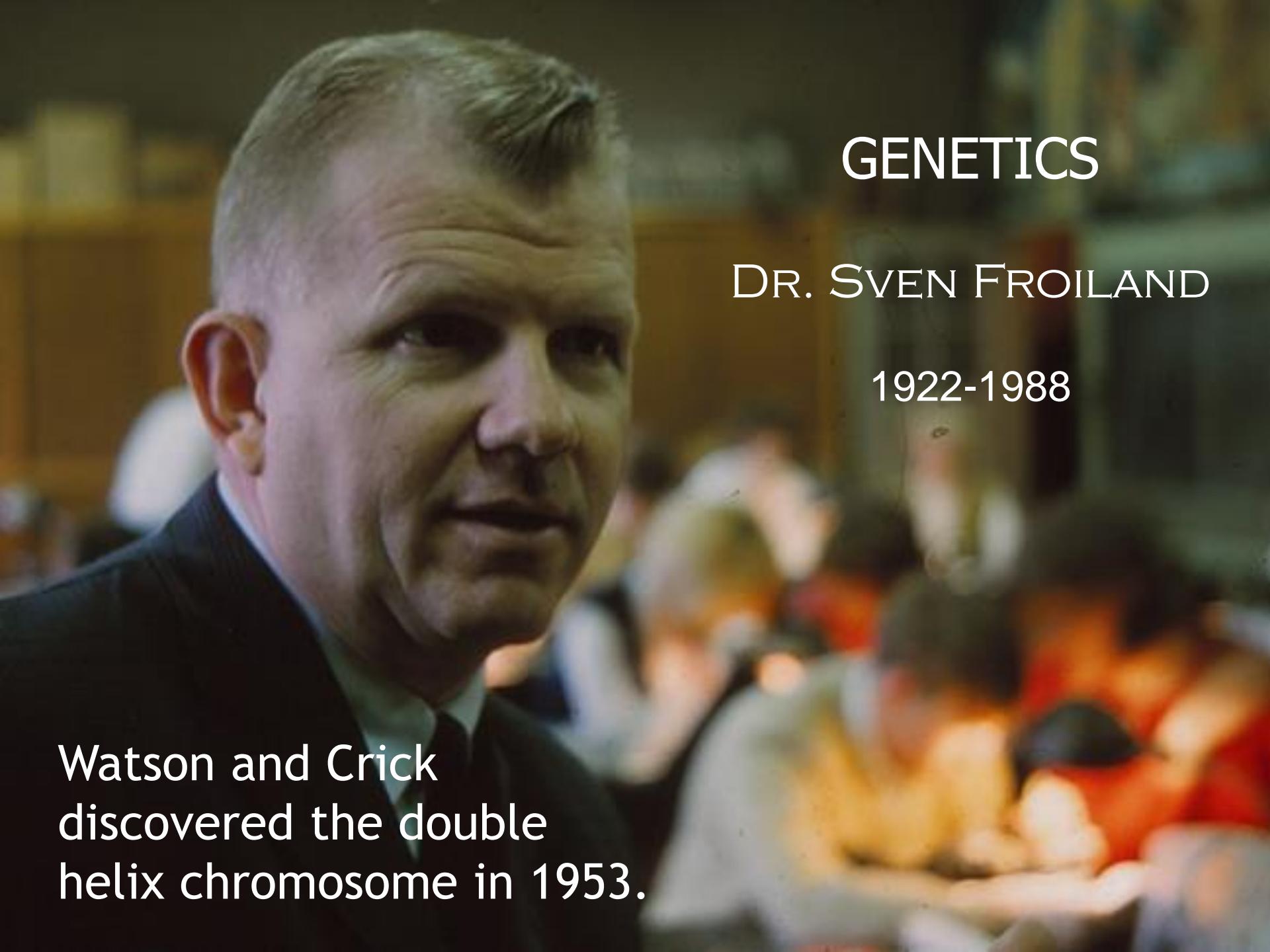
Larry K. Brendtro Martin L. Mitchell



evidence-based essentials
in education, treatment, and youth development

Consilience





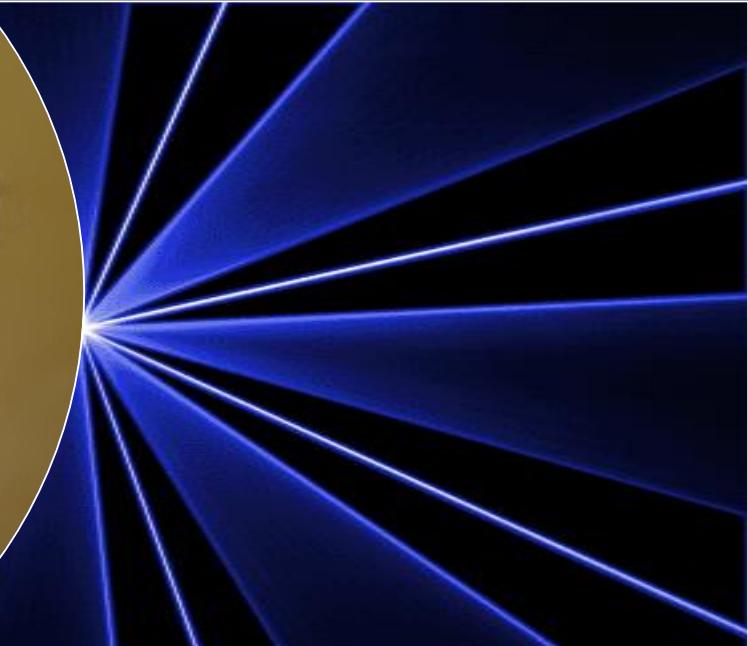
GENETICS

DR. SVEN FROLAND

1922-1988

Watson and Crick
discovered the double
helix chromosome in 1953.

