Title: Scaling Astrobiology and Protocell Research into Systemic Health Productivity; an Anatomy and Physiology Solution Parallel to Monetarism.

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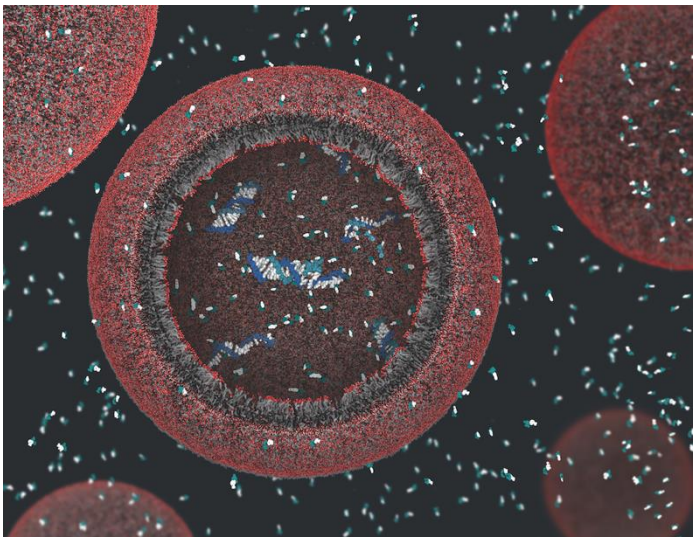


The Protocell Model

Credit: *Janet Iwasa, Szostak Laboratory, Harvard Medical School and Massachusetts General Hospital*
See: National Science Foundation Protocell Summary

Introduction

Current research in astrobiology, cosmo-chemistry, origin of life (1 Damer, Deamer) , and the protocell model (2 Adamala, Szostak) present insights into principles and function of modern human anatomy and physiology. These primordial chemical, cellular structures and mechanisms of action are the foundation of the tree of life, evolutionary biology, anthropology, and subsequently, the physiological and conceptual principles in historic and modern medicine and healthcare, as well as child development. They are the biological foundation of all arts, humanities and sciences, and academic disciplines, in all global cultures. They are primary biological, anatomy and physiology
factors of production for the health economy, and the general economy.

Therefore, novel insights from astrobiology can scale to produce systemic benefits broadly across the health and social economy.

This paper will outline an initiative to achieve that goal.

Specifically, the recent collective stress and trauma of society has been a cause for concern

The proposed systemic productivity initiative is relevant now due to the global increase in stress, and collective trauma in the population due to multiple factors, such as the Covid-19 pandemic, regional wars, climate issues. This trend is measured by Gallup Polls (3),. The American Psychological Association (4, 5). And the Journal of Molecular Psychiatry (6)

The relationship between stress and illness is well known. Thus the burden of stress in recent years, both for adults and children, increase the risk of longer term disease burden in the population, and stress to the healthcare system (7, 8, 9)

This is a micro to macro risk reduction initiative.

This outline proposes that the magnitude of this problem is parallel to the gaps in principles that preceded the monetary crisis of the Great Depression of 1929. The solutions proposed are parallel to the development of monetarism by Friedman and Schwartz that utilized data from the Great Depression. The benefits are estimated to be parallel to the introduction of monetarism and its implementation as monetary policy – improved population stability and productivity. This translates as improved societal wellness and less healthcare costs.

This paper proposes an interpretation of astrobiology and the protocell as an organizing framework to integrate fundamental principles, structures and forces of the anatomy and physiology of work, communication and measurement. These are foundational elements of human resilience in the face of stress and trauma. This paper introduces an organization of these principles across astrobiology, prenatal and child development, human development, education, healthcare and economics.

The proposed innovation are presented as a sea change to concepts of human anatomy and physiology. This paper will outline a novel anatomy and physiology model of the human mammal. This refined, protocell informed anatomy and physiology model corrects an oversight in the taxonomy (biological classification) of human mammals (Linnaeus).

As the perception of the nature of human anatomy and physiology is at the root of education and child development, healthcare and medicine, this modernization of the primary model of anatomy and physiology has significant impact upon all academic disciplines and activities related to human biology.

