Food for Thought

Ruth Ann Foster, MA, RN

SBCNA, November 4, 2018

Disclaimer:

"Materials that are included in this course may include interventions and modalities that are beyond the authorized practice of mental health professionals.

As a licensed professional, you are responsible for reviewing the scope of practice, including activities that are defined in law as beyond the boundaries of practice in accordance with and in compliance with your professions standards."

- **American Psychological Association (APA)**

Learning Objectives

- *Describe the gut-brain axis*
- *List 3 widely-held nutritional beliefs*
- *Identify high-quality food choices that support gut function and mental health*
- *Evaluate personal dietary habits*
- *Specify dietary habits that will improve diet quality*

Why?

1) Poor diet contributes more to the global disease burden than physical inactivity, smoking, and drinking combined.

2)Food choice determines the gut microbiota.

Malhotra, A., Noakes, T., & Phinney, S. (2015). It is time to bust the myth of physical inactivity and obesity: you cannot outrun a bad diet. *Br J Sports Med, 49*(15), 967-968. doi:10.1136/bjsports-2015-094911

Lerner, A., Neidhofer, S., & Matthias, T. (2017). The Gut Microbiome Feelings of the Brain: A Perspective for Non-Microbiologists. *Microorganisms, 5*(4). doi:10.3390/microorganisms5040066

Take Home Message:

Eat Real Food*

* Fresh, whole foods
* NO industrial processing or ultra-processing
  * No refining
  * No added chemicals
  * No added sugars or salts

Outline

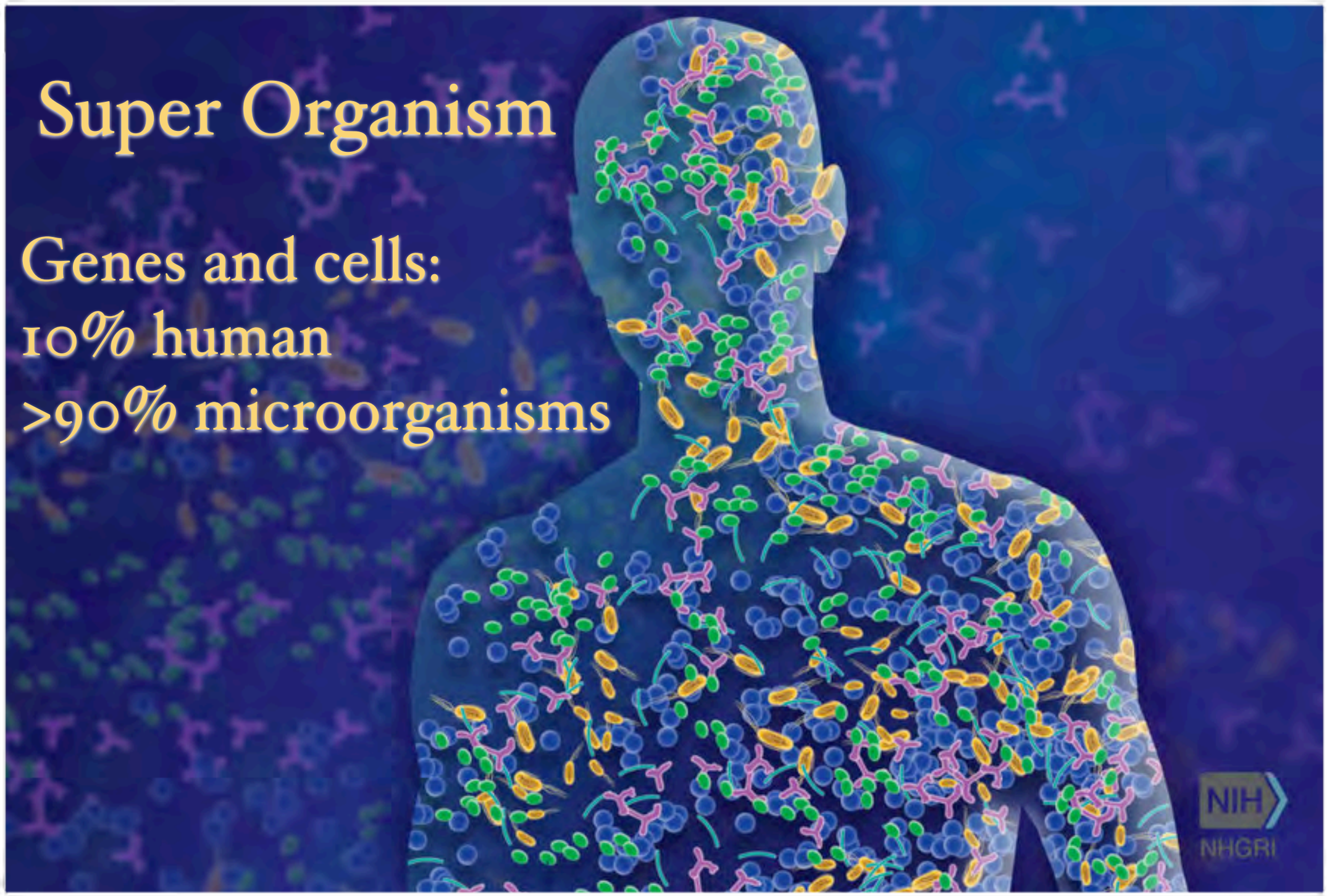
- I. Nutrition Transition - What Are We Eating?
- II. Ancestral Diets - What Did We Eat?
- III. The Gut-Brain-Microbiome Axis - What Should We Eat?

I. Nutrition Transition

Industrial Revolution

- *Dramatic Dietary Changes:*
  - *Food processing*
  - *Food structure*
  - *Dietary habits*

The Human Microbiome



The Gut Microbiome

Food Processing

"Food processing is defined here as all methods and techniques used by the food, drink and associated industries to turn whole fresh foods into food products."

Monteiro, C. A., Levy, R. B., Claro, R. M., Castro, I. R., & Cannon, G. (2010). A new classification of foods based on the extent and purpose of their processing. *Cad Saude Publica, 26*(11), 2039-2049.

International Food Information Council

"**Q:** Are processed foods safe?

A: Yes, in fact processing foods often makes them safer. For example, heating foods helps remove harmful bacteria.

Pasteurization is a common heating process applied to milk to kill harmful organisms. Canning and freezing foods such as meats, fruits and vegetables helps them to stay fresher longer."

https://www.foodinsight.org/

Industrial Revolution

1856 Borden's Condensed Milk

- In 1855, dairy products were shipped in unsanitary oak barrels.
- Gail Borden used an airtight vacuum to boil off the 87% of water found in milk.
- Canned condensed milk did not spoil and could be easily transported.

1867
Synthetic Baby Food

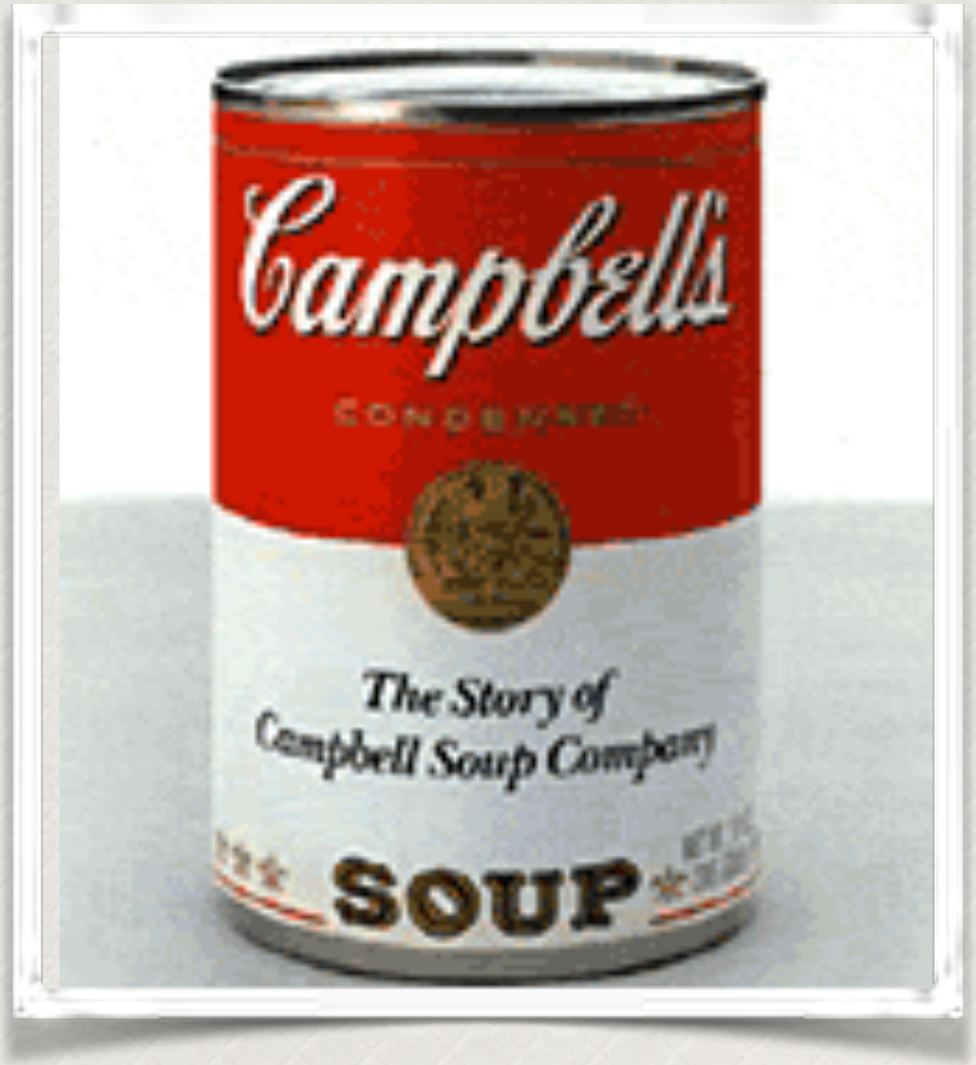
- Formula was followed by cereals, fruits, and vegetables.
- Malted milk and chocolate were “health foods” for children.

1886

Coca Cola

1897
Campbell's Soup

- Housewives had to be convinced to buy Campbell's instead of making their own soup.
- They were marketed as being slightly different to homemade, but inexpensive and incredibly time-saving.



1911
Crisco

- Procter and Gamble's flagship product.
- Crisco first accepted in Kosher kitchens.

Processed Foods

Cheese
Ham and other slated, smoked, canned meat or fish
Vegetables and fruits preserved in salt or sugar
Nuts and seeds, salted or sugared, butters and spreads
Beer and wine

Ultra-Processed Foods

Breads, rolls, crackers
Cakes, cookies, and pies
Desserts
Pizza
Breakfast cereals
Salty snacks - chips
Sweet snacks
Soft drinks, sweetened beverages, fruit drinks
French fries and other potato products
Instant and canned soups
Ready-made meals
Sauces, dressings, and gravies

Theories and Confusion

- *Calorie Theory - Food Industry Distraction*
- *Low-fat Theory - Scientific Fraud*
- *Moderation Theory - Conflict of Interest*

Calorie Theory

- *Shifts focus away from the food industry to individual:*
  - *Simplistic view*
- *Overlooks food processing -*
  - *Cooking increases energy gained*
  - *Metabolic costs in digestibility and immune defense*

Carmody, R. N., Weintraub, G. S., & Wrangham, R. W. (2011). Energetic consequences of thermal and nonthermal food processing. *Proc Natl Acad Sci U S A, 108*(48), 19199-19203. doi: 10.1073/pnas.1112128108

Low-fat Theory

- *1967 - Sugar becomes the new tobacco - Harvard University and The Sugar Research Foundation*
- *Demonized fat and cholesterol*
  - *Replaced tradition fats with industrial seed oils*
- *Substituted sugar for fat*

Kearns, C. E., Schmidt, L. A., & Glantz, S. A. (2016). Sugar Industry and Coronary Heart Disease Research: A Historical Analysis of Internal Industry Documents. *JAMA Intern Med, 176*(11), 1680-1685. doi:10.1001/jamainternmed.2016.5394


TIME
CHOLESTEROL
And Now the Bad News...
AFTER SUPER TUESDAY
The Democrats Brace for a Marathon
March 1984
TIME
Eat Butter.
Scientists labeled fat the enemy. Why they were wrong
BY BRYAN WALSH
June 2014

JAMA Internal Medicine

Special Communication | September 12, 2016

Sugar Industry and Coronary Heart Disease Research

A Historical Analysis of Internal Industry Documents FREE

ONLINE FIRST

Cristin E. Kearns, DDS, MBA[1,2]; Laura A. Schmidt, PhD, MSW, MPH[1,3,4]; Stanton A. Glantz, PhD[1,5,6,7,8]

[+] Author Affiliations

JAMA Intern Med. Published online September 12, 2016. doi:10.1001/jamainternmed.2016.5394

WW2 Food Rationing -

Life Magazine May 11, 1942

SUGAR

U. S. consumers register for first ration books

On May 4, for the first time in its history, the people of the United States lined up inside schoolhouses to register for their first book of rationing coupons. Sugar is the first commodity for which War Ration Book One will be used. All sugar sales stopped April 27. They were resumed May 5 where registration was completed, but only to consumers armed with a war ration book. The fixed ration of half-pound a week per person is half what the sweet-toothed U. S. public normally consumes, but is almost twice as much as allotments in France and Italy. Commercial users of sugar, such as bakeries, candy and ice-cream manufacturers, received ration books April 28–29, were allotted about 70% normal requirements. The existing sugar shortage which necessitates rationing so that all on the home front may have a fair share, is due to 1) fact that 62% of sugar used in U. S. was imported from Philippines, Hawaii and West Indies; 2) large amounts of sugar are used in manufacture of alcohol for explosives.