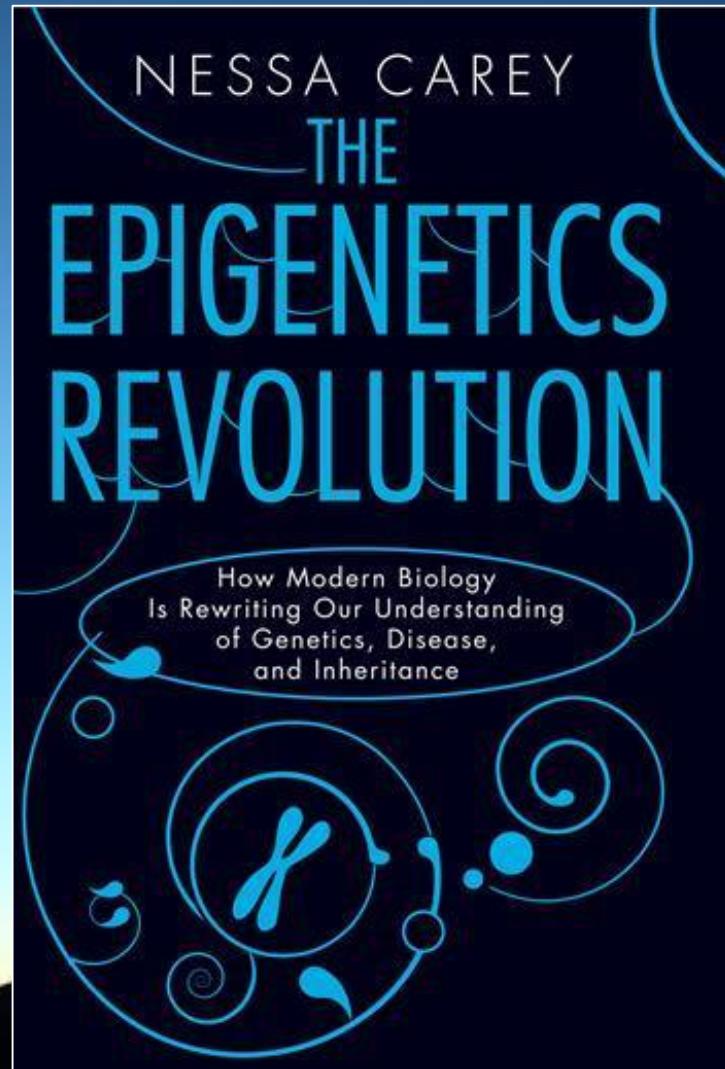
EPIGENETICS



If genes were fixed, humans would be locked in one way of responding. Instead, life experiences turn genes off or on to adapt to the environment.

BRUCE PERRY

Epi is Greek
for *on top of*.