The protocell model provides a perspective on biological systems, and information signalling within that system, and work output, that parallels fundamental principles of micro and macro economics, such the definition of money, market exchange, and market function.

With health Gross Domestic Product estimated at 17% and 4.5 Trillion dollars, this paper proposes a systemic productivity initiative; positive short and long term step, to reduce healthcare costs and social burdens of illness.

It is argued that the excessive cost of the US healthcare system are in part due to a fundamental flaw/inefficiency in the biological ‘work’, ‘communication’, and ‘measurement’ processes that arise from the inaccurate/incomplete model of human anatomy and physiology used in western medicine and healthcare. Therefore, the

healthcare system accrues higher costs and delivers less 'work' output – i.e. results – meaning less human health.

It is proposed that the innovations derived from the interpretation of protocell model can be cultivated into a microeconomic systemic productivity solution that is parallel in important elements of macroeconomic monetarism (Freidman, Schwartz). Consequently, a narrow, targeted initiative centered on the novel protocell informed anatomy and physiology is proposed to explore the development of these concepts to achieve the economic gains proposed.

As monetarism was developed to prevent future Great Depressions, this proposed initiative intends to prevent or soften the detrimental human factor impacts that arise from economic shocks, be they financial, health-related or from other factors.

Translating, promoting, and implementing the astrobiology innovations directly benefits the entire economy in a manner parallel to monetary policy management of the economy. This paper proposes a fundamental short and long term stimulus tool for the economy.

Therefore, a corrective initiative is warranted now.

Contribution of the Protocell Model to Health Economics

The interpretation of the protocell model and it progression to the modern human contribute the following novel biological elements to a health economic solution:
A) Structural and system integration, system coherence.
B) Mechanism of action and biological force.
C) information signalling at the level of biological chemistry and cellular systems that are translated to both whole system physiology and cognitive regulation.
D) Establishing a novel, fundamental unit of biological measurement.
E) A refined description of the taxonomy of the human mammal.
F) Targets a narrow range of psycho-physiology factors that contribute to life cycle resilience and health, or conversely to the progression of high cost health conditions.
G) Novel model of biological function and resilience.
H) Life cycle: targeted early stage function and life cycle capacity and resilience.
I) A contribution to a multiple intelligences model.

These elements are translated into a curriculum that emphasizes the anatomy and physiology of work, communication and measurement as critical factors in life cycle health and wellness, personal resilience, social and market exchange capacity, and general economic productivity..

Micro-Macro Applications of the Protocell Curriculum

A) Reducing healthcare costs and burden to the population.
B) Long-term reduction to costly healthcare silos.
C) Reducing the long term, costly trend, of adults with multiple chronic health condition. high risk, high cost demographics.
D) General application to the fields of preventative health ,pre-natal/pregnancy, Obstetrics and Gynecology, women's and family health, early child development, social medicine, social determinants of health, PACES (Positive and Adverse Childhood Experiences), eldercare and hospice.
E) Societal resilience in the face in increased stress and trauma in the population. This is critical, as stress and trauma disrupt the human mechanisms of communication, relationship, and exchange, thus disrupting the capacity to exchange and participate in the market economy. These disruptions to the human factors of exchange are seen in the current society, post Covid-19 pandemic. Plausibly, this cause and effect of stress and trauma and functional human capacity occurred during the Great Depression of 1929.
F) Novel application to general mental health issues.
G) Supporting general economic productivity and resilience.

The Protocell Model Illuminates Emerging NIH Health Research

The protocell model illuminates and supports the underlying principles of the nature, value, and application of two area of current research in the National Center for Complimentary and Integrative Health, a division within the National Institute of health.

A)_Interoception – an innovation in the principles of internal human, biological signalling. Labeled as a 'Hot Topic' in the NIH.
B) The Mechano-connective tissue, (i.e. myo-facia). A network of tissue within the human body that contributes to system wide signalling and function in ways that are not well understood. This signalling is separate from vascular, lymphatic, or neurological signalling.

The Protocell, Biological Information Signalling and Healthcare

A common healthcare narrative is that 'silos' are contributing to the excessive costs in the industry. The protocell model helps clarify this issue and to help resolve it long term.