Honey, maple or corn syrup and molasses are suggested for sweetening fruits. These may also be used for cooked desserts.

Juice from canned fruits should be kept. It can be used as a sweetening agent in cooking, sauces and for jellied desserts.

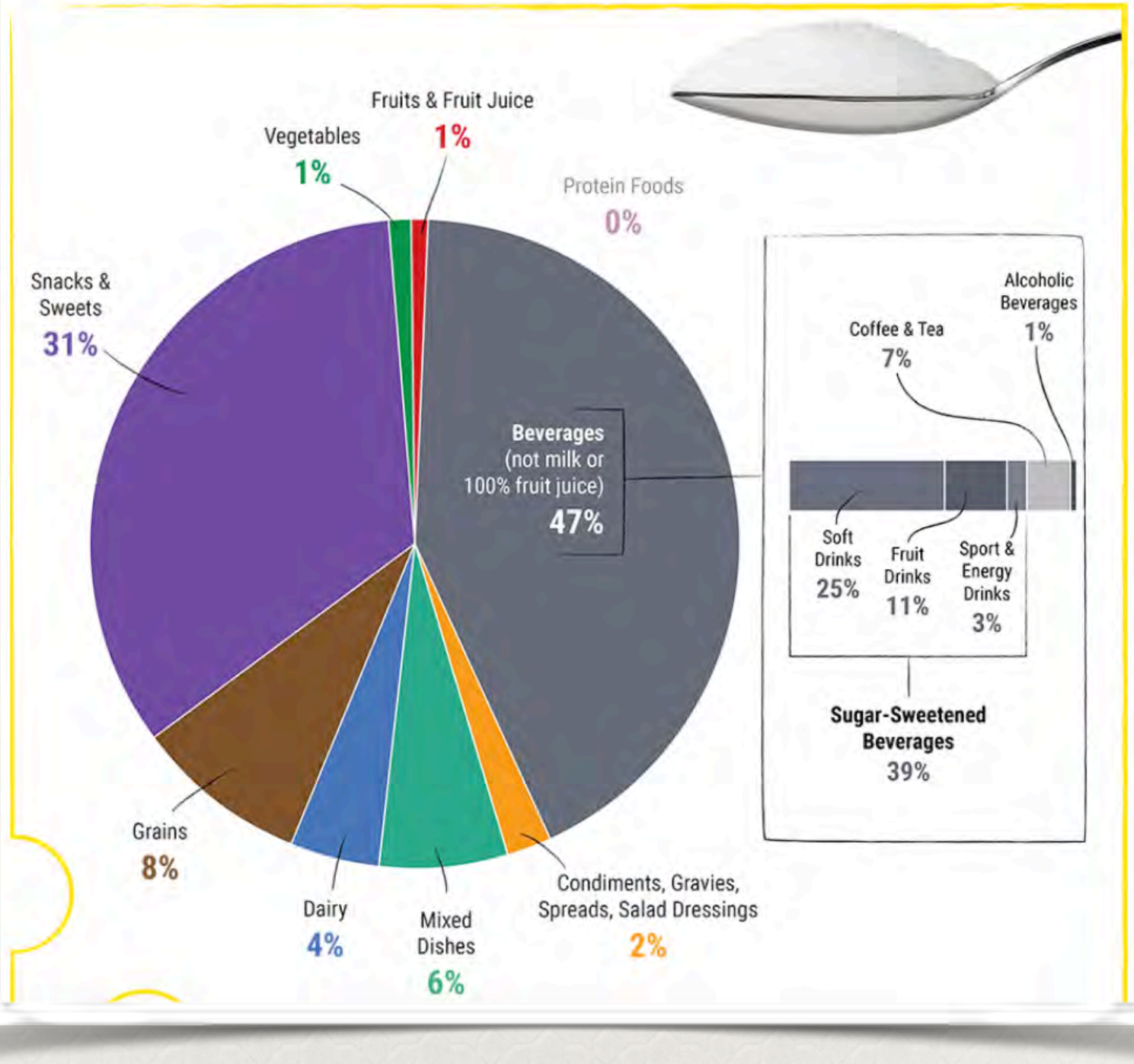
Salt, although not a sugar substitute for sugar, adds flavor to most foods, has the odd effect of accentuating the sugar taste.

Sugar Rationing - First and Last

April 27, 1942 to October 31, 1947

- Sugar is the first commodity for which War Ration Book will be used.
- The fixed ration of half-pound (1 cup) per week per person is half what the sweet-toothed U.S. public normally consumes, but is almost twice as much as the allotment in France and Italy.
- The existing sugar shortage which necessitates the ration is due to:
  - 1) fact that 62% of U.S. sugar is imported from the Philippines, Hawaii and West Indies:
  - 2) large amounts of sugar are used in the manufacture of alcohol for explosives - Nitroglycerin

Food Category Sources of Added Sugars in the U.S. Population Ages 2 Years and Older



What We Eat in America (WWEIA) Food Category analyses for the 2015 Dietary Guidelines Advisory Committee. Estimates based on day 1 dietary recalls from WWEIA, NHANES 2009-2010.

Added Sugars

Processed Foods 1.6%
Ultra-processed Foods 90%

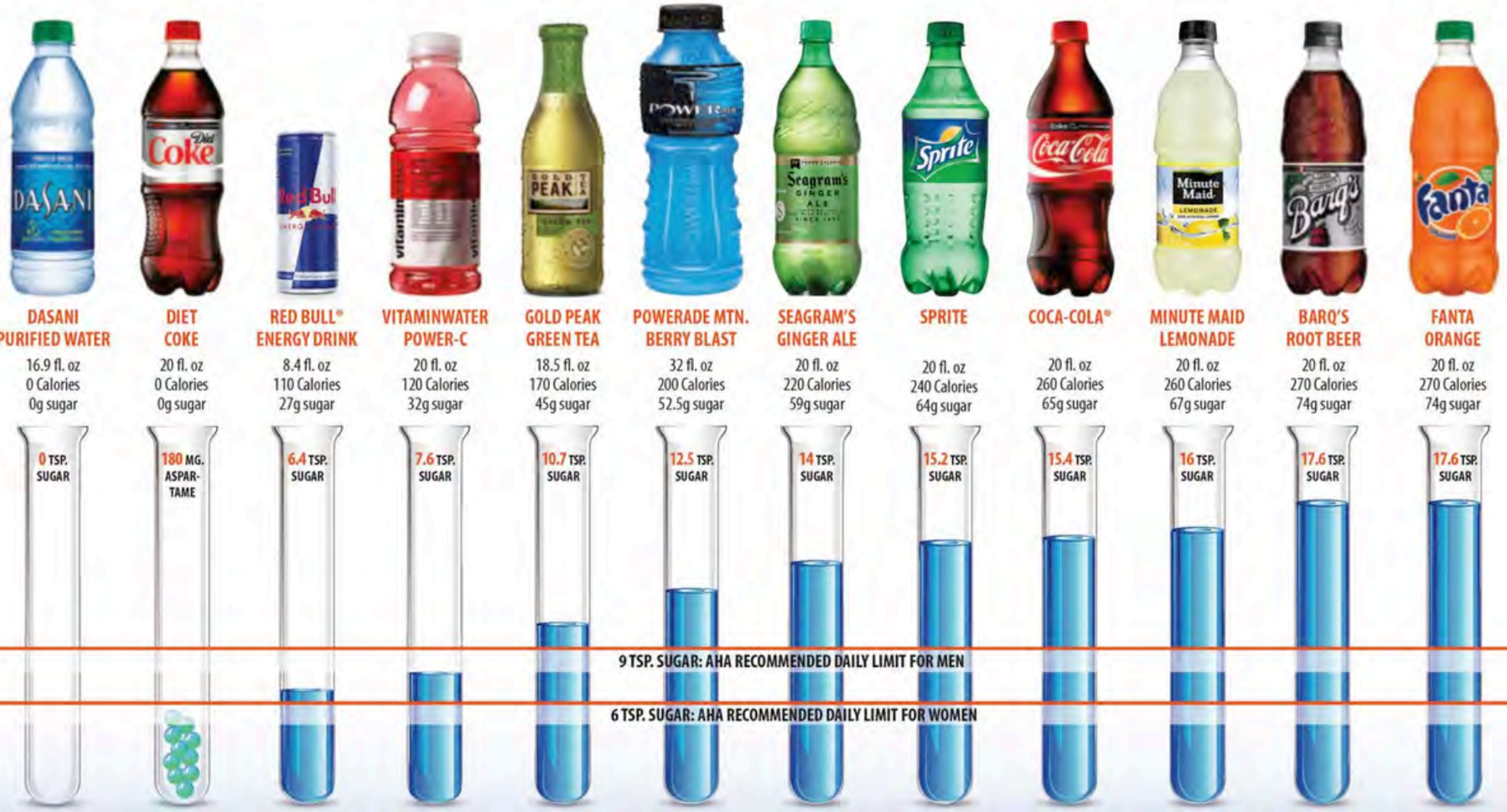
Calories

Ultra-processed Foods 60%

Martinez Steele, E., Baraldi, L. G., Louzada, M. L., Moubarac, J. C., Mozaffarian, D., & Monteiro, C. A. (2016). Ultra-processed foods and added sugars in the US diet: evidence from a nationally representative cross-sectional study. *BMJ Open, 6*(3), e009892. doi:10.1136/bmjopen-2015-009892

THINK BEFORE YOU **DRINK.**

The American Heart Association (AHA) recommends consuming no more than 6 teaspoons (tsp.) of added sugars per day for women, and no more than 9 tsp. of added sugars per day for men. How does your drink measure up?



DASANI PURIFIED WATER	DIET COKE	RED BULL® ENERGY DRINK	VITAMINWATER POWER-C	GOLD PEAK GREEN TEA	POWERADE MTN. BERRY BLAST	SEAGRAM'S GINGER ALE	SPRITE	COCA-COLA®	MINUTE MAID LEMONADE	BARQ'S ROOT BEER	FANTA ORANGE
16.9 fl. oz	20 fl. oz	8.4 fl. oz	20 fl. oz	18.5 fl. oz	32 fl. oz	20 fl. oz	20 fl. oz	20 fl. oz	20 fl. oz	20 fl. oz	20 fl. oz
0 Calories	0 Calories	110 Calories	120 Calories	170 Calories	200 Calories	220 Calories	240 Calories	260 Calories	260 Calories	270 Calories	270 Calories
0g sugar	0g sugar	27g sugar	32g sugar	45g sugar	52.5g sugar	59g sugar	64g sugar	65g sugar	67g sugar	74g sugar	74g sugar
0 TSP. SUGAR	180 MG. ASPAR-TAME	6.4 TSP. SUGAR	7.6 TSP. SUGAR	10.7 TSP. SUGAR	12.5 TSP. SUGAR	14 TSP. SUGAR	15.2 TSP. SUGAR	15.4 TSP. SUGAR	16 TSP. SUGAR	17.6 TSP. SUGAR	17.6 TSP. SUGAR

9 TSP. SUGAR: AHA RECOMMENDED DAILY LIMIT FOR MEN

6 TSP. SUGAR: AHA RECOMMENDED DAILY LIMIT FOR WOMEN

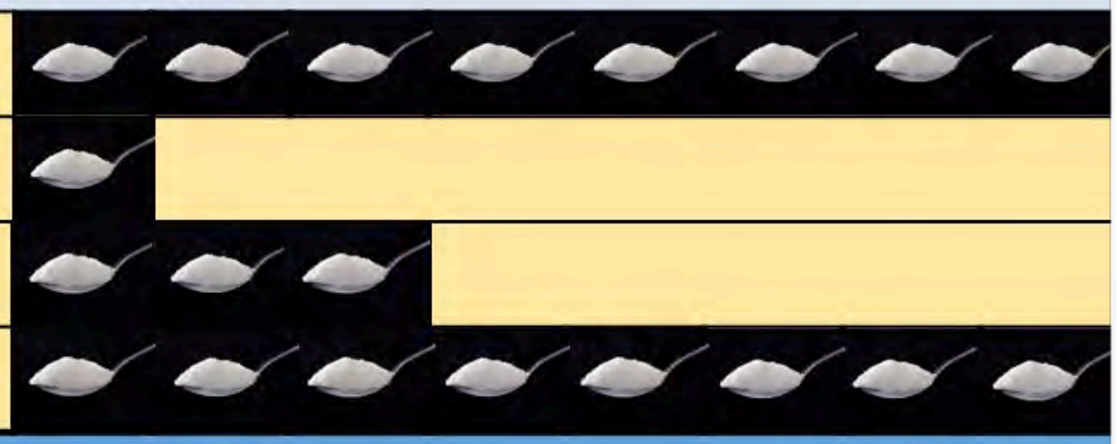
The nutritional information contained in this document was obtained from the following resources: http://www.productnutrition.thecoca-colacompany.com, http://www.dasani.com, http://www.seagramsmixers.com/ginger-ale-nutrition-facts.jsp, http://www.minutemaid.com/lemonade-and-punch/lemonade-20-fl-oz-bottle, http://www.us.powerade.com, http://www.vitaminwater.com/vitaminwater_2013_NutritionFacts.pdf, http://www.goldpeaktea.com/Flavors#/sweet-tea.