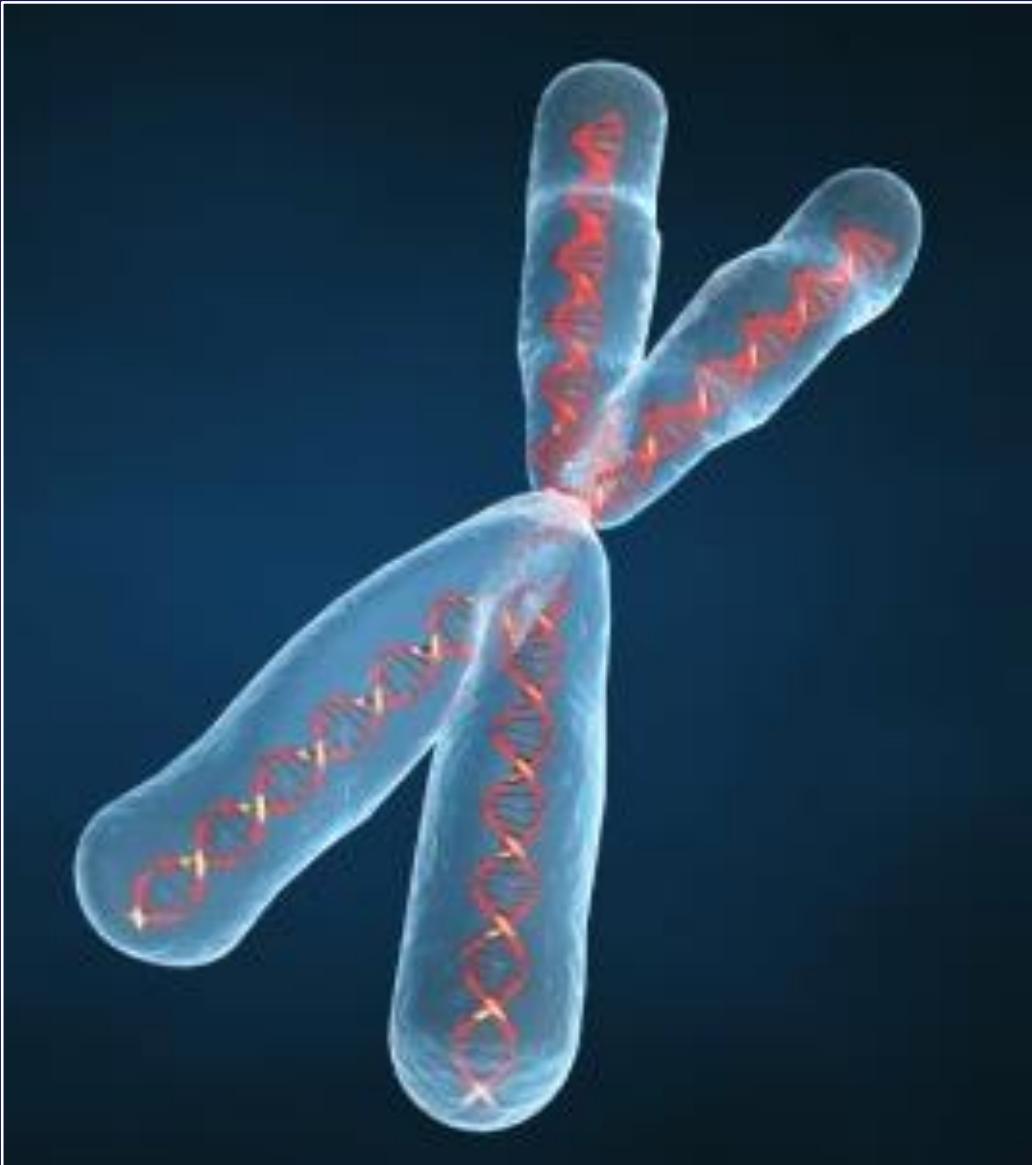


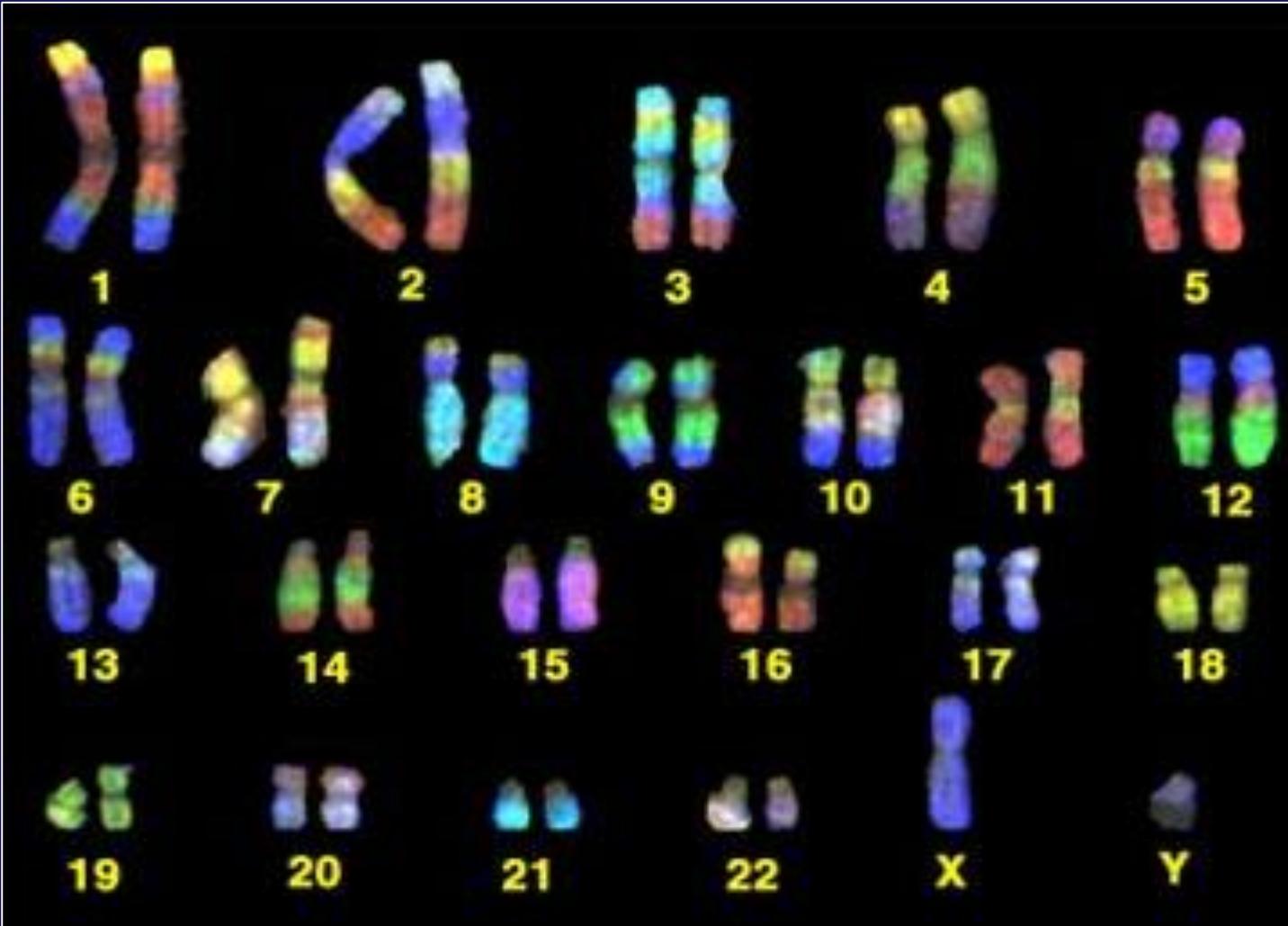


Humans have highly
resilient brains.

And, 84% of our genes
affect the brain.

Chromosomes
contain our DNA
and 20,000 genes.