On a micro level of the patient (based upon case studies) costs and quality of life can improve. On a macro, industry, long term – the benefit are structural and long term

The proposed initiative is a micro/macro economic application.

The protocell proposition introduces a model of biological signalling that parallels the progression of health information technology across the healthcare system. While information technologic is critical to the function of the health system, the biological information and signalling model is more primary to prevention and mitigation of disease across the population, across the life cycle.

Enhancing the foundational information model, and the respective population skills, is a smart long term investment in healthcare efficiency and effectiveness.

The systems biology work model of the protocell supports a structural micro/macro, short and long term solution.

The Protocell Alters the Classification of Human Taxonomy and Improves the Anatomy and Physiology Model of Healthcare

Based upon the 'Argument Points' (described below) one reason for the emergence of costly silo's in healthcare is that the fundamental model of anatomy and physiology in contemporary American healthcare is incomplete and inaccurate. This causes the organizing principles of human biology to be skewed and therefore to be inefficient across the healthcare system, on scale.

The interpretation of the protocell model clarifies this issue. The protocell offers clarification for the biological principles of work, communication and measurement. Hypothetically, more important than the anatomy and physiology of muscles, bones, organs, the human body is an integrated information, communication and signalling system; multiple distinct information systems are embedded into a single coordinated unit – the person, the self, the family, the community – biological concepts of unity and integration.

The concept of the human body as an information system is parallel the concepts in economics of the marketplace as a coordinating system for multiple individual entities. The market coordinates via information systems which communicate needs and wants, and the monetary system coordinates exchange via a common monetary currency.

Therefore: the protocell is parallel to the human body (and society) which is parallel to the marketplace.

It is proposed that the current model of anatomy and physiology are based upon two notions:

One: that the human mammal falls into the taxonomy of a bilateral organism (Linneas). Insights from the protocell propose that this is incomplete and incorrect. The protocell presents the perspective that the human mammal has distinct qualities of whole systems biology that are poorly acknowledged in the bilateral taxonomy classification.

Two, it is proposed, that the current model of anatomy and physiology is the result of advances in precision measurement systems over the past centuries, in waves of measurement innovation. The trends of precision measurement science over the past 300 to 500 years in Euro-American science, all be they beneficial, tended towards precision structures of the brain and central nervous system, and undervalued whole systems biology- both conceptually and physiologically.

Consequently, overcoming the costly silos in healthcare, as well as improving the health solutions for the individual, can be improved by shifting focus to a robust, whole system model of anatomy and physiology, such as is proposed by the protocell.

The Protocell -Across Historic Arts and Humanities

How we think about 'work' in human biology influences the entire healthcare industry, which in turn influences the economy.

The interpretation of the protocell model in this paper identifies several simple element of cellular biological work output, communication, and measurement. It is proposed that these simple elements scale to the modern human. Evidence of these simple protocell elements are seen within the arts and humanities across cultures, over time. It is also argued that these simple elements are poorly cultivated in science, society and within healthcare. They are more represented within the arts and humanities.

The Protocell in Visual Art History

Visual imagery of human anatomy and physiology from across global cultures supports the conclusion of a protocell inspired model.

A central of this scholarship is that a protocell model of anatomy and physiology is more clearly represented in the art work of the European Middle Ages than is represented in the progression of health and medical sciences in the Modern Era (scientific revolution).

This conclusion is based upon example in the art history of anatomy and physiology and the progression of medical illustration. This assessment shows representation of precision and systems changing over the course of several hundreds of years.

Specifically, it is argued that the integrity of the protocell model, seen in the Middle Ages was diluted in the progression of science during the Modern Era. It is proposed that supports the conclusion that a systemic productivity initiative based on whole system anatomy and physiology will support the short and long term benefit to patients and cost reduction to the health system.

In the shift from the Middles Ages to the Modern Era (scientific revolution) the prevalence of the whole system protocell model was diluted. A shift from divine revelation, God speaking within, to the era of direct observation of the material world. A shift from internal epistemology to external epistemology. A reduction system orientation,

Protocell, Anatomy & Physiology and Parallels to Monetarism

Monetarism is a systemic solution for the management of the economy. One of the goals of monetarism is to support market transactions – thus monetarism is in part a communication and work output system. Monetarism is an extension of principles of barter exchange and the use of fiat currency, both also aspects of communication innovation. The initiative proposed here within, presents the protocell model as a further communication innovation.