Business Health Services

Daily sugar consumption = 42.5 teaspoons per day (3/4 cup)

A healthy breakfast: cereals, toast, fruit juice?

Food item	Serving size in g/ml	How does each food affect blood glucose compared with one 4g teaspoon of table sugar?
Corn flakes	30	8.4
Milk	125	1
Brown toast, 1 slice	30	3
Pure Apple juice	200	8.6



Total for breakfast 21 teaspoons

Useful information for those with T2Diabetes making dietary choices

*As per calculations derived from the glycaemic index. To be found in: *It's the glycaemic response to, not the carbohydrate content of food that matters in diabetes and obesity* Journal of Insulin Resistance 2016. Unwin et al

De Novo Lipogenesis

Hepatic de novo lipogenesis (DNL) is the biochemical process of synthesizing fatty acids from most commonly carbohydrate (sugar) catabolism.

In addition to glucose (sugar) which most commonly supplies carbon units for DNL, fructose is also a profoundly lipogenic substrate that can drive DNL, important when considering the increasing use of fructose in corn syrup as a sweetener.

Sanders, F. W., & Griffin, J. L. (2016). De novo lipogenesis in the liver in health and disease: more than just a shunting yard for glucose. *Biol Rev Camb Philos Soc, 91*(2), 452-468. doi:10.1111/brv.12178

DNL

Therefore, a high-carbohydrate (sugar) diet can prime the DNL pathway with a large substrate load and increase rates of DNL.

Sanders, F. W., & Griffin, J. L. (2016). De novo lipogenesis in the liver in health and disease: more than just a shunting yard for glucose. *Biol Rev Camb Philos Soc, 91*(2), 452-468. doi:10.1111/brv.12178

Sugar and Triglycerides

- *Triglycerides rise when dietary carbohydrate >55% of energy = Carbohydrate-induced hypertriglceridemia*
- *Paradox - TG levels still rise with increased dietary carbohydrate consumption despite a decrease in dietary fat consumption*

Parks, E. J. (2001). Effect of dietary carbohydrate on triglyceride metabolism in humans. *J Nutr, 131*(10), 2772S-2774S. doi:10.1093/jn/131.10.2772S

Moderation Theory

- *Academy Nutrition and Dietetics*

AND *Position Papers*

"It is the position of the Academy of Nutrition and Dietetics that the total diet or overall pattern of food eaten is the most important focus of healthy eating.

All foods can fit within this pattern if consumed in moderation with appropriate portion size and combined with physical activity.

In contrast to the total diet approach, classification of specific foods as good or bad is overly simplistic and can foster unhealthy eating behaviors."

Freeland-Graves, J. H., Nitzke, S., Academy of, N., & Dietetics. (2013). Position of the academy of nutrition and dietetics: total diet approach to healthy eating. *J Acad Nutr Diet, 113*(2), 307-317. doi:10.1016/j.jand.2012.12.013

Academy of Nutrition and Dietetics

The Coca-Cola Company

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https://www.eatrightpro.org/about-us/advertising-and-sponsorship/meet-our-sponsors

Campbell's Healthy Request Chicken Noodle Soup

CHICKEN STOCK,
COOKED CHICKEN MEAT,
CARROTS,
CONTAINS LESS THAN 2 % OF:
WATER,
CHICKEN FAT,
POTATO STARCH,
SALT,
POTASSIUM CHLORIDE,
HIGH FRUCTOSE CORN SYRUP,
ONION POWDER,
DEHYDRATED COOKED CHICKEN,
CHICKEN FLAVOR,
LOWER SODIUM NATURAL SEA SALT,
DISODIUM INOSINATE,
DISODIUM GUANYLATE,
MILK SOLIDS,
DEHYDRATED GARLIC,
MODIFIED FOOD STARCH,
SPICE EXTRACT,
SOY PROTEIN ISOLATE,
SODIUM PHOSPHATES,
BEEF EXTRACT,
ASCORBIC ACID (ADDED TO HELP RETAIN COLOR),
CHICKEN FLAVOR (CONTAINS CHICKEN STOCK, CHICKEN POWDER, CHICKEN FAT),
BETA CAROTENE FOR COLOR.

COOKED ENRICHED EGG NOODLES WITH ADDED CALCIUM:

(WHEAT FLOUR,
CALCIUM CARBONATE*, *
IN EXCESS OF STANDARD
EGGS,
EGG WHITES,
NIACIN,
FERROUS SULFATE,
THIAMINE MONONITRATE,
RIBOFLAVIN,
FOLIC ACID),


NEW!
JJ
Jimmy Dean
Pancakes & Sausage
ON A STICK
Pancake Batter Covering a Sausage Link
14
Chocolate Chip


EARN CASH For Your School
Betty Crocker
Made With Real Fruit
FRUIT SNACKS
FRUIT GUSHERS
STRAWBERRY SPLASH
6

The Farmer's Share

Did you know that farmers and ranchers receive only 14.8* cents of every food dollar that consumers spend?

According to the USDA, off farm costs including marketing, processing, wholesaling, distribution and retailing account for more than 80 cents of every food dollar spent in the United States.

Bacon
1 lb.

Retail: $4.99
Farmer: $0.68

Top Sirloin Steak
1 lb.

Retail: $8.99
Farmer: $2.01

Bread
2 lbs.

Retail: $3.49
Farmer: $0.12

Fresh Carrots
5 lbs.

Retail: $4.49
Farmer: $1.40

Beer
6-pack cans

Retail: $8.99
Farmer: $0.04

Cereal
18 oz. box

Retail: $5.09
Farmer: $0.05

Tomatoes
1 lb.

Retail: $3.99
Farmer: $0.40

Eggs
1 dozen

Retail: $2.89
Farmer: $2.01

Flour
King Arthur, 5 lbs.

Retail: $6.09
Farmer: $0.43

Boneless Ham
1 lb.

Retail: $3.99
Farmer: $0.68

Lettuce
1 lb.

Retail: $2.79
Farmer: $0.47

Milk
1 gallon, fat free

Retail: $4.49
Farmer: $1.34

Fresh Apples
1 lb.

Retail: $2.19
Farmer: $0.34

Fresh Potatoes
Russet, 5 lbs.

Retail: $3.99
Farmer: $0.56

Soda
2 liters

Retail: $2.19
Farmer: $0.05

Farmer's share derived from USDA, NASS "Agricultural Prices," 2018 | Prices based onMarch 2018 data.
Retail prices based on Safeway (SE) brand except where noted. | *Figure according to U.S. Department of Agriculture Economic Research Service

April 27, 2018

The New 2010 Food Guide Pyramid

9 to 11 Servings of grain = 2 cups of sugar!

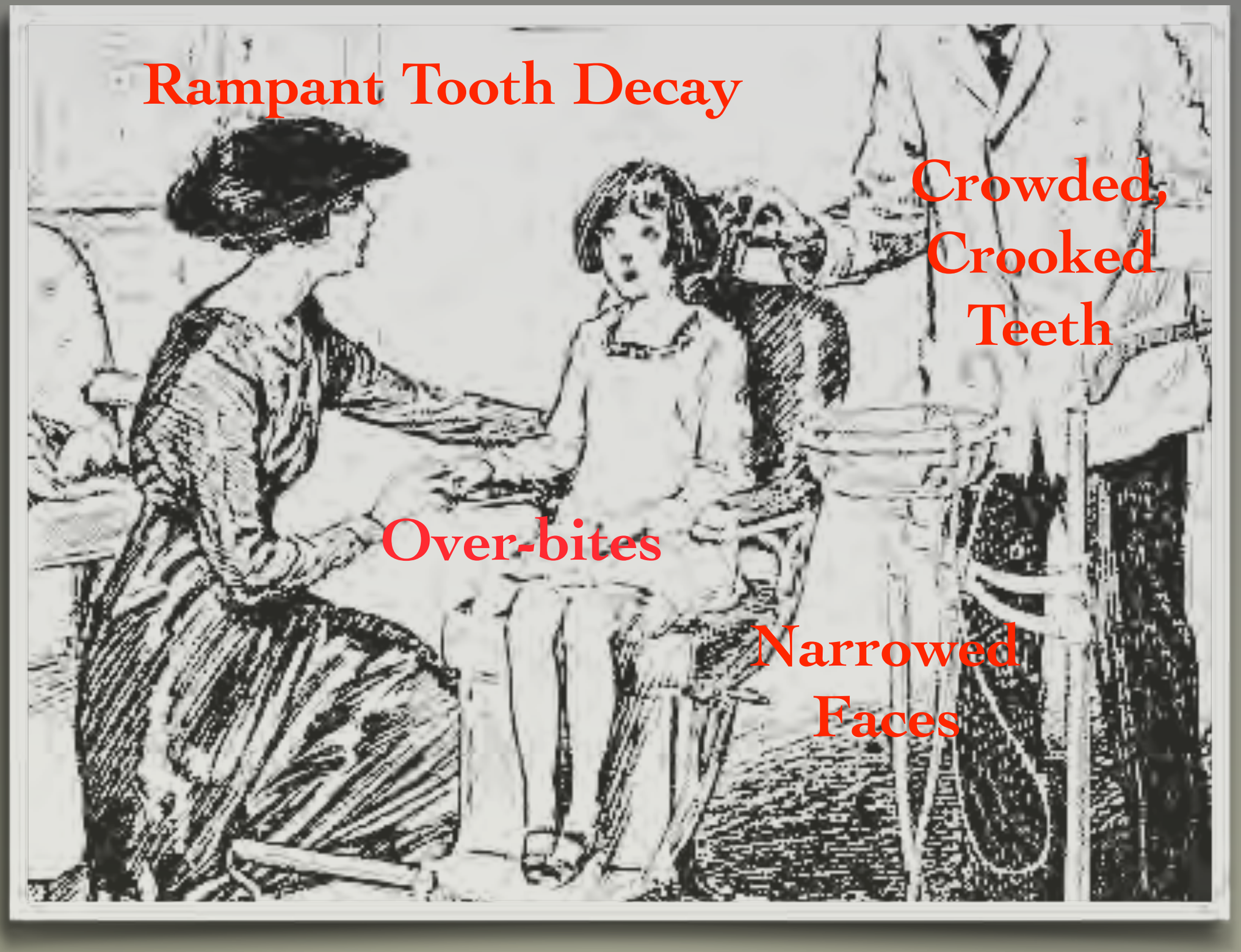
eat right. Academy of Nutrition and Dietetics

II. Ancestral Diets -

Nutritional Wisdom

Dr. Weston A.Price

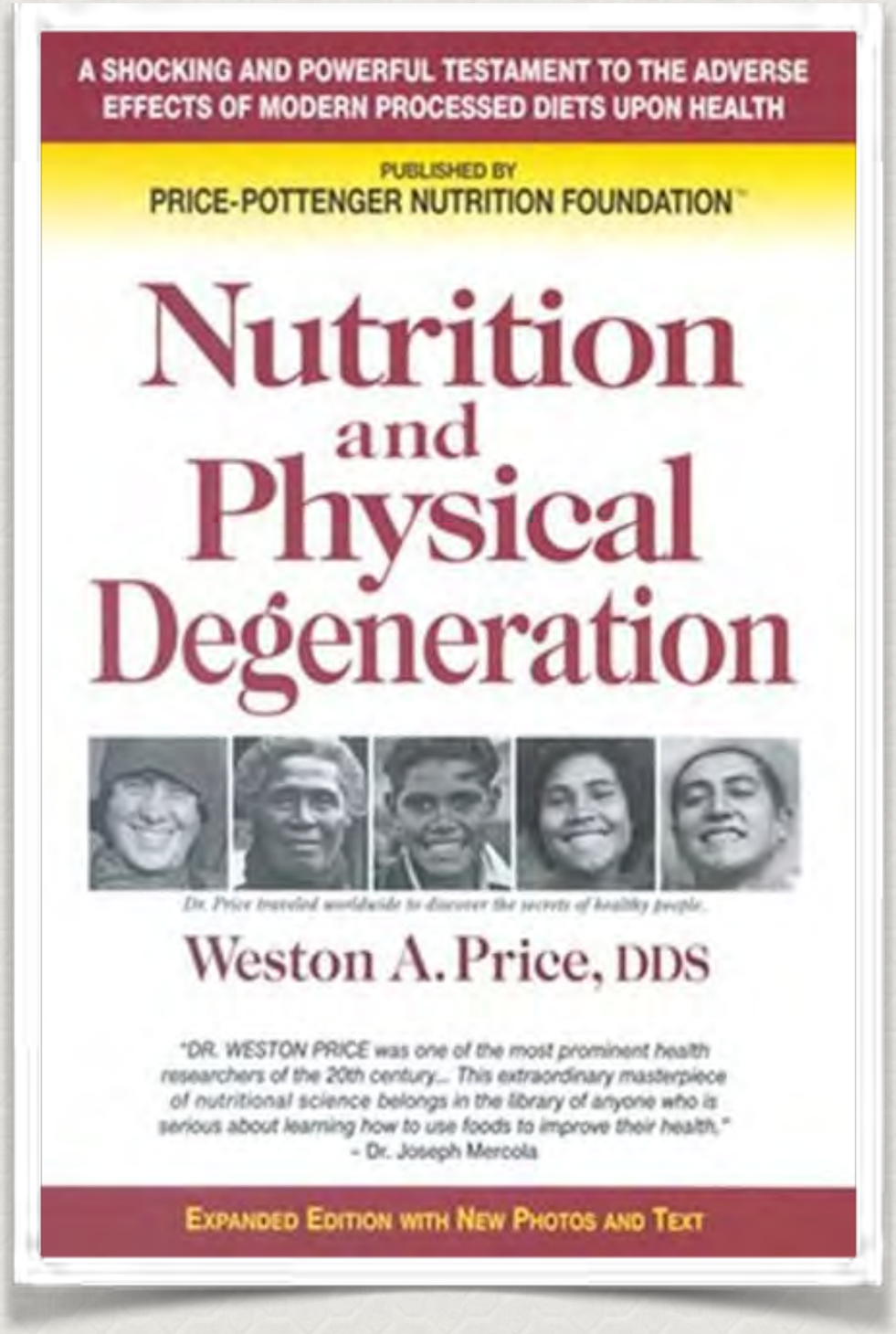
1870-1948



Children showed increasing signs of dental problems.