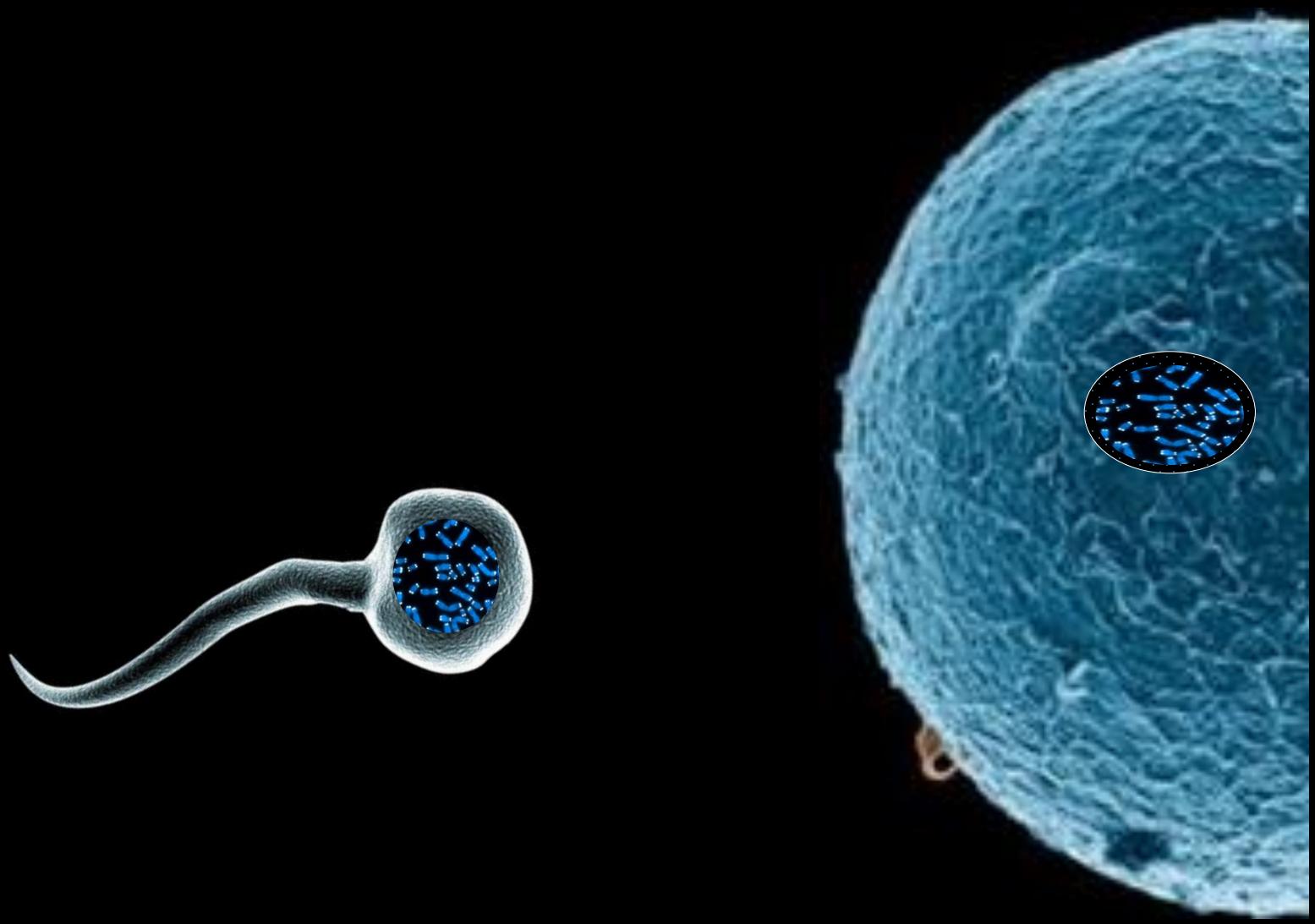




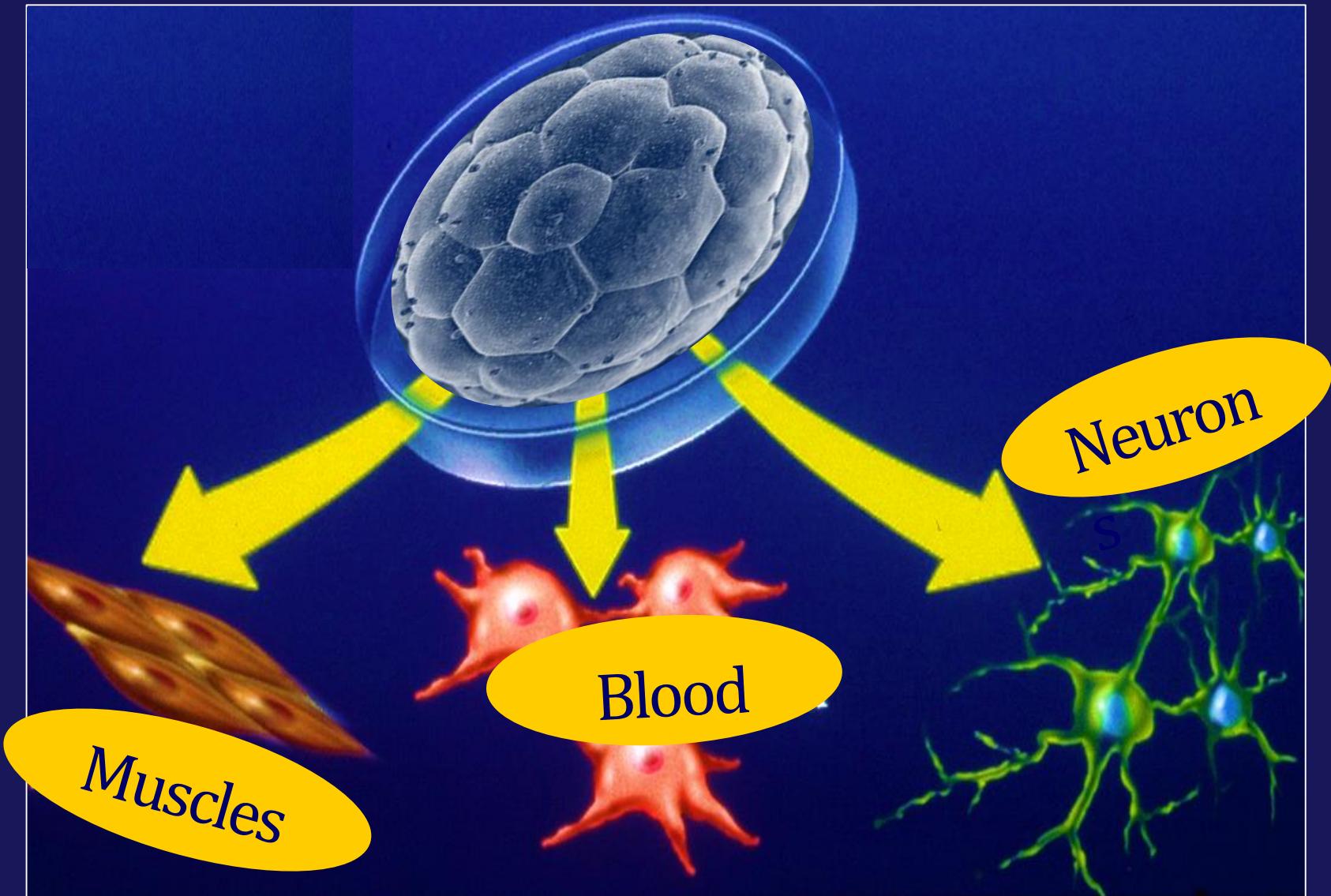
Twenty-three pairs of chromosomes are in the nucleus of virtually every body cell.

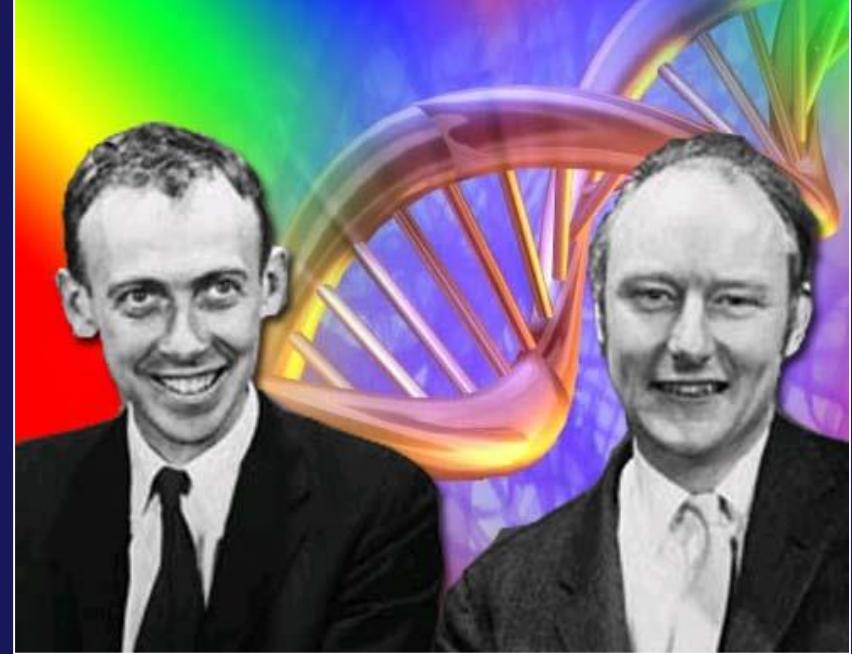
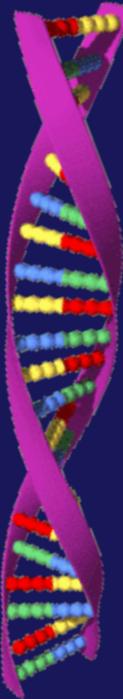
"We will call this the Family Drive."

THEODORE QUANBECK



Embryonic Stem Cells Specialize





WATSON & CRICK

Each chromosome in each bodily cell, if stretched out, would be five feet long.

However, genes only make up 5 percent of the DNA. Crick called the rest “Junk DNA.”

EPIGENETICS

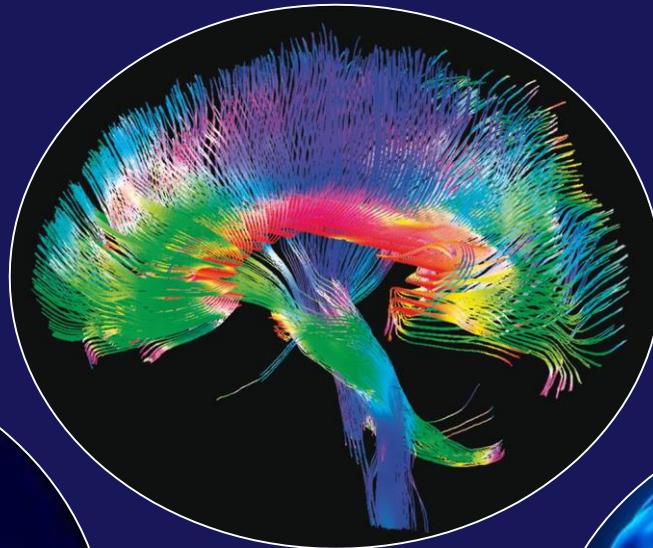


“Junk DNA” actually contains four million *epigenetic switches* that can turn genes on and off.

