Class 1: Practicalities. The Challenge we are Facing

Contents:

- Prologue
- Practicalities
- The Earth's Life-Support System and Sustainability
- Homo sapiens: An Exceptional Success Story







Why should you be engaged in Conservation Leadership?



Why should you be engaged in Conservation Leadership?

Why are Mitigation of Threats and Adaptation to Changes of Relevance to you?



Homo sapiens and Earth

Human environment 300 million tons of humans and 700 million tons of domesticated animals

400 million domesticated dogs600 million domesticated cats1.5 billion cows20 billion chicken

81% of Earth's surface changed significantly by humans

Earth's Energy Imbalance increased by roughly 10,000,000 times above pre-human values

Non-Human environment 100 million tons of wild animals (more than 2 kg)

200,000 wolfs 40,000 lions 900,000 African buffalo 50 million penguins

5% of Earth surface still untouched



Homo sapiens and Earth

Working hypothesis: The future does not exists; it depends on the interventions and actions of the past and the present





Homo sapiens and Earth **Spectrum of Possible Futures**

Copyrighted Material HALF-EARTH



Our Planet's Fight for Life

EDWARD O. ULSON Yuval Noah Harari New York Times Bestselling Author of Sapiens

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RESCRIPTION.	
220m	

Homo ROAD Deus A Brief History of Tomorrow

CORMAC MCCARTHY THE

"His tale of survival and the miracle of goodness only adds to McCarthy's stature as a living master. It's gripping, frightening and, ultimately, beautiful It might very well be the best book of the year, period. -San Francisco Chronicle





Homo sapiens and Earth Spectrum of Possible Futures

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Science-based warnings to humanity





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Our Planet's Fight for Life

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Author of Sapiens

CORMAC MCCARTHY THE ROAD

NATIONAL BESTSELLER

His tale of survival and the miracle of goodness only adds to McCarthy's as a living master. It's gripping, frightening and, ultimately, beautiful t might very well be the best book of the year, period San Francisco Chronici

Science-based warnings to humanity

Deep Adaptation: Preparing for the time after the total social collapse - Who do we want to be then?

WINNEB OF THE PULITZER

PRIZE

THE COLLAPSE OF

WESTERN CIVILIZATION

A VIEW FROM THE FUTURE

NAOMI ORESKES AND ERIK



Deep Adaptation

Deep Adaptation

This blog post includes the following:

- An opportunity to learn about and understand the term "Deep Adaptation". The term comes from the paper Deep Adaptation: A Map for Navigating Climate Tragedy by Jem Bendell, which has greatly changed the landscape of what we are doing in the Scientists' Warning Initiative. An excerpt from the abstract of this paper follows; however, the reader is urged to take the time to read the full content of the paper by clicking the link. Note: There is a link at the bottom of this post where you can download the full resolution Deep Adaptation Badge image.
- A note from Alison Green, a member of Scientists' Warning's Advisory Council, about her experience travelling and copresenting with Stuart to the Foresight Group at the European Commission in Brussels. A video of the actual presentation given





Class 1: Practicalities. The Challenge we are Facing









Class 1: Practicalities. The Challenge we are Facing

Ubuntu: "I am, because of you" "a person is a person through other persons"







Class 1: Practicalities. The Challenge we are Facing

Ubuntu: "I am, because of you" "a person is a person through other persons" Me:

"I know, because of you"







Class 1: Practicalities. The Challenge we are Facing









Class 1: Practicalities. The Challenge we are Facing

Our perception depends on the distance we have ...















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<u>Workspace</u>

RESEARCH

MARI

ACADEMICS

Spring 2019 — 466W/566W: Introduction to Mitigation and Adaptation Studies

Overview (print)	Courses: Course title:	BIOL 466W (CRN 29687), IDS 466W Introduction to Mitigation and Adaptat	
Legal and formal issues (<u>print</u>)	Instructors:	Dr. Hans-Peter Plag, Office Hours: Mondays, 1:00-3:00 F	
Class Schedule (print)		Dr. Tatyana Lobova Office Hours:Mondays 1:00-2:00 PM	
Class Contents (print)	Term:	and on request Spring 2019, January 14 - April 29, 20	
Print All References	Time: Location:	Mondays and Wednesdays, 3:00 PM Oceanography Bldg OPN 202	
Access to			