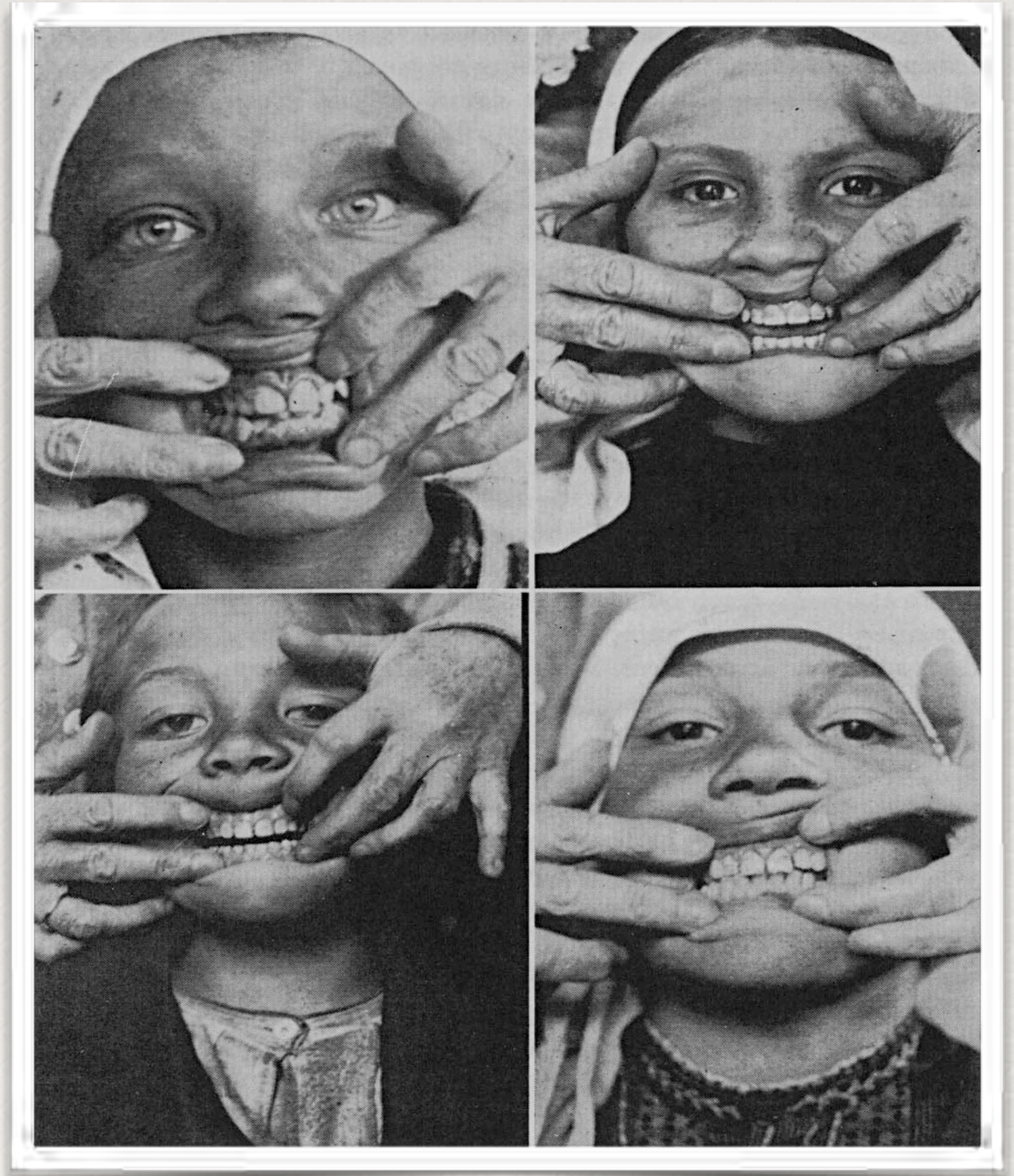
Cultures Studied

- Swiss
- Gaelics
- Eskimos
- North American Indians
- Melanesians
- Polynesians
- Africans
- Australian Aborigines
- Torres Straight Islanders
- Maori of New Zealand
- Peruvian Indians


A SHOCKING AND POWERFUL TESTAMENT TO THE ADVERSE EFFECTS OF MODERN PROCESSED DIETS UPON HEALTH
PUBLISHED BY
PRICE-POTTENGER NUTRITION FOUNDATION™
Nutrition and Physical Degeneration
Dr. Price traveled worldwide to discover the secrets of healthy people.
Weston A. Price, DDS
"DR. WESTON PRICE was one of the most prominent health researchers of the 20th century... This extraordinary masterpiece of nutritional science belongs in the library of anyone who is serious about learning how to use foods to improve their health."
- Dr. Joseph Mercola
EXPANDED EDITION WITH NEW PHOTOS AND TEXT

1939

The Lötschental Valley, Switzerland



Traditional Diet - *UnProcessed* Foods

-Only 1% tooth decay

-No tooth brushes

-Every adult and child had straight teeth

-Zero cases of TB

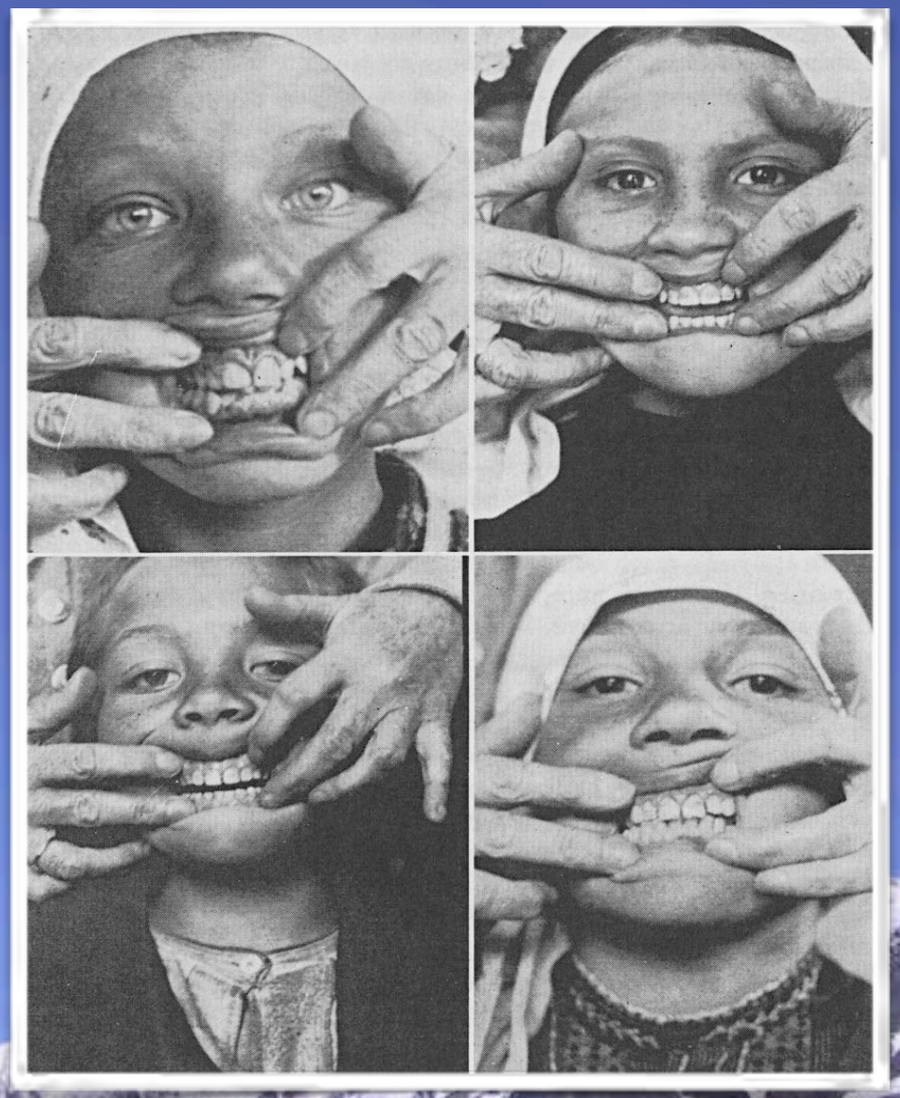
Isolated Swiss Children

Industrially Processed Foods

-At least one tooth in three had decayed
-Narrow faces
-Crowded, crooked teeth
-Tuberculosis problem

Modern Swiss Children

What did they eat?



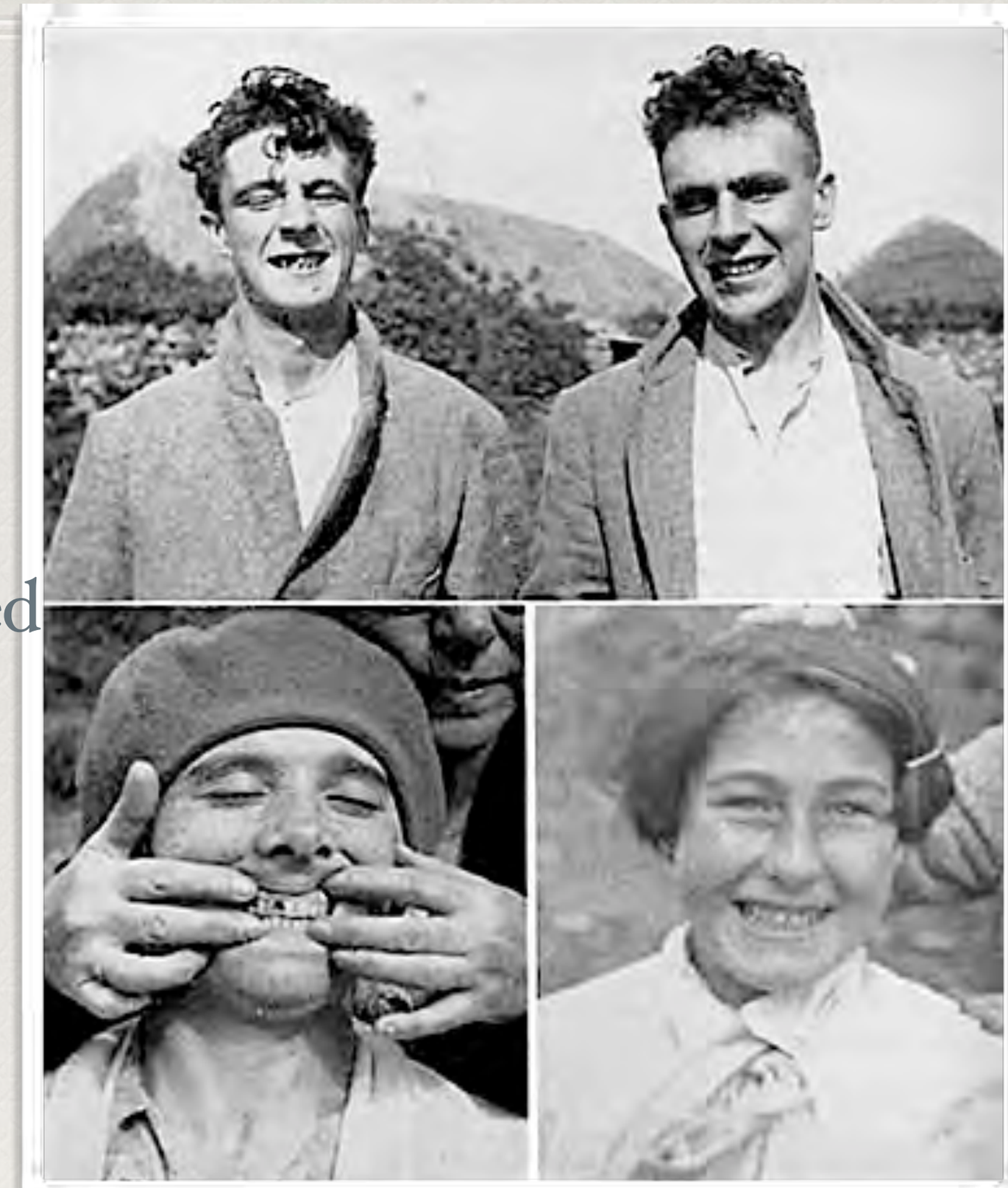
The Lötschental villagers confirmed Dr. Price's theory on nutrition and degeneration.