Where as monetarism and monetary theory were championed by the scholarship of Milton Friedman and Anna Schwartz from analyzing data for the Great Depression of 1929, this scholarship proposes a simple parallel theory and initiative that address a more fundamental microeconomic factors of production in market exchange, function, and work output – that of the functional capacity of human anatomy and physiology to participate in social and market exchange and productive activity. This is an argument for human factors capacity with focus on the biology of work, communication and measurement informed by the protocell model.

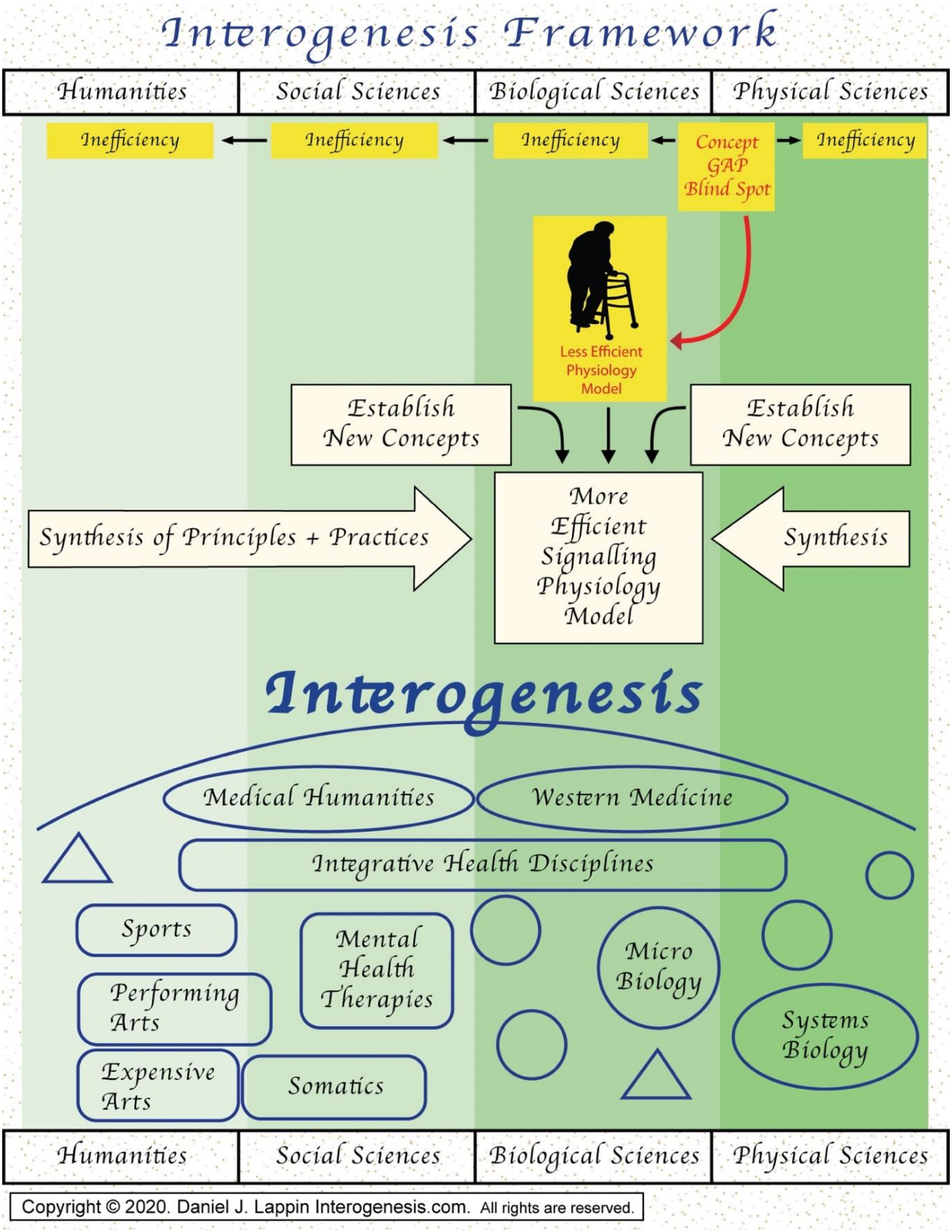
The systemic market shock of the Great Depression of 1929 impacted people. Many responded with physiological stress, shock and trauma. These human factors disrupted the physiological capacity for many people to exchange and engage in productive work. This real consequence to human anatomy and phsy8iology occurred in tandem to the break down of banking institutions and monetary exchange mechanisms.