Course description

In this course, students will be introduced to studies focusing on The course will combine lectures with discussions and project work. There will be weekly homeworks in written form. Each week, a set of mitigation of human-induced changes in the Earth system, including but not limited to changes in the physiology of Earth's life-support questions will be made available and written answers will have to be system, extinction, climate change and sea level rise, and adaptation provided based on the material presented in the class and additional to the impacts of these changes. A particular focus will be on the readings. These answers have to be concise and in scientific writing challenges these anthropogenic changes pose to conservation style with sufficient citation of peer-reviewed sources. The answers efforts. The course will cover the hazards resulting from the on-going have to include the name of the student as well as the questions planetary reengineering that is pushing the planet out of the themselves. The answers have to cite the sources consulted in Holocene; the vulnerability of the integrated socio-ecological and writing the answer and a list of references. For the 500-level class, economic system of system to these hazards, the foresight we have there will be additional questions. In total, there will be twelve sets of in terms of future trajectories of the planet and the probability density questions of which the ten best will be counted for the overall grade. functions of the hazards; the opportunities and limitations for

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http://www.mari-odu.org/academics/2019s adaptation

INFORMATION CONNECTING RESOURCES



Approach





Spring 2019 — 466W/566W: Introduction to Mitigation and Adaptation Studies

Overview (print)	Courses: Course title:	BIOL 466W (CRN 29687), IDS 466W Introduction to Mitigation and Adapta	
Legal and formal issues (<u>print</u>)	Instructors:	Dr. Hans-Peter Plag, Office Hours: Mondays, 1:00-3:00 P	
Class Schedule (print)		Dr. Tatyana Lobova Office Hours:Mondays 1:00-2:00 PM	
Class Contents (print) Print All	Term: Time:	Spring 2019, January 14 - April 29, 2 Mondays and Wednesdays, 3:00 PM	
References	Location:	Oceanography Bldg OPN 202	
Access to Workspace	Class Schedule		

Class Schedule

submitted in the workspace using the "Stay Woke" utility.

January 2019

Monday	Tuesday	Wednesday	Thursday	Friday
Dec 31	Jan 1	Jan 2	Jan 30	Jan 4
Jan 7	Jan 8	Jan 9	Jan 10	Jan 11
Jan 14 3:00 - 4:15 PM: <u>Class 1:</u> <u>Practicalities. The</u> <u>Challenge we are Facing</u> <u>Class slides</u>	Jan 15	Jan 16 3:00 - 4:15 PM: <u>Class 2:</u> <u>The Syndrome of Modern</u> <u>Global Change: Baseline</u> <u>and Syndrome</u> <u>Class slides</u>	Jan 17	Jan 18 6:00 PM: Answers for Question Set 1 are due
Jan 21 No Class	Jan 22 (Drop deadline)	Jan 23 3:00 - 4:15 PM: <u>Class 3:</u> <u>The Syndrome of Modern</u> <u>Global Change:</u> <u>Diagnosis, Prognosis,</u> <u>Therapy</u> Class slides	Jan 24	Jan 24 6:00 PM: Answers for Question Set 2 are due



Note that all homeworks and research project documents (draft bibliography, draft paper, final paper, presentation) have to be





MARI RESEARCH ACADEMICS

Spring 2019 — 466W/566W: Introduction to Mitigation and Adaptation Studies

Back to Class Page Register	Log In	
Log in	Email:	Email
Workspace	Password:	Password
Log out	Sign In	

Forgot your password? Request a new one

HAVE A LOOK ARROUND





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ACADEMICS

Internal Workspace for 466W/566W

Internal Links:	You are logged in as System Administrator (hoplag@mycoas	
Back to Class Page Overview	Introduction to Mitigation and Adaptatio	
Stay Woke List of Mails	ABOUT THE WORKSPACE	
Print All References	This page is only accessible for those who are registered for here and manage your participation in this class.	
Change Password	Standard functions available in all workspaces include:	
Log Out		

and participate in discussions with other students.

- Mail List: You can view all mails sent to students by the instructors.
- Change Password: To change your password, use this function.
- Sign Out: Allows you to sign out from the workspace.

HAVE A LOOK ARROUND

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Internal News:

[2019/01/10] The workspace is now fully functional.