The Isle of Lewis, Scotland

Isolated Scots

Smoke-filled Living Room

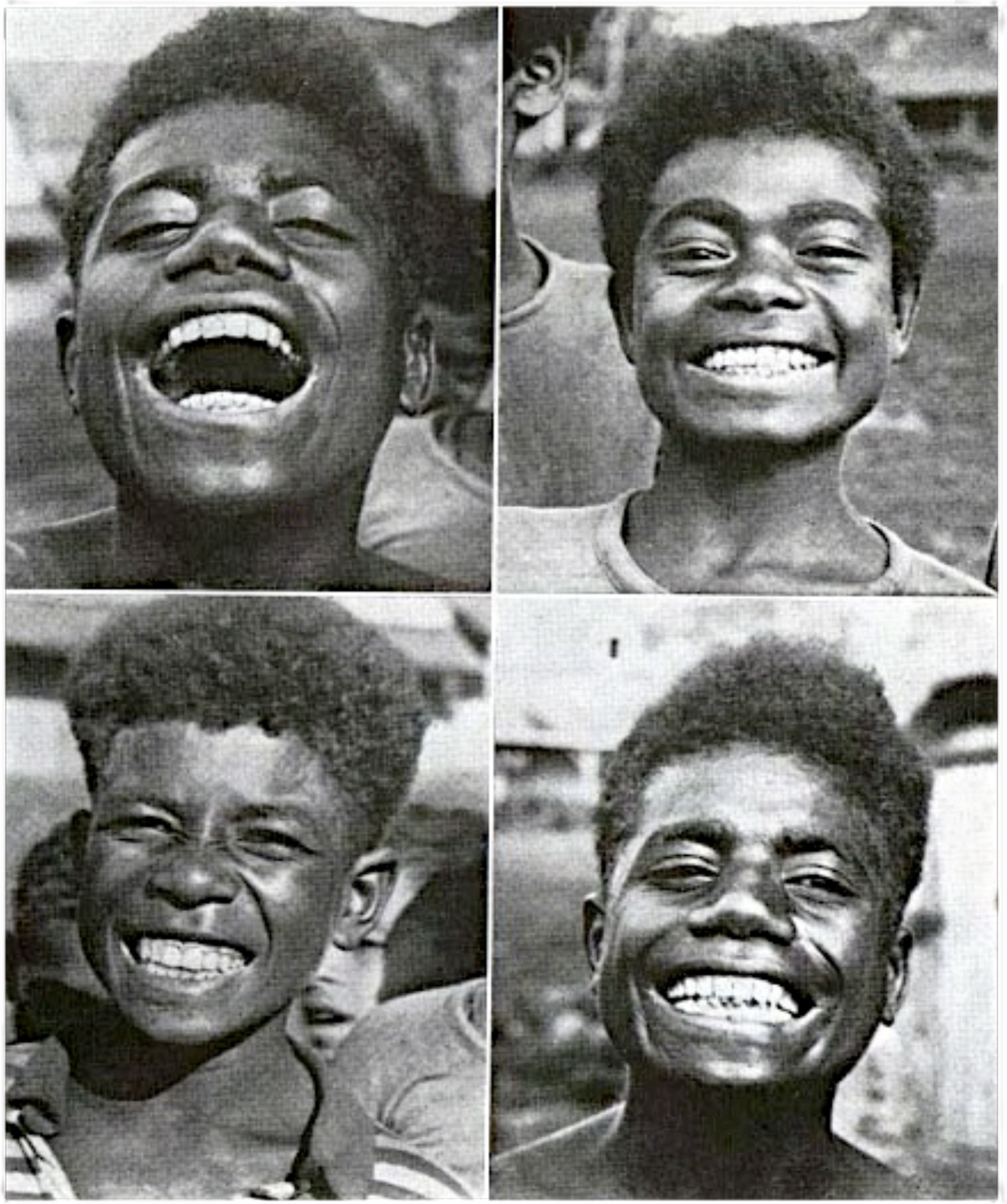
Traditional Diet

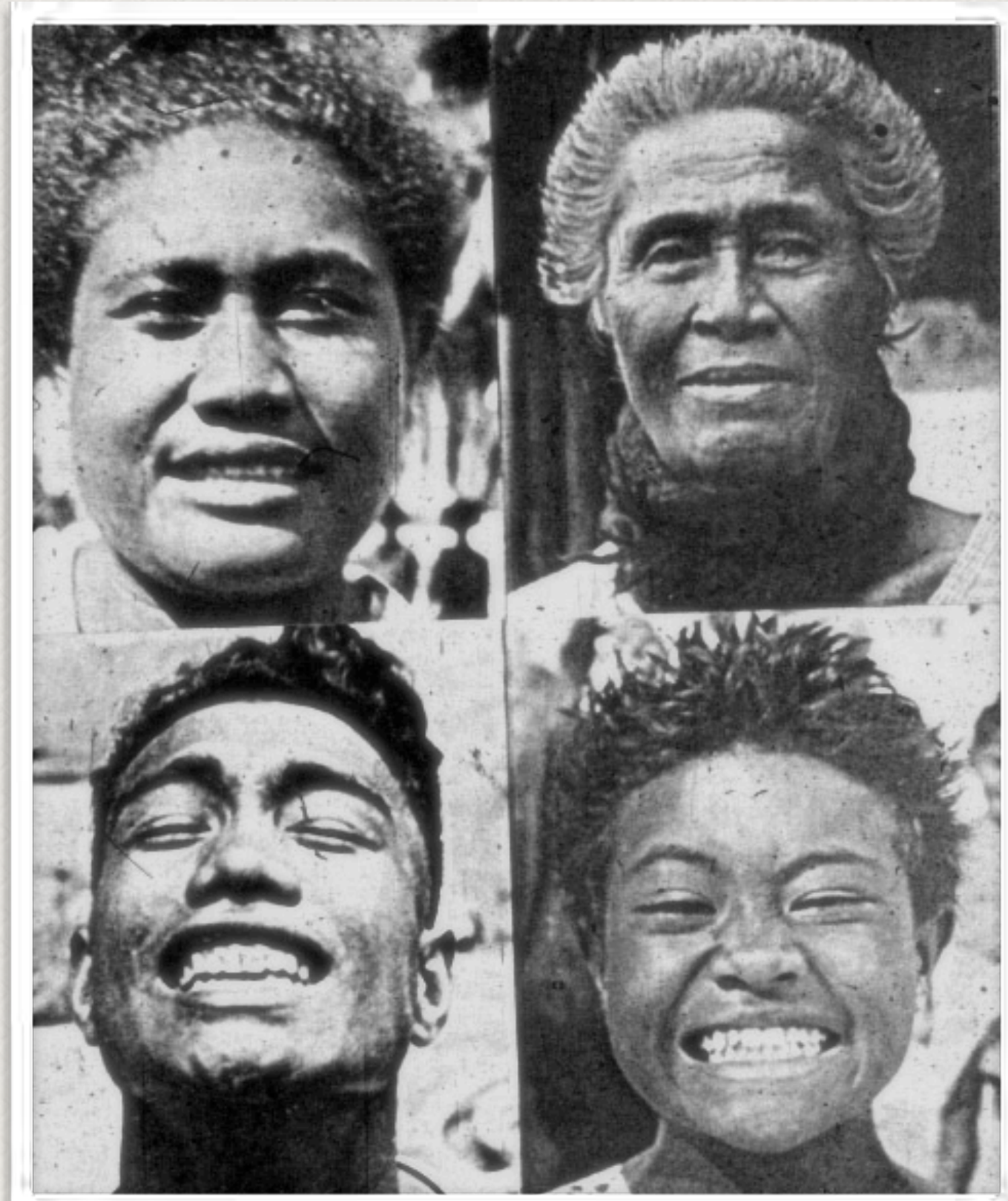


Modernized Gaelics

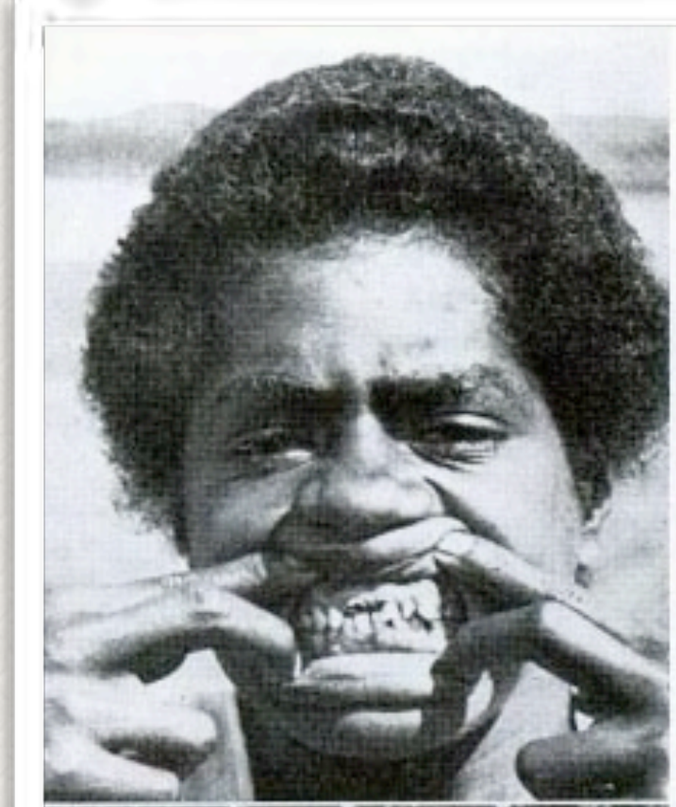
Primitive Gaelic

South Sea Islanders

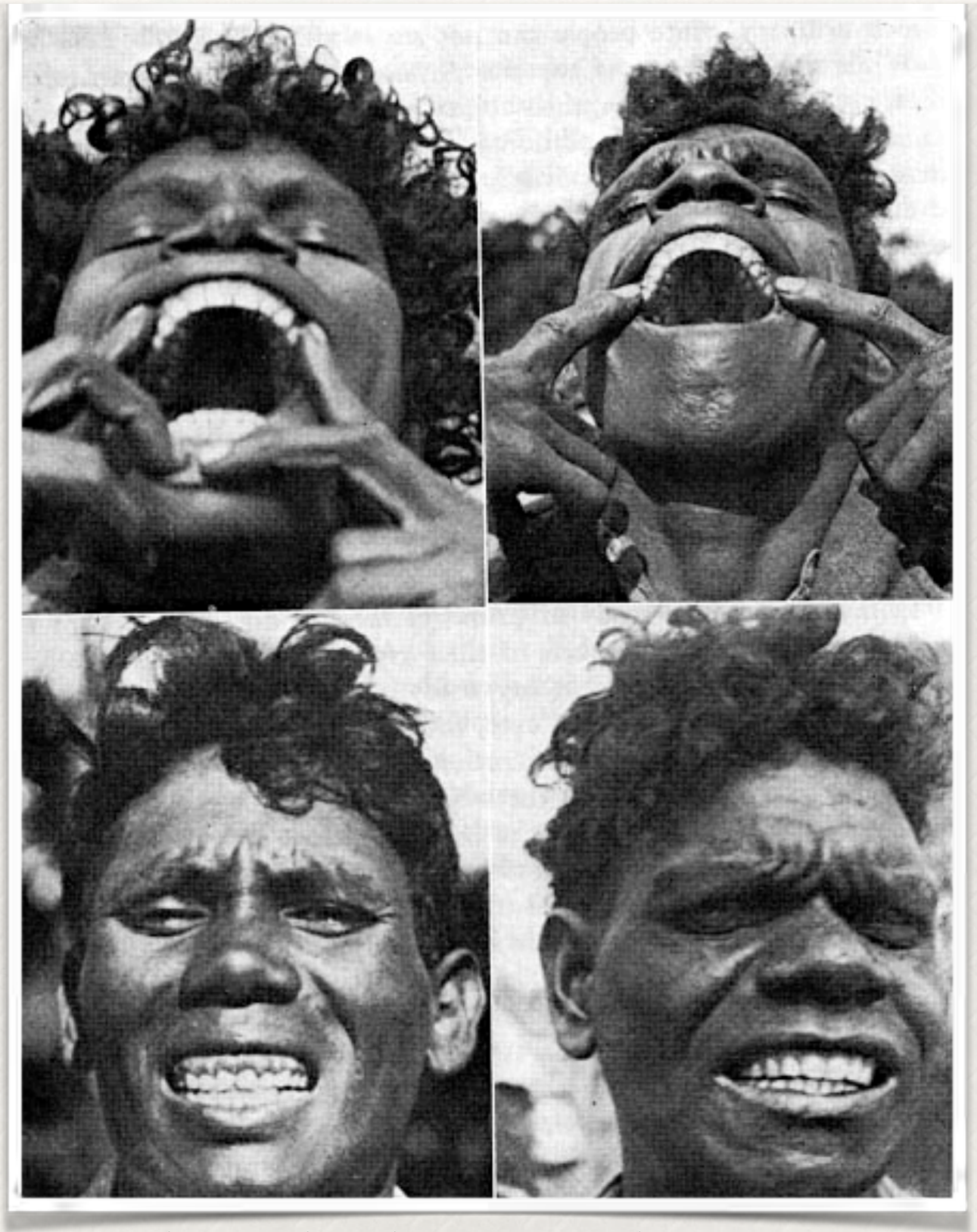




90 years old

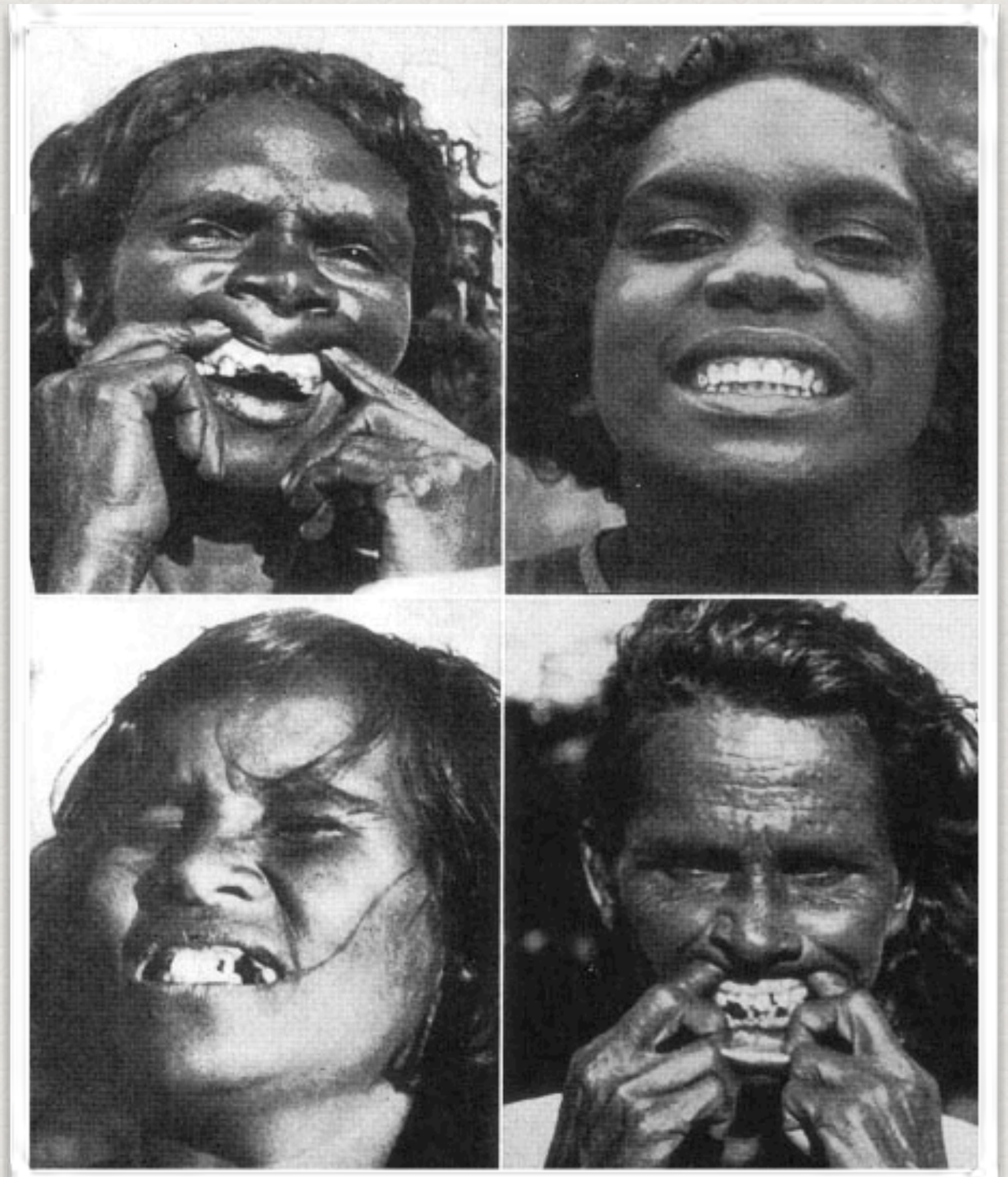


The Australian Outback



Isolated Aborignal Women

Refined Diets

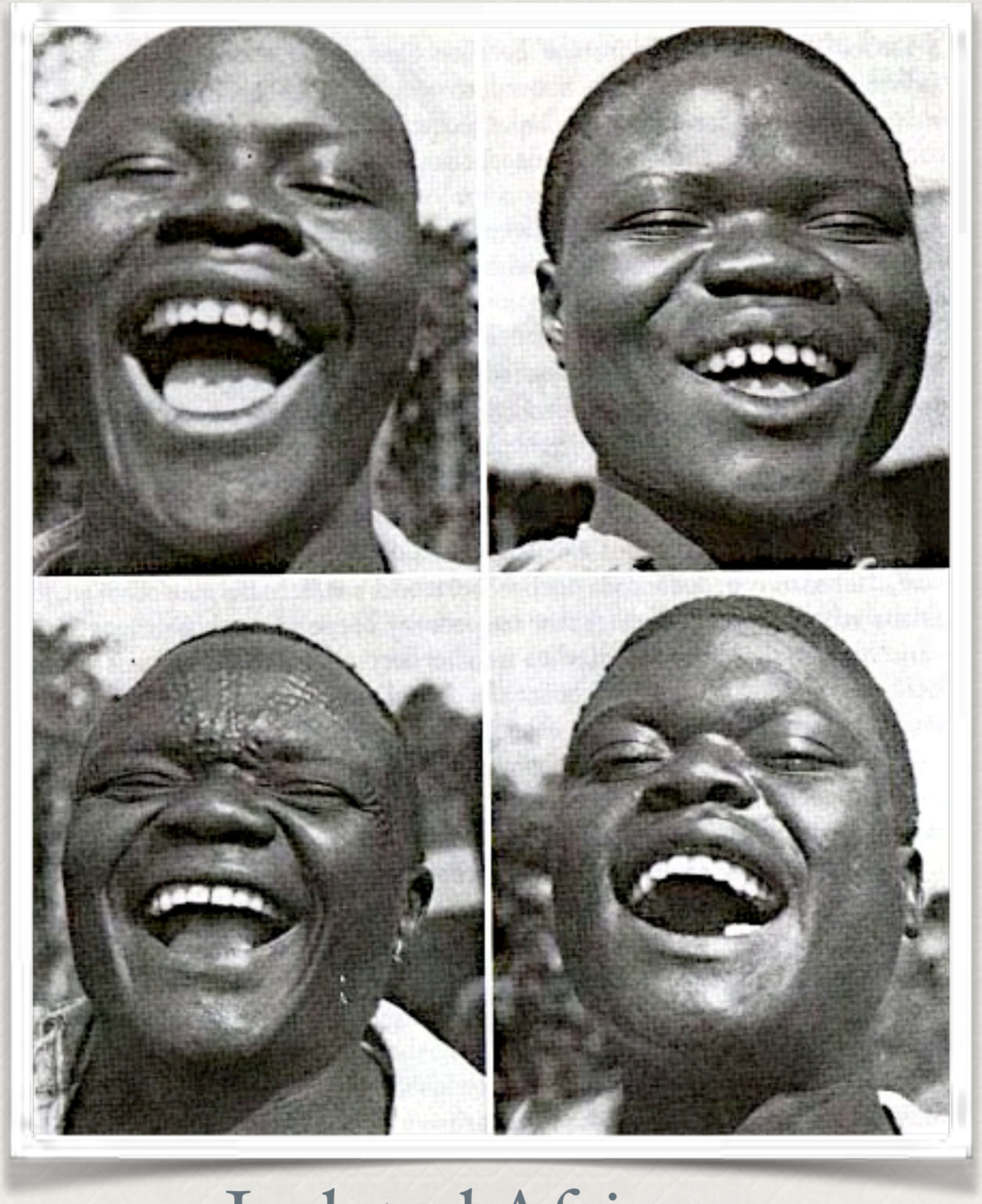


Traditional Diet

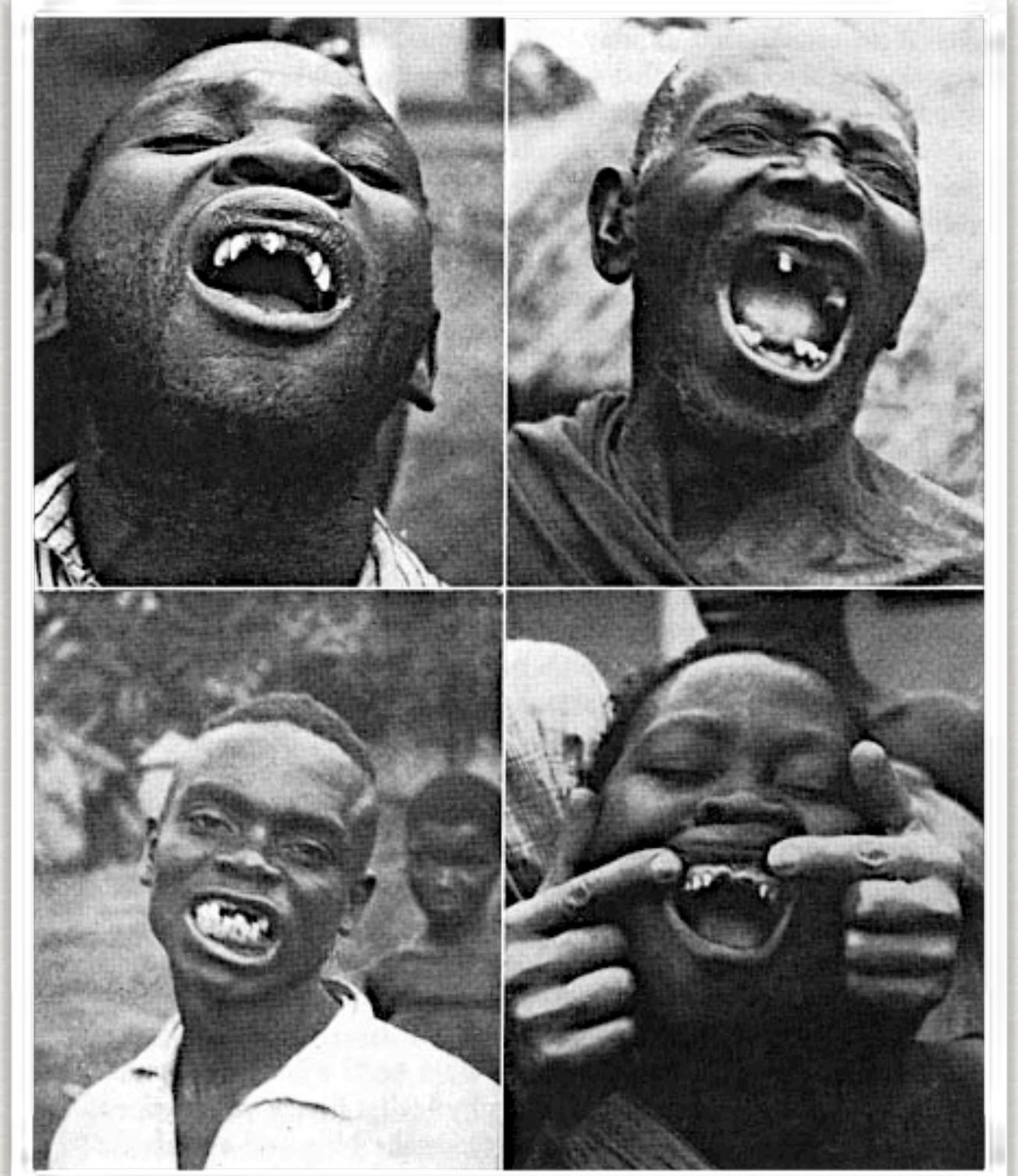
"The displacing foods of modern commerce"

Underdeveloped Middle Third of Face

Africa



Isolated Africans



Modern Africans

African Diets
Cattle Herders, Hunters, Agriculturists

- *No cavities found in the cattle herder and hunter groups*

- *6% tooth decay among the agriculturists*

  - *Agriculturists groups were shorter in height, heavier in weight, and not as robust*

Masai warrior

African Boys

Sacred Foods

- *Swiss - butter from cows on spring pasture*
- *Gaelics - cod's head stuffed with oats and chopped cod liver*
- *South Sea Islanders - organ meats of certain fish and sharks*
- *Africans - liver, raw and cooked*

Traditional Diets

- Some had no plant food
- Some had few animal foods
- Some had mostly cooked foods
- Some had large amounts of raw foods
- Some had milk products; some did not
- Some had grains; some did not
- Some had fruits; some did not

Dr. Price's Healthy Diets