This description proposes that Human communication precedes money as factors of exchange in the market. Such as barter exchange markets precedes fiat money exchange markets.

It is proposed that the domain of the human anatomy and physiology related to principles of communication and exchange, resilience and work output, and measurement are poorly organized across the academic disciplines of Physical, Biological, and Sociual Sciences, and the humanities, and specifically in medicine and healthcare.

It is proposed that this presents a microeconomic problem for individual healthcare patients, and macroeconomic problem for business and industry, and the healthcare sector.

This following info-graph, (Interogenesis – meaning internally generated) illustrates a concept gap that the author has identified between biological and physical sciences. It is proposed that this concept gap contributes to an inefficient model of anatomy and physiology within medicine and healthcare. The protocell model helps to repairs this concept gap and establish a more accurate, effective and efficient model of anatomy and physiology to support cost reduction micro and macro in the health sector.



Money is an Extension of Human Biology

This charts illustrates the parrallels between the definition and functions of money and parallel definitions and functions within language, technology and biology.

Definition of Money	Language	Computers	Human Biology
Medium of Exchange	Conversation, writing	Network standards	Electro-chemical-molecular
Unit of Account	letters and words	Processors	Protocell, protein markers
Store of value	meaning	storage devices	cell receptors
Portable	book, pen and paper	laptop	sperm and eggs
Divisible	Alphabet	file formats	systems to cells

Conclusions:
Premise: the use of money is an extension of principle of human biology.
A unit of money = a unit of work = a unit of communication work.

Protocell Inspired Curriculum Overview

This paper outlines the case for a system productivity initiative based upon astrobiology and the protocell model.

The initiative is proposed as a narrow, focused curriculum based upon anatomy and physiology skills. The curriculum in based in astrobiology and protocell principles that are translated to the modern human. It aggregates multiple novel anatomy and physiology principles organized around the protocell.

The goal of the practical, skills-based curriculum is support human functional capacity, resilience, and positive social and business relationships, life cycle health. When the individual experiences are aggregated it creates a macroeconomic benefit. The focus is on the functional capacity of the individual, in a social setting, in the environment. It is a novel STEM-Anatomy and Physiology theme.

Applicable to consumer, business, and industry this adaptable curriculum can be shaped into a rage of themes: fitness, sports, arts & entertainment, women's and family health..

Notable issues that will enhance the public media promotion for this initiative are the connection to astrobiology and NASA missions for the search for the origin of life, astronaut mission, and the extreme condition of rare diseases.

Foundation of Novel Curriculum Content

The proposal to translate astrobiology and protocell principles into a systemic productivity initiative represents a large leap in knowledge. This proposition is built upon uncommon scholarship and an integration of existing research commensurate with the magnitude of the proposal.

The core of scholarship is:

A) A mixed method scoping review.

The scoping review (described here: https://interogenesis.com/blumberg-astrobiology-chair.html) conclude a significant macroeconomic benefit from this initiative.

B) An N=1 medical case study.

These insights and innovation arose as a result of the author's childhood complex, extreme medical condition. A condition whose symptoms at age 16 were 40 year ahead of the disease being established as a disease in the International Classification of Disease. The scholarship of this paper is a discourse on the journey to solve a medical mystery – the author's.

This mystery medical condition motivated a profound search for answers to the intermittently disabling symptoms and high risk situation. Consultation with over 40 medical and health practitioners over 30 years – all helpful, but inconclusive diagnosis and treatment plan until the past few eyers.

This profound medical shock and trauma stated motivated the author to consider the human factors of the Great Depression of 1929.