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INFORMATION CONNECTING RESOURCES

sts.org).

on Studies

the class. As a registered student or instructor, you can access the workspace

StayWoke: This utility is the place to submit 2+2 Forms, answers to questions, select your case study topic, manage your case study,



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Internal Links:	You are logged in as System Administrator (hoplag)			
Workspace StayWoke	StayWoke — Act			
	My Page	View all your submis		
	Case Study	You can select a top		
	Question Sets	You can manage yo		
	Submit Class Form	Class 2+2 Forms to in the class.		
	View Your 2+2 Feedbacks	View your own feed		
	Pin It	Submit new PinIt iter statements that defined on the pinned statement		
	Ask It	Submit new AskIt ite participants, who the		
	Show It	Submit new ShowIt i pictures, diagrams, s add their likes to the		
	Talk It	Talk about it. All can		

coasts.org).

ssions and your status.

pic for your case study and manage your submissions.

our submission of your answers to Question Sets.

be submitted by each student in each class. This submission documents participation

backs provided in the 2+2 Forms.

ems, view Pinlts, and comment on them. Pinlt items are used to make important ne the overall contents of the deliberations. Other participants will be able to comment ments and to express the relevance individual statements have for them.

ems, view AskIts, and respond to them. AskIt items are used to pose questions to all en can respond to these questions.

items, view ShowIts, and comment on them. With ShowIt items, participants can show sketches, vidoes or other visual items. Other participants can comment on ShowIts and em.

participate in conversation around specific topics.





- Working together helps: Find a partner to work with
- Active class participation is important
- Submission of 2+2 forms in each class is mandatory:
 - it documents class participation;
 - it is an opportunity for a one-to-one dialog with the instructors.
- Use the StayWoke Page to interact with instructors and the class.
- Feel free to contact us if there are issues/questions
- Communication by e-mail is the best way to reach us





This is a Writing Class: You will have to write a lot. - Reading the reading material is important: - Weekly Question Sets:

- Questions to be answered are based on the reading material;
- Answers will normally be discussed in the subsequent Monday classes. - Case Study:
 - You need to select a topic for the case study (StayWoke);
 - Selection should be done soon;
 - Will be the basis for the paper and the presentation.
- Main Issues:
 - Spelling and grammar;
 - Style is not sufficiently scientific;
 - Citations are insufficient in number, quality, format;
 - Reference are not of sufficient quality and listed in improper format;

- Written answers need to be provided online on the dates given in the class schedule;

- Insufficient reasoning and justification ("Knowledge is a justified true belief", Plato).





Citation of references:

more information on the CSE style.

Scientific Style and Format 8th Edition

The CSE Manual for Authors, Editors, and Publishers

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Search:

MANUSCRIPT PREPARATION

MANUSCRIPT AND PROOF MARKUP

SAMPLE CORRESPONDENCE

EDITORIAL OFFICE PRACTICES (PDF)

PROMOTING INTEGRITY IN SCIENTIFIC JOURNAL PUBLICATIONS

SCIENTIFIC STYLE AND FORMAT CITATION QUICK GUIDE

Scientific Style and Format Citation Quick Guide

Scientific Style and Format presents three systems for referring to references (also known as citations) within the text of a journal article, book, or other scientific publication: 1) citation-sequence; 2) name-year; and 3) citation-name. These abbreviated references are called in-text references. They refer to a list of references at the end of the document.

The system of in-text references that you use will determine the order of references at the end of your document. These end references have essentially the same format in all three systems, except for the placement of the date of publication in the name-year system.

Though Scientific Style and Format now uses citation-sequence for its own references, each system is widely used in scientific publishing. Consult your publisher to determine which system you will need to follow.

Click on the tabs below for more information and to see some common examples of materials cited in each style, including examples of electronic sources. For numerous specific examples, see Chapter 29 of the 8th edition of Scientific Style and Format.

CITATION-SEQUENCE AND CITATION-NAME NAME-YEAR

Name-Year

The following examples illustrate the name-year system. In this system (sometimes called the Harvard system), in-text references consist of the surname of the author or authors and the year of publication of the document. End references are unnumbered and appear in alphabetical order by author and year of publication, with multiple works by the same author listed in chronological order.