- Animal foods in every diet -
  - Vitamins A and D
- Nutrient-dense foods
- No processed foods

III. The Gut-Brain-Microbiome Axis

Traditional Diets

"Epidemiological studies have reported that more traditional dietary patterns are associated with good mental health and lowered risk of depression.

Short-term intervention studies show that traditional dietary patterns can positively influence mental outlook, cognition and chronic fatigue."

Logan, A. C., Jacka, F. N., Craig, J. M., & Prescott, S. L. (2016). The Microbiome and Mental Health: Looking Back, Moving Forward with Lessons from Allergic Diseases. *Clin Psychopharmacol Neurosci, 14*(2), 131-147. doi:10.9758/cpn.2016.14.2.131

Diet rapidly and reproducibly alters the human gut microbiome (2014)

"Our findings that the human gut microbiome can rapidly switch between herbivorous and carnivorous functional profiles may reflect past selective pressures during human evolution.

Consumption of animal foods by our ancestors was likely volatile, depending on season and stochastic foraging success, with readily available plant foods offering a fallback source of calories and nutrients21.

Microbial communities that could quickly, and appropriately, shift their functional repertoire in response to diet change would have subsequently enhanced human dietary flexibility. Examples of this flexibility may persist today in the form of the wide diversity of modern human diets."