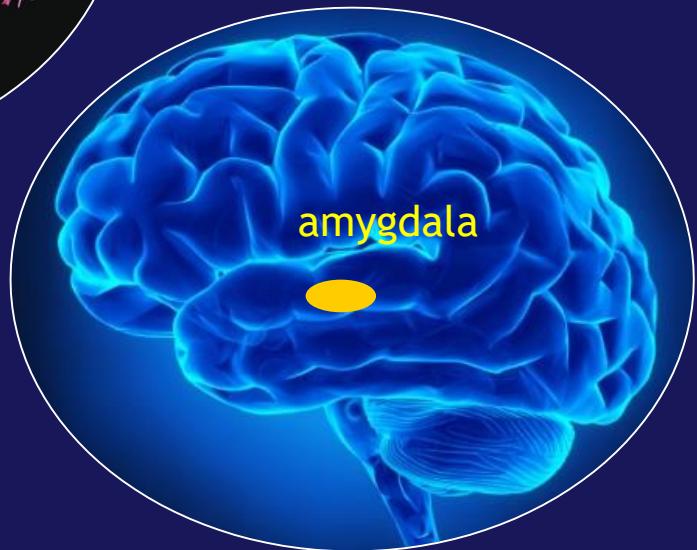
Epigenetic effects can be brief or long term.



Resetting your circadian clock in a new time zone



Connecting neurons for long-term learning

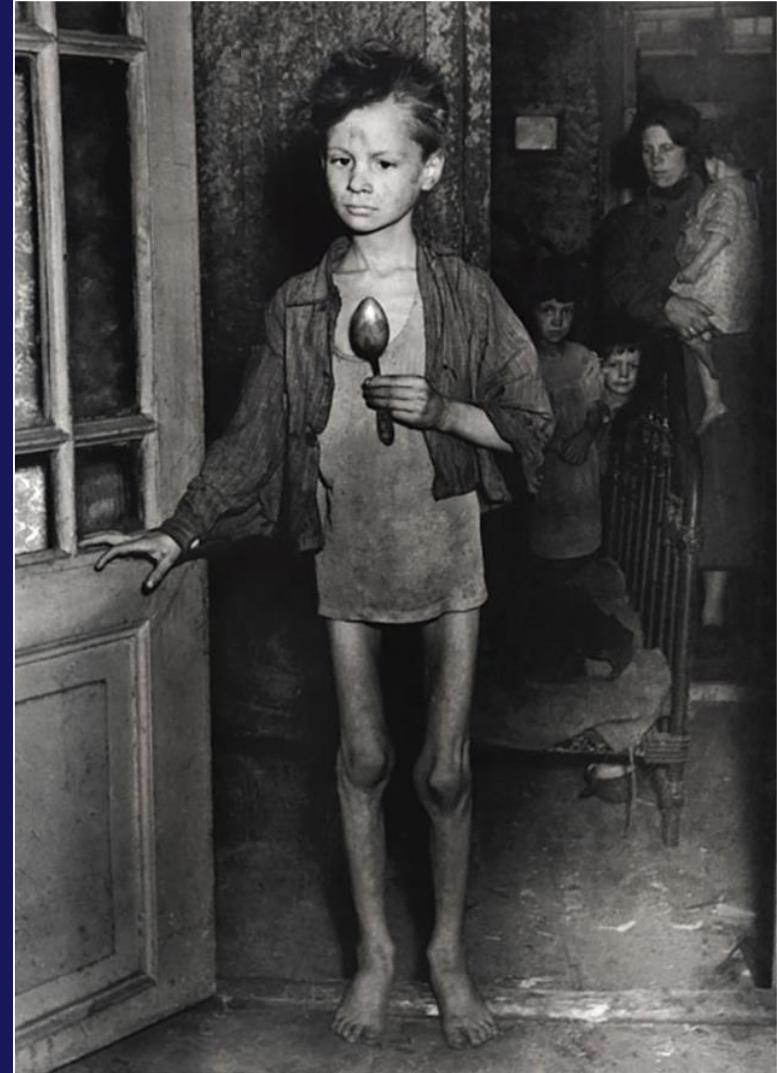


Passing trauma effects to future generations

Dutch Hunger Winter (1944-45)

Children conceived in this famine were tiny but stored fat to survive. After the war, they became obese.

Children and grandchildren in later generations were small at birth, and likely to become obese and diabetic.



Skink Lizards Alter Genes to Defend Against Snakes

Vulnerable to
Predators:

- ▶ Small
- ▶ Short tails



Pregnant mothers who smell a predatory snake have offspring that grow larger with longer tails.

Neglectful
Mothering



Nurturing
Mothering



MICHAEL MEANEY
McGill University



REACTIVE

Fearful
Avoidant
Dysregulated



RESILIENT

Social
Curious
Intelligent

Bisphenol A



Mother and daughter—which is which?



Boys who smoke before puberty can produce harmful epigenetic changes in male offspring.

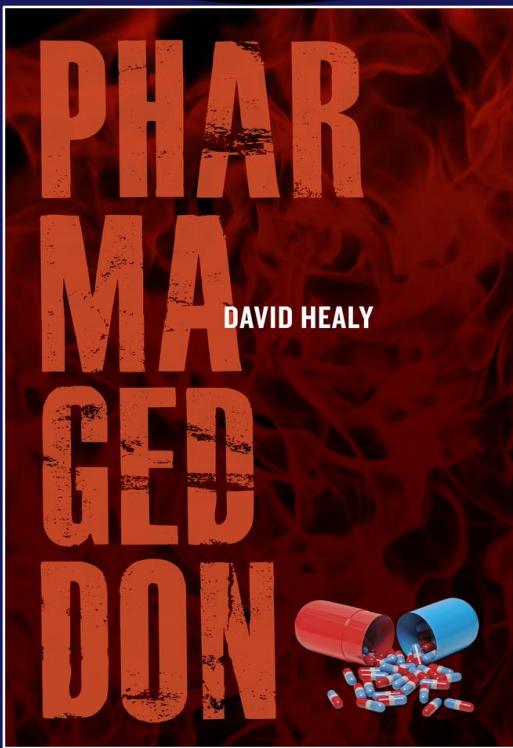
(Pembrey et al., 2006)



83,000 substances are not natural in human history.
Exposure can affect health and growth and is related
to autism, aggressiveness, and learning problems.

GRANDJEAN & LANDRIGAN

Each capsule contains your medication plus a treatment for each of its side effects.



These drugs do not just have the action we are told about but often have much greater effects throughout the body.

DAVID HEALY
University of Cardiff, UK



Drugs and Autism

John has little speech and flaps his hands while Sam uses his iPad. Drugs during surgery at 3 months made the difference.