This is stated as a matter of record. It helps to give perspective to the vast and deep insights proposed in the paper.

Over the course of approximately five decades this body of scholarship integrated:

1. The authors Personal medical case study, Observation of real physiology phenomena poorly identified by medical doctors nor in health and medical literature.
2. Development of a novel physiological recovery tactic to the intermittently disabling symptoms, out of context of known biological forces. This was later identified as present in the protocell model.
3. Early stages of the scooping review.
4. Identification of concept gap basic science relating to the anatomy and physiology of work, communication and measurement.
5. Early conclusion orally presented to Gary Becker, Prof. of Economics, The University of Chicago, Nobel Laureate Economics. Prof Berker commented, in the mid 1990's after an hour of conversation, that he had never heard of the ideas relating to anatomy and physiology of biological work, across physical, biological, social sciences and the humanities as a foundation for economic concepts and

the definition of money. He expressed interest in the research and requested to remain informed of its progress.

6. Development of the hypothesis of a parallel anatomy and physiology principles to monetarism.
7. Observations of the Arts and humanities factors of societal resilience during the Great Depression of 1929.
8. Conversation with Federal Reserve Chairman Greenspan, and co-chair of Public information Nancy Goodman.
9. The author becomes a healthcare practitioner incorporating client observational case studies
    a. Over 10,000 hours of client observational case studies in the author's healthcare practice.
    b. These case studies are presented as micro-economic case studies of stress and shock that parallel macro economic concepts of economic depression, market failure, market resilience, and systemic risk
    c. These client case studies ranged from prenatal/pregnancy to adult stress and trauma and illness, to hospice.
    d. These provided observations into life cycle cascade of illness and the functional capacity of the patient. Conclusions are extrapolated to the larger social economy.
10. Whereas Friedman and Schwartz analyzed macroeconomic data to support their position promoting monetarism, the author of this paper conducted assessment on a micro-economic level of individual patient case studies – focusing on micro economic anatomy and physiology principles related to communication anatomy and physiology. This is a central foundation of the conclusions and proposal of this paper.
11. Assessment of the medical and health industry
12. Scoping review expanded
13. Astronaut Space health and astrobiology explored to identify fundamental biological forces in extreme environments.
14. The organizing principles of the protocell was identified as containing unique factors of biological work, communication and measurement
    a. These primary forces reflected the authors observations of biological forces utilized in his medical recovery.
15. Development of conclusion of the error in the classification of human taxonomy.
    a. Resulting in the systemic inefficiency in the taxonomy (classification of biological organisms) of human mammals, establishing incorrect assumptions of human anatomy and physiology. This implies that correcting this historic inaccuracy and promoting the solution creates a positive social-economic benefit.
16. The systemic productivity curriculum initiated.

Prior Systemic Risk Initiative by the Federal Reserve

The conceptual framework of the initiative is parallel to a previous event held by the Federal Reserve Bank of New York and The National Academy of Sciences.

Title: New Directions for Understanding Systemic Risk

(see:https://www.newyorkfed.org/newsevents/news/research/2007/rp071031.html)

This event was a cross-disciplinary conference in May 2006 between the New York Fed and the National Academy of Sciences' Board on Mathematical Sciences and Their Applications.

The intention was stated as: "The pace of financial innovation over the past decade has increased the complexity and interconnectedness of the financial system. This development is important to central banks, such as the Federal Reserve, because of their traditional role in addressing systemic risks to the financial system. … To encourage innovative thinking about systemic issues, the New York Fed partnered with the National Academy of Sciences to bring together more than 100 experts on systemic risk from 22 countries to compare cross-disciplinary perspectives."

This paper proposes a parallel conference, potentially again in collaboration between the Federal Reserve and The National Academies of Science, Engineering, and Medicine to examine systemic risk and productivity based upon the themes of this paper.

Addressing the Consequences of Societal Stress and Trauma - The Value of this Initiative Now!

The Great Depression of 1929 was a riveting social economic event for society. Over the past several years, the Covid-19 pandemic was described a similar in social economic impact to the Great Depression.