David, L. A., Maurice, C. F., Carmody, R. N., Gootenberg, D. B., Button, J. E., Wolfe, B. E., . . . Turnbaugh, P. J. (2014). Diet rapidly and reproducibly alters the human gut microbiome. *Nature, 505*(7484), 559-563. doi:10.1038/nature12820

Microbiota - Rural vs. Urban

"Remote rural areas have experienced relatively small variation over the past century, with the inhabitants having gut microbiota distinct from those of modern city dwellers.

Even in developed countries, rural–urban differences in gut microbiota exist. For example, the bacteria that metabolize fiber have decreased, whereas the bacteria that metabolize animal protein and fat have increased in city dwellers; even in people who have moved from villages to cities, the gut microbiota seems to have changed to a more urbanized microbiota.

Modernization has been changing the microbiota by various means, including diet, lifestyle, and medication."

Liang, S., Wu, X., & Jin, F. (2018). Gut-Brain Psychology: Rethinking Psychology From the Microbiota-Gut-Brain Axis. *Front Integr Neurosci, 12*, 33. doi: 10.3389/fnint.2018.00033

Dietary Changes and Dysbiosis

- *Dietary structure:*
  - *Increased intake of refined carbohydrates - also high-fat, especially industrially-produced seed oils*
  - *Decreased dietary fiber intake*
- *Dietary habits:*
  - *Eating out, increased snacking*

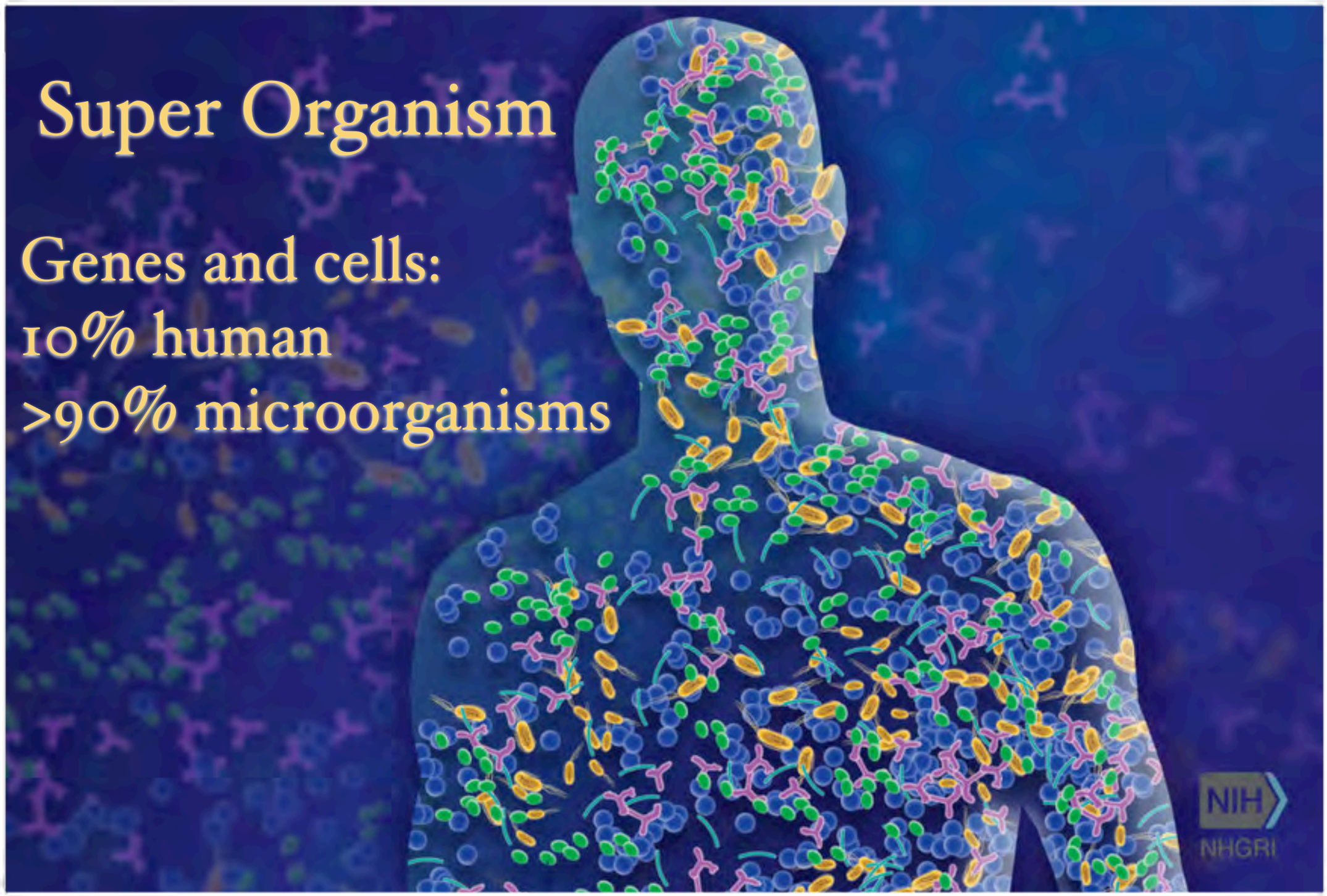
Liang, S., Wu, X., & Jin, F. (2018). Gut-Brain Psychology: Rethinking Psychology From the Microbiota-Gut-Brain Axis. *Front Integr Neurosci, 12*, 33. doi:10.3389/fnint.2018.00033

Dietary Changes and Dysbiosis

- *Increased ultra-processed food consumption:*
  - *Pesticide and drug residues*
  - *Food additives and antiseptics - sodium benzoate, potassium sorbate*
  - *Artificial sweeteners*
- *Decreased consumption of fresh and traditionally-fermented foods*

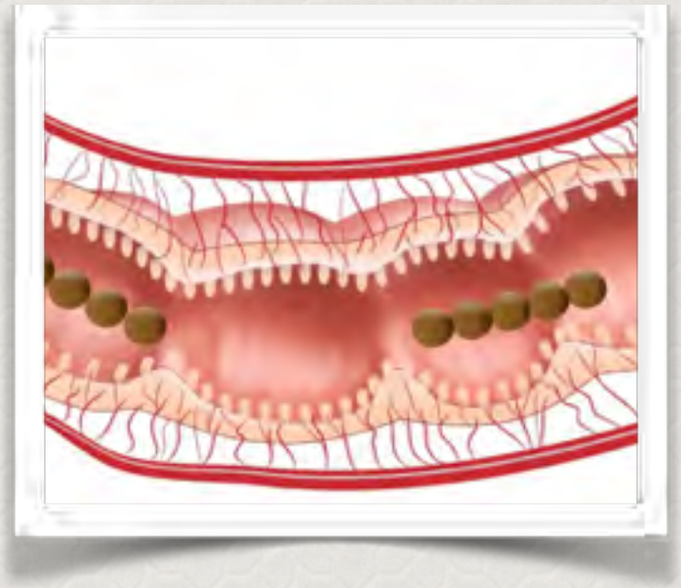
Liang, S., Wu, X., & Jin, F. (2018). Gut-Brain Psychology: Rethinking Psychology From the Microbiota-Gut-Brain Axis. *Front Integr Neurosci, 12*, 33. doi: 10.3389/fnint.2018.00033

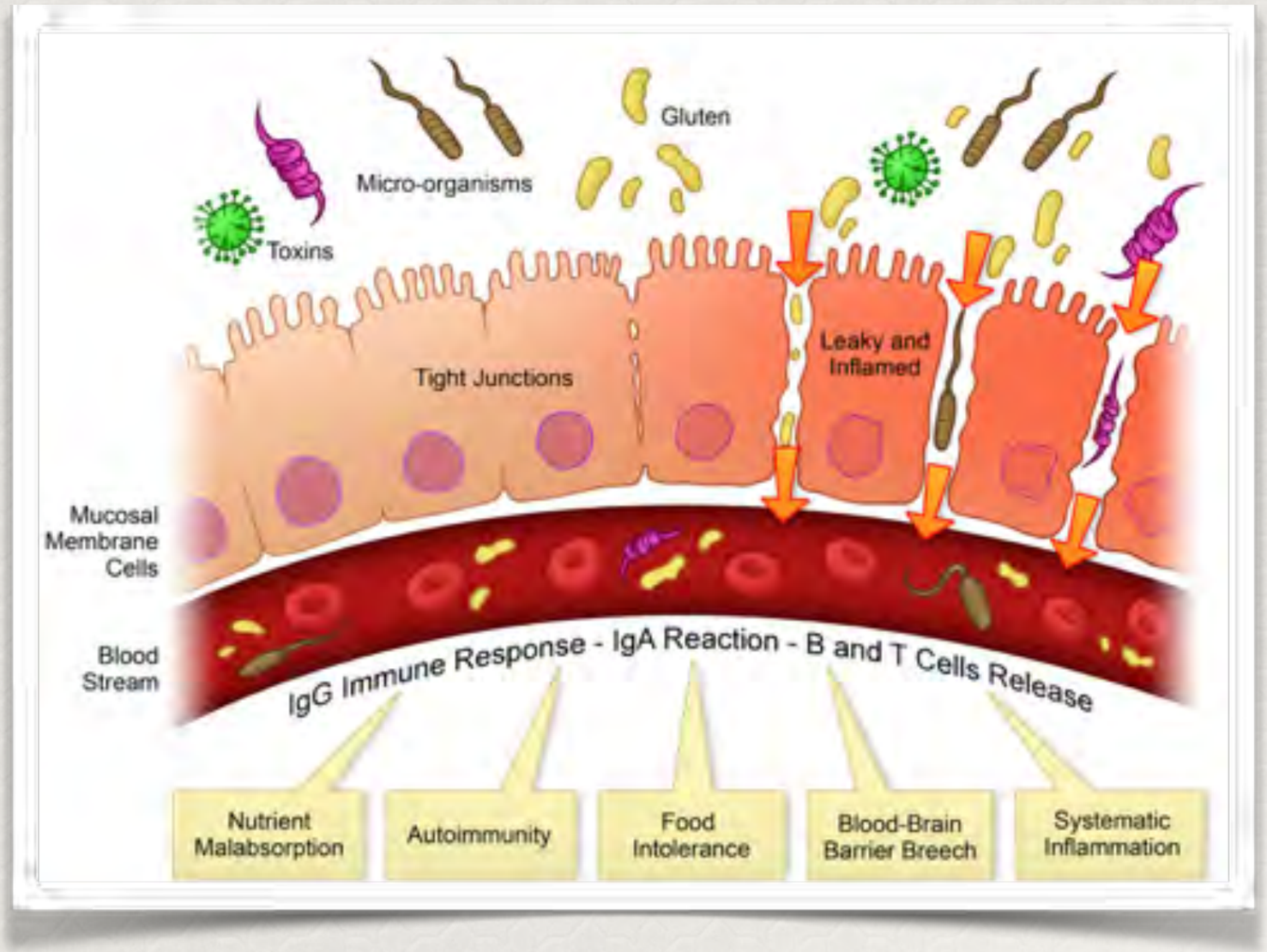
The Human Microbiome



The Gut Microbiome

The Gut Microbiome





Functions of Gut Microbiota

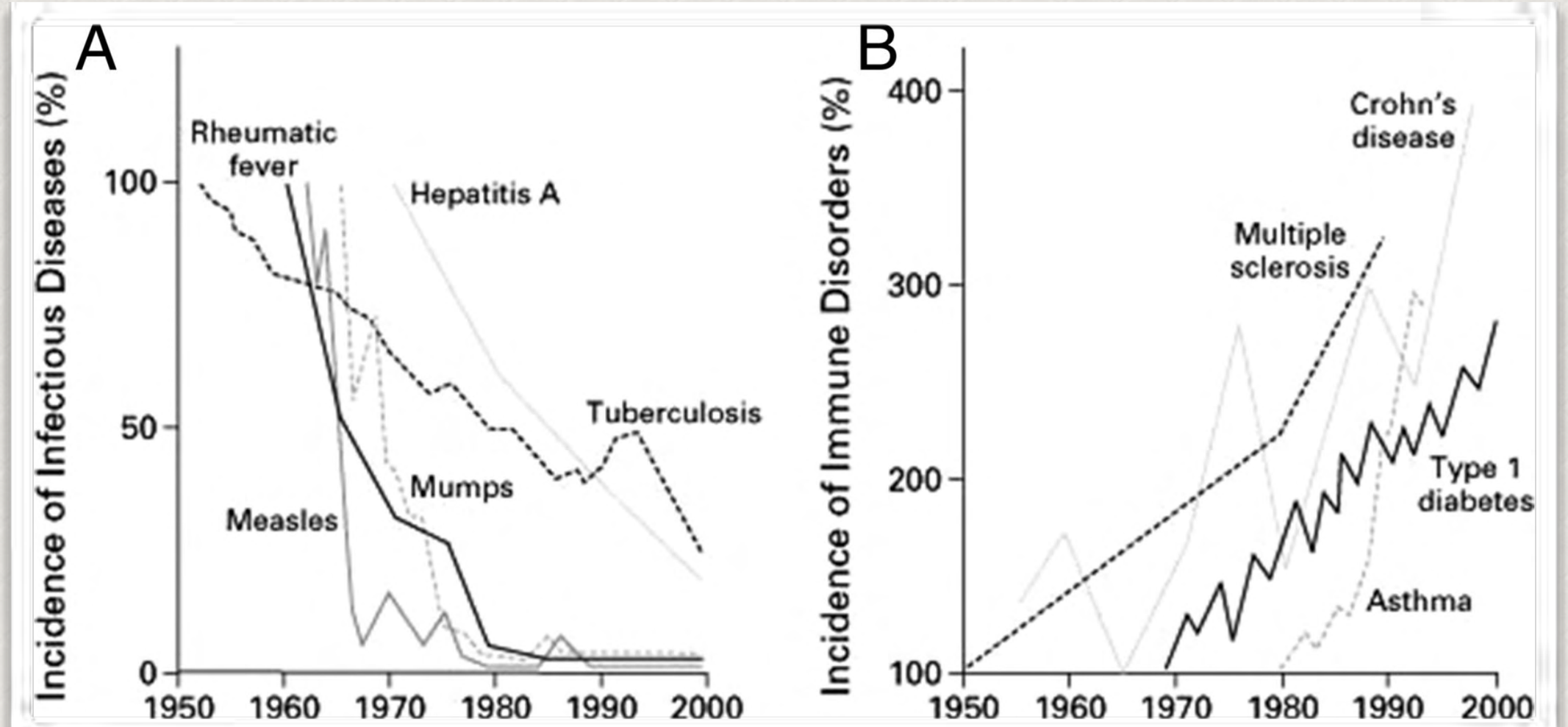
- *Nutrient digestion, absorption, and metabolism*
  - *Resistant starches*
  - *Protein decomposition (endogenous and exogenous)*
- *Bile acid breakdown*
- *Vitamin and other bioactive compound synthesis*
- *Immune system maturation*
- *Neuroendocrine system regulation*
- *Brain and mind development and function*