Fetal Epigenetics

Diet

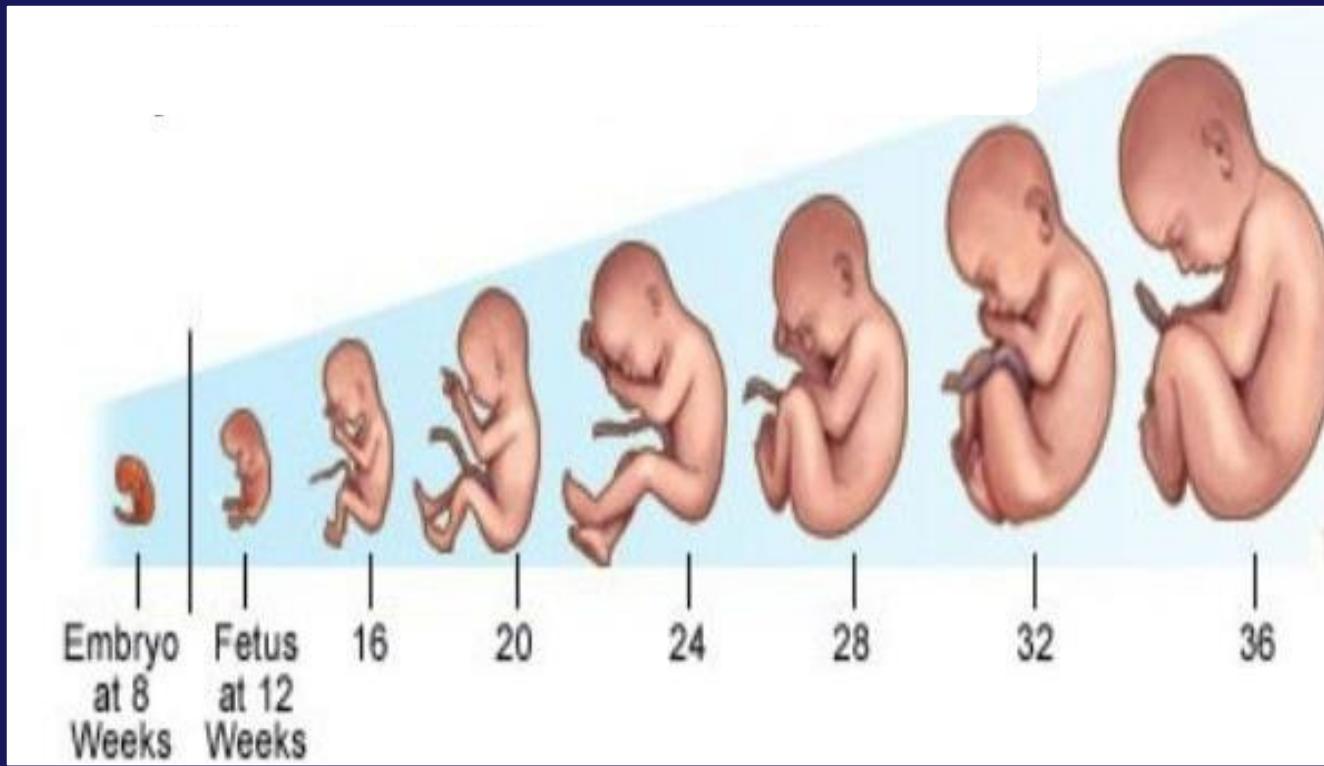
Drugs

Poverty

Smoking

Pollution

Cultural Trauma



Epigenetics is most potent during the fetal stage when an average of 250,000 new neurons are created each minute throughout pregnancy.



Epigenetics and Aboriginal Health

Obesity

Diabetes

Hypertension

Kidney Disease

Heart Problems

Reduced Life Span



Cultural and racial trauma can affect up to four generations.

(Kuzawa & Sweet, 2009)

T
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M
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T



Bold: Low Reactive



Timid: High Reactive

Natural differences in brains make some children bold and others timid. Highly reactive children are more influenced by the quality of caregiving.