It is evident that micro and macro stressors are increasing on the planet. The Covid-19 pandemic, regional wars. Climate impacts. Accumulated stress challenges the resilience of the population. Biology, health and economics are inter-related. Given the rise of ambient social stress and trauma, this systemic productivity is timely and needed – now.

The protocell model presents an evolved distinction in the understanding of human biology and comparatively simple tactics to support human resilience and health and reduce healthcare costs.

Notes:

1) The author previously had a face to face conversation the former Fed Chairman Alan Greenspan. That conversation led to the attached letter

(https://interogenesis.com/images/files/Alan-Greenspan.pdf ; https://interogenesis.com/references-testimonials.html). ,

and coordinated a phone meeting with Nancy Goodman, former Vice-chair of Public Information for the Board of Governors. Ms. Goodman stated that the subject of my research (1998) "was of interest to the Fed".

2) In conversations since 2010 with Professor James Heckman, Professor of Economics, University of Chicago, Nobel Laureate in Economic 2001, Prof. Heckman has given his permission that I may use his name as a reference when I approach the Fe3derl Reserve with this initiative.

This paper is copied to him.

3) Victor Dzau, President of the National Academies of Medicine, in a face to face conversation, requested to be kept informed of this research

4) Two NASA executives and one NASA mission Principal Investigator have expressed interest in this initiative.

Citations

1) Bruce Damer[1,2], David Deamer[3]

Coupled phases and combinatorial selection in fluctuating hydrothermal pools: a scenario to guide experimental approaches to the origin of cellular life

Life (Basel) . 2015 Mar 13;5(1):872-87. doi: 10.3390/life5010872.

2) KATARZYNA ADAMALA AND JACK W. SZOSTAK

Nonenzymatic Template-Directed RNA Synthesis Inside Model Protocells

SCIENCE 29 Nov 2013, Vol 342, Issue 6162, pp. 1098-1100
DOI: 10.1126/science.1241888

3) Stressed, Sad, and Anxious: A Snapshot of the Global Workforce

https://hbr.org/2022/06/stressed-sad-and-anxious-a-snapshot-of-the-global-workforce

4) Stress in America 2022: Concerned for the future, beset by inflation
https://www.apa.org/news/press/releases/stress/2022/concerned-future-inflation

5)
Stress in America™ 2023: A nation grappling with psychological impacts of collective trauma

American Psychological Association
https://www.apa.org/news/press/releases/2023/11/psychological-impacts-collective-trauma

6)

The COVID-19 pandemic and epidemiologic insights from recession-related suicide mortality

Mol Psychiatry. 2020; 25(12): 3445–3447.
Published online 2020 Sep 1. doi: 10.1038/s41380-020-00875-4
PMCID: PMC7462110
PMID: 32873897

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7462110/

7)

The correlation between stress and economic crisis: a systematic review

Nicola Mucci,[1] Gabriele Giorgi,[2] Mattia Roncaioli,[3] Javier Fiz Perez,[2] and Giulio Arcangeli[1]

Neuropsychiatr Dis Treat. 2016; 12: 983–993.
Published online 2016 Apr 21. doi: 10.2147/NDT.S98525
PMCID: PMC4844458
PMID: 27143898

https://www.yahoo.com

8)

The Future Effects of COVID-19 on the Health System: Applying the Futures Wheel Method

Mojtaba Nouhi, [1] Majid Heydari,[* 2] Zahra Goudarzi, [3] Rahil Sadat Shahtaheri, [4] Azadeh Ahmadzaeh, [5] and Alireza Olyaeemanesh[* 1, 6]

Med J Islam Repub Iran. 2022; 36: 164.
Published online 2022 Dec 22. doi: 10.47176/mjiri.36.164

PMCID: PMC9997418
PMID: 36908937

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9997418/

9)

The COVID-19 pandemic and health-related quality of life across 13 high- and low-middle-income countries: A cross-sectional analysis

- Mara Violato ,
- Jack Pollard,
- Andrew Lloyd,
- Laurence S. J. Roope,
- Raymond Duch,
- Matias Fuentes Becerra,
- Philip M. Clarke

- Published: April 11, 2023
- https://doi.org/10.1371/journal.pmed.1004146

https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1004146