Liang, S., Wu, X., & Jin, F. (2018). Gut-Brain Psychology: Rethinking Psychology From the Microbiota-Gut-Brain Axis. *Front Integr Neurosci, 12*, 33. doi:10.3389/fnint.2018.00033

Development of the Gut Microbiome

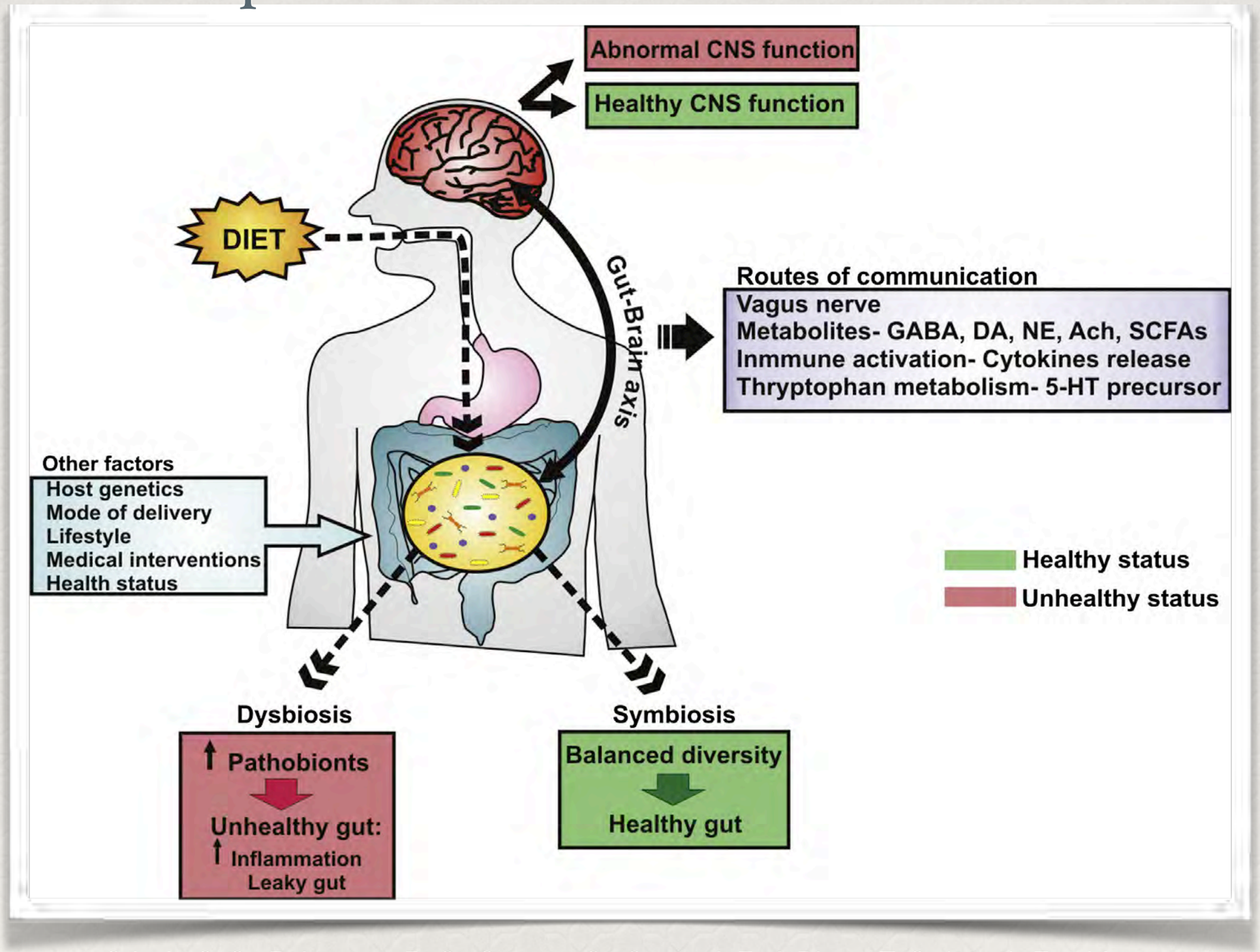
Hygiene Hysteria

The inverse relationship between (A) infectious disease incidence and (B) the rates of immune disorders suggested that a reduction in infections might be causing the human immune system to malfunction.



Scudellari, M. (2017). News Feature: Cleaning up the hygiene hypothesis. *Proc Natl Acad Sci U S A, 114*(7), 1433-1436. doi:10.1073/pnas.1700688114

Impact of Diet on CNS Function



Oriach, C. S., Robertson, R. C., Stanton, C., Cryan, J. F., & Dinan, T. G. (2016). Food for thought: The role of nutrition in the microbiota-gut-brain axis. *Clinical Nutrition Experimental, 6*. doi:http://dx.doi.org/10.1016/j.yclnex.2016.01.003

Psychology of the Gut-Brain

- *Gut-brain can function independent of the brain*
  - *These functions persist even in a vegetative state*
- *Gut-brain regulates local gut functions plus influences human behavior and cognition*

Animal Studies - Germ Free

Oriach, C. S., Robertson, R. C., Stanton, C., Cryan, J. F., & Dinan, T. G. (2016). Food for thought: The role of nutrition in the microbiota-gutebrain axis. *Clinical Nutrition Experimental, 6*. doi:http://dx.doi.org/10.1016/j.yclnex.2016.01.003

Gut Microbiota and Behavioral Influences - Animal Studies

- *1) Pain perception and response - peripheral and visceral*
- *2) Cognitive functions - learning and memory*
- *3) Mood and emotion*
- *4) Character and temperament*
- *5) Stress management - stress response system*
- *6) Modulates dietary choices and appetite*
- *7) Social interaction and reproductive choices*

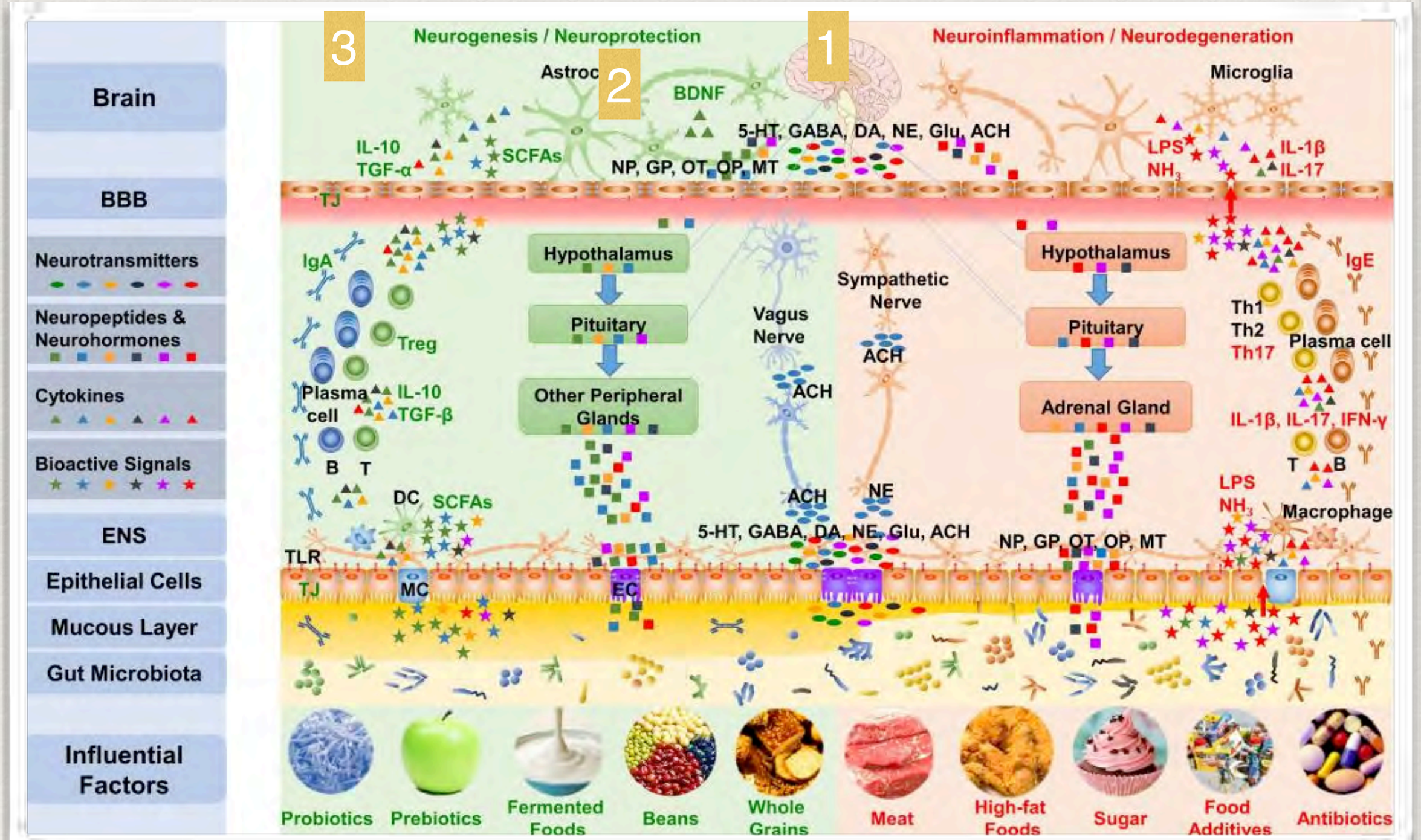
Liang, S., Wu, X., & Jin, F. (2018). Gut-Brain Psychology: Rethinking Psychology From the Microbiota-Gut-Brain Axis. *Front Integr Neurosci, 12*, 33. doi:10.3389/fnint.2018.00033

How Microbes Talk to the Brain

- *1) Neural Pathway - the Vagus nerve*
- *2) Neuroendocrine Route -*
  - *Neurotransmitter secretion (GABA, serotonin, catecholamines, histamine, etc.)*
  - *Microbial metabolites may provide signaling modulators*
- *3) Immune Pathway*

Lefas, I. (2018). The intriguing role of the Gut Microbiome in the etiology and pathogenesis of Neuropsychiatric Disorders. *Dialogues in Clinical Neuroscience & Mental Health, 1*(2). doi:DOI 10.26386/obrela.v1i2.48

Three Pathways of Communication



Liang, S., Wu, X., & Jin, F. (2018). Gut-Brain Psychology: Rethinking Psychology From the Microbiota-Gut-Brain Axis. *Front Integr Neurosci, 12*, 33. doi:10.3389/fnint.2018.00033

Gut Microbes and Appetite

- *Microbial control of the appetite-regulating hormones*
- *Abnormal eating habits disturb microbial ecosystem, potentially creating a loop perpetuating the disorder*

Lefas, I. (2018). The intriguing role of the Gut Microbiome in the etiology and pathogenesis of Neuropsychiatric Disorders. *Dialogues in Clinical Neuroscience & Mental Health, 1*(2). doi:DOI 10.26386/obrela.v1i2.48

Norris, V., Molina, F., & Gewirtz, A. T. (2013). Hypothesis: bacteria control host appetites. *J Bacteriol, 195*(3), 411-416. doi:10.1128/JB.01384-12

Conclusion

- *A balanced and diverse gut microbiota is vital for neurodevelopment, brain function, and mental health.*
- *Diet is an important therapeutic strategy.*
  - *Traditional foods - fresh, whole, and minimally processed.*
  - *Traditional fats - butter, coconut oil, lard, olive oil, ghee*
  - *Fiber-rich foods*
- *Reduce or eliminate sugar - especially sugar-sweetened beverages*

Practice:

- *Include dietary habits in client assessment*
  - *Suggest healthy food choices where necessary*
- *Handouts:*
  - *Food-based dietary guide*
  - *Food Diary*
- *Encourage physical activity for well-being NOT weight loss*

Thank You!