JEROME KAGAN

Positive

OUTCOME

Negative

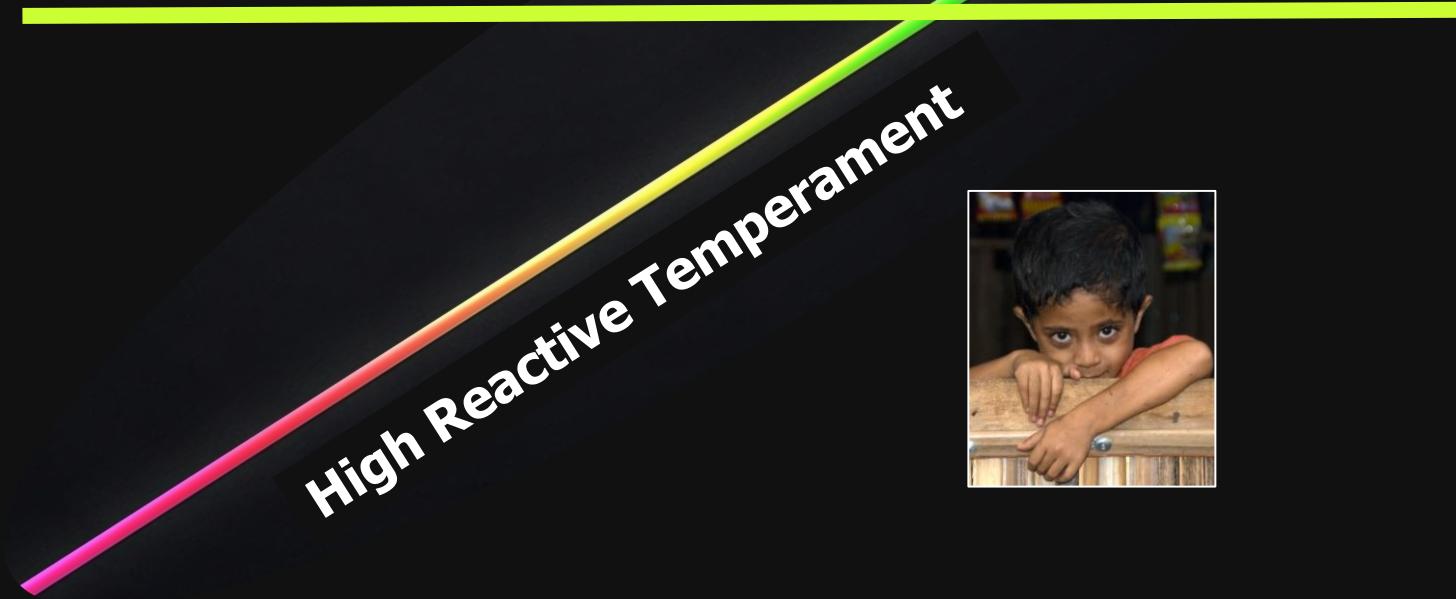
Negative

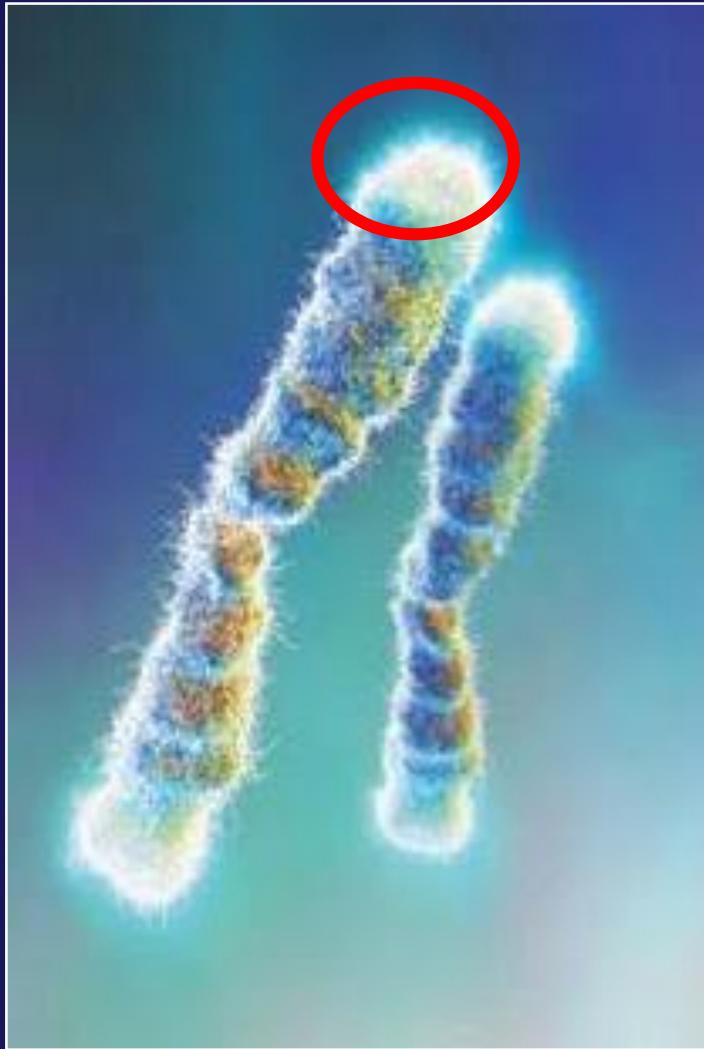
ENVIRONMENT

Positive



Low Reactive Temperament





Telomeres: Our Human Aging Clock

These are protective caps on chromosomes which shorten with age.

When telomeres wear away, the cell becomes cancerous or dies.

(Shamman, 2012)



Extreme Stress Erodes Telomeres

Children exposed to domestic violence, physical abuse, or frequent bullying show significantly more telomere loss between ages 5 and 10.

Epigenetic problems are potentially reversible.
Meeting needs builds resilient brains.



Epigenetics and Senior Lifestyles



Smoking, lack of physical activity, obesity, stress, exposure to pollution, etc., can increase the rate of telomere shortening, risk of cancer, and pace of aging.

Shammers, 2012

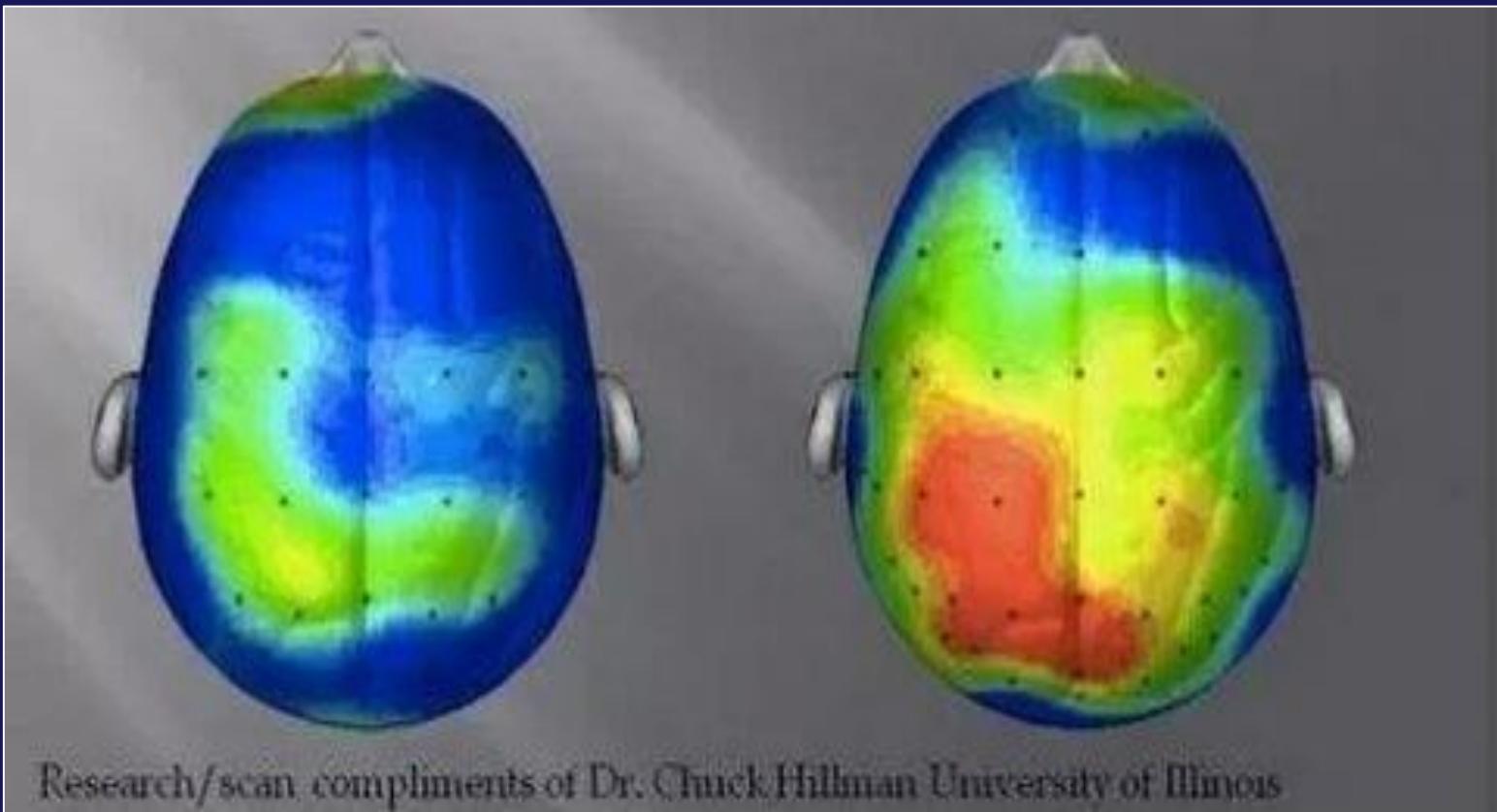
Healthy diet and regular exercise can potentially reduce the rate of telomere shortening, disease risk, and pace of aging.

Shammaz, 2012



Brain after
sitting quietly

Brain after
20-minute walk





Throughout life, the human brain changes its structure to cope with new challenges.

(Doidge, 2016)

Neuroplasticity

Both positive and negative experiences redesign the brain, for better or worse.