Citations and Reference have to follow the documentation style defined by the Council of Scientific Editors, known as the CSE style. See SSF-Guide (http://www.scientificstyleandformat.org/Tools/SSF-<u>Citation-Quick-Guide.html</u>) or the <u>WISC</u> (<u>https://writing.wisc.edu/Handbook/DocCSE.html</u>) page for



the writing center

UNIVERSITY OF WISCONSIN-MADISON

Handbook Index Academic and Professional Writing Writing Process and Structure

Improving Your Writing Style

Grammar and Punctuation

Cite References in Your Paper

American Psychological Association Documentation Chicago/Turabian Documentation Modern Language Association Documentation American Political Science Association Documentation Council of Science Editors Documentation Institute of Electrical and Electronics Engineers Numbered References Quoting and Paraphrasing Sources

Writing Center Home

Council of Science Editors **Documentation Style**

The Council of Science Editors (CSE) offers three systems of documentation. In all three systems, a reference list at the end of the paper provides all the information your reader needs to track down your sources. In-text references in your sentences show your reader which sources support the claims and information of that sentence.

- <u>Citation-sequence and citation-name</u>
- Name-year

A quick overview of CSE styles

The systems differ in the details of how they format in-text references and how they organize the reference list. For more information about each system, click on the appropriate link below:

 In the citation-name system, number your sources alphabetically by each author's last name in the reference list at the end of your paper. In the sentences of your paper, cite these sources using the number from the

reference list. This means that the in-text citation ¹ refers to the first source in your alphabetical list.

Example from Charkowski (2012):

Despite this, there has been significant progress in modeling gene regulation in SRE, including mathematical models of virulence 75 and examination of gene expression at the single cell level 87,158,159,166

 In the citation-sequence system, number your sources in the reference list at the end of the paper by the order in which you refer to them in your paper.

- Council of Science Editors (CSE) documentation overview
- Citation-Sequence and Citation-Name
- End references
- Name-Year
- In-text references
- End references







In-text references



Journal articles:

- Earth's biosphere. *Nature*, **486**, 52-58, doi:10.1038/nature11018. **Articles/chapters in Book/Collection**:
- Books:
- Taleb, N. N., 2012. Antifragile: Things That Gain From Disorder. Random House. **Technical Reports**:
- Geohazards Reducing the Disaster Risk and Increasing Resilience. European Science Foundation. Web Pages:

• MARI, 2017. Fall 2017: Natural hazards and Disasters. Old Dominion University, http://www.mari-odu.org/ academics/2017f_disasters. Accessed on September 14, 2017. Examples of citations of the above sources in the text are:

- Barnosky et al. (2012) found ...
- ... might lead to a significant state shift (Barnosky et al., 2012).
- ... a transition from being resilient to being antifragile (Taleb, 2012).
- ... loss of coastal ecosystems (Plag and Jules-Plag, 2013).

• Barnosky, A. D., Hadly, E. A., Bascompte, J., Berlow, E. L., Brown, J. H., Fortelius, M., Getz, W. M., Harte, J., Hastings, A., Marquet, P. A., Martinez, N. D., Mooers, A., Roopnarine, P., Vermeij, G., Williams, J. W., Gillespie, R., Kitzes, J., Marshall, C., Matzke, N., Mindell, D. P., Revilla, E., Smith, A. B., 2012. Approaching a state shift in

• Plag, H.-P., Jules-Plag, S., 2013. Sea-Level Rise and Coastal Ecosystems. In Pielke Sr., R. A., Seastedt, T., Suding, K. (eds.): Vulnerability of Ecosystems to Climate, Volume 4 of: Climate Vulnerability: Understanding and Addressing Threats to Essential Resources, 163-184, Elsevier. DOI: 10.1016/B978-0-12-384703-4.00105-2.

• Plag, H.-P., Brocklebank, S., Brosnan, D., Campus, P., Cloetingh, S., Jules-Plag, S., Stein, S., 2015. Extreme









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Life-Support System: Physiology



Planetary Physiology





Planetary Physiology

Flows in the Earth System also allow assessing the "Health of the Planet"





Planetary Physiology

- Flows in the Earth System also allow assessing the "Health of the Planet"
- Earth: Life-Support System for many species




- Flows in the Earth System also allow assessing the "Health of the Planet"
- Earth: Life-Support System for many species
- Everything is about Flows





- Flows in the Earth System also allow assessing the "Health of the Planet"
- Earth: Life-Support System for many species Everything is about Flows

Limitations in the flows between a community and its lifesupport system limit the growth of the community