(Champagne, 2010)



Disproving the Dying, Aging Brain Theory

Brain imaging studies of healthy persons in their 80s and 90s show that brain shrinkage is less than thought, and much may be judicious pruning.

Only the old have the experience to view the lifespan in its fullest context.

GEORGE E. VALIANT, MD



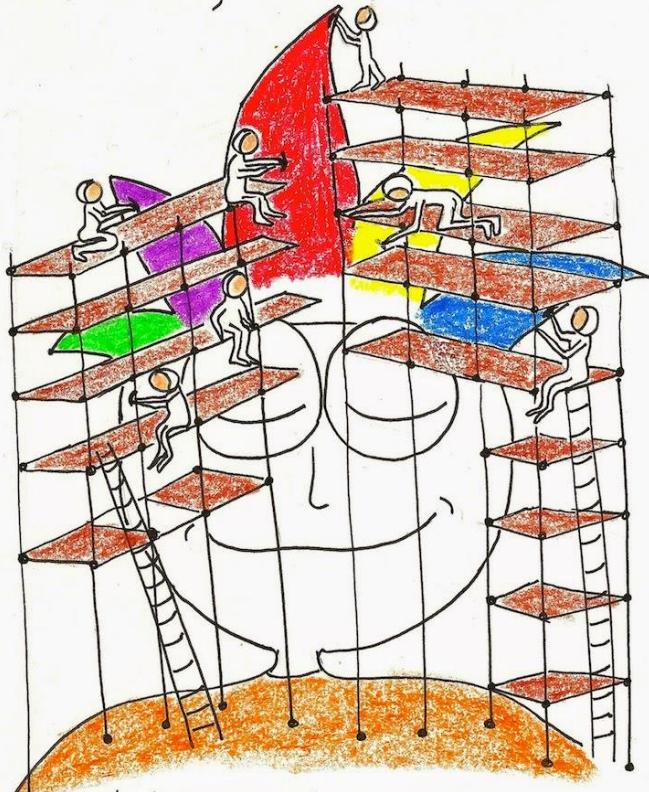
Remodeling Old Brains

700 School Sisters of Notre Dame are the largest brain donor group in the world.

Their intellectually stimulating life caused brain cells to branch wildly, creating millions of new connections.

Neuroplasticity and the Aging Brain

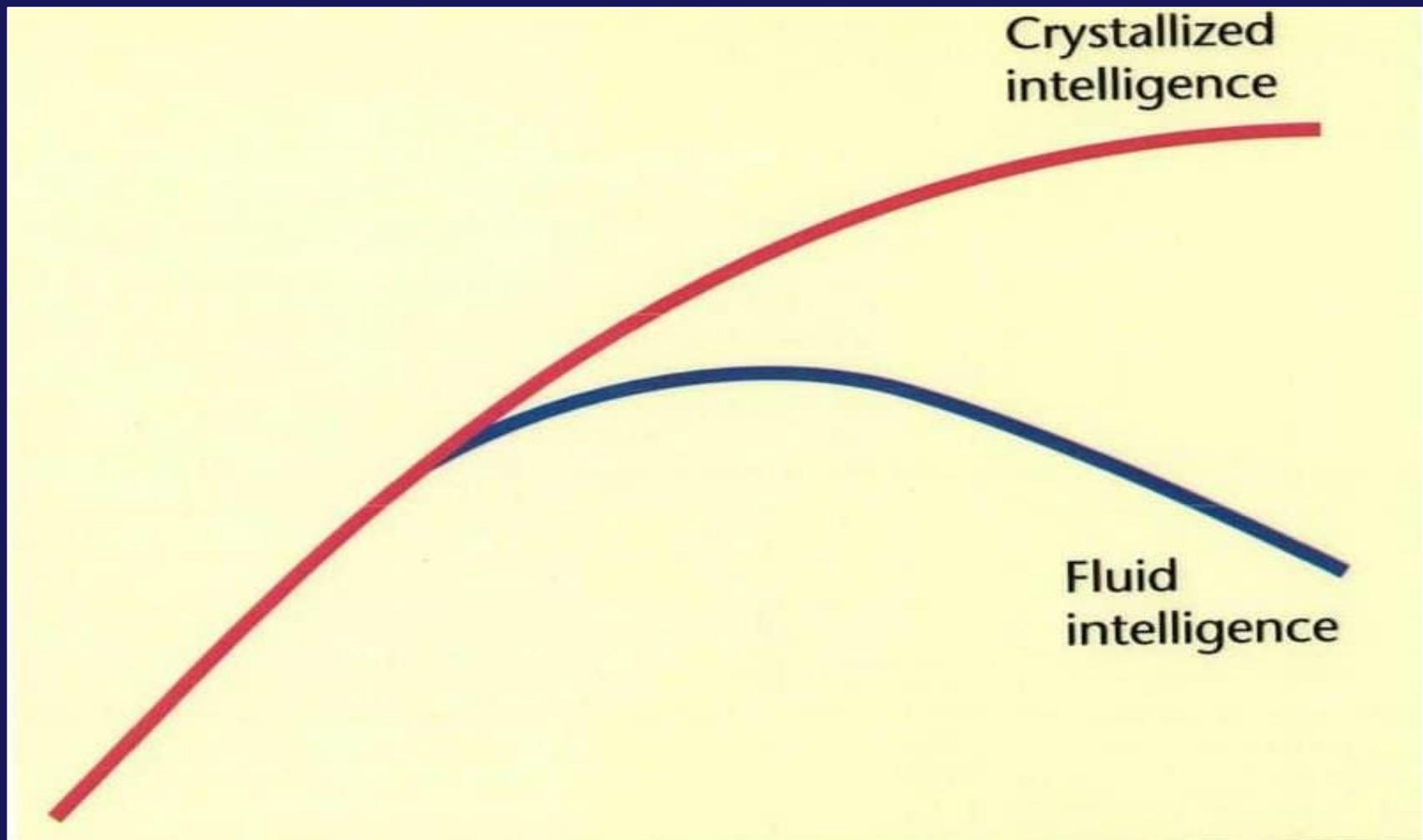
Compensatory Scaffolding of the Brain



- bilateral recruitment
- strengthened connectivity
- recruitment of new regions
 - neurogenesis
- enhanced fronto-parietal recruitment



Elders as Culture Carriers



Infant Child Young Adult Middle Age Elder



Novice brains are designed to acquire new learning needed to survive and thrive.
(fluid intelligence)

Elder brains are designed to recall life experiences and plan adaptive responses.
(crystallized intelligence)



Let us build a country in which our children and youth
can learn to care for and respect others.

NELSON MANDELA

Resilient Brains

A photograph of a man and a young child walking away from the camera on a paved path through a park. The man, wearing a light blue shirt and jeans, holds the child's hand. The child, wearing a red sweater and dark pants, walks slightly ahead. They are surrounded by lush green trees and bushes. Sunlight filters through the leaves, creating bright highlights on the path and the subjects' faces.

larry.brendtro@gmail.com