Flows in the Earth System also allow assessing the "Health of the Planet"

Earth: Life-Support System for many species Everything is about Flows

> Limitations in the flows between a community and its lifesupport system limit the growth of the community

For Homo sapiens, the flows are regulated by ethical, social, and - recently economic rules





- Flows in the Earth System also allow assessing the "Health of the Planet"
- Earth: Life-Support System for many species
- Everything is about Flows





- Flows in the Earth System also allow assessing the "Health of the Planet"
- Earth: Life-Support System for many species Everything is about Flows

Flows have accelerated in the last 200 years







Planetary Life-Support System Physiology: Homeostasis



Planetary Life-Support System Physiology: Homeostasis Essential: Earth's Energy Imbalance: Incoming Energy - Outgoing Energy



Physiology: Homeostasis

Essential: Earth's Energy Imbalance: Incoming Energy - Outgoing Energy

"Healthy Life-Support System": Energy Imbalance is very small, tiny

g Energy - Outgoing Energy nce is very small, tiny



Physiology: Homeostasis

Essential: Earth's Energy Imbalance: Incoming Energy - Outgoing Energy

"Healthy Life-Support System": Energy Imbalance is very small, tiny

Earth's energy imbalance due to photosynthesis: on the order of 10⁻¹⁰ to 10⁻⁹

10-10 to 10-9



Physiology: Homeostasis

Essential: Earth's Energy Imbalance: Incoming Energy - Outgoing Energy

"Healthy Life-Support System": Energy Imbalance is very small, tiny

Earth's energy imbalance due to photosynthesis: on the order of 10⁻¹⁰ to 10⁻⁹ **7** Imbalance today: on the order of 10⁻³ (300-320 TeraWatt), (e.g., Stephens et al., 2012; Trenberth et al., 2014, Cheng et al., 2016)

g Energy - Outgoing Energy nce is very small, tiny





Earth's Energy Imbalance



The Earth's Life-Support System and sustainability

Earth's Energy Imbalance





Earth's Energy Imbalance



Total energy storage in 200 Myrs: Order 100-1000 ZetaJoules



Earth's Energy Imbalance



Total energy storage in 200 Myrs: Order 100-1000 ZetaJoules



Total energy storage per century: Order 1000 ZetaJoules





The Earth's Life-Support System and sustainability

Earth's Energy Imbalance

What increased the Earth's energy imbalance by a factor of 10⁶ to 10⁷?



Total energy storage in 200 Myrs: Order 100-1000 ZetaJoules



Total energy storage per century: Order 1000 ZetaJoules







Physiology: Homeostasis

Essential: Earth's Energy Imbalance: Incoming Energy - Outgoing Energy

"Healthy Life-Support System": Energy Imbalance is very small, tiny

Earth's energy imbalance due to photosynthesis: on the order of 10⁻¹⁰ to 10⁻⁹ Imbalance today: on the order of 10⁻³ (300-320 TeraWatt),





 Λ -3

Physiology: Homeostasis

Essential: Earth's Energy Imbalance: Incoming Energy - Outgoing Energy

"Healthy Life-Support System": Energy Imbalance is very small, tiny

Earth's energy imbalance due to photosynthesis: on the order of 10⁻¹⁰ to 10⁻⁹ Imbalance today: on the order of 10⁻³ (300-320 TeraWatt),

What caused this catastrophic change in the Earth's Energy Imbalance?





Physiology: Homeostasis

Essential: Earth's Energy Imbalance: Incoming Energy - Outgoing Energy

"Healthy Life-Support System": Energy Imbalance is very small, tiny

Earth's energy imbalance due to photosynthesis: on the order of 10⁻¹⁰ to 10⁻⁹ Imbalance today: on the order of 10⁻³ (300-320 TeraWatt), (e.g., Stephens et al., 2012; Trenberth et al., 2014, Cheng et al., 2016) Λ -3 Homo sapiens is the one species, the virus, that infected the planetary Life-Support System ...



Mitigation and Adaptation Studies

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Plag, 2016





The Evolution of Key Environmental Factors











Plag, 2016





The Evolution of Key Environmental Factors



Plag, 2016





The Evolution of Key Environmental Factors



Holocene: Stability

20th and 21st Century: Change, imbalance

> Future: Uncertainty





Out of Scale



Scaling law for metabolic rate: $Y = Y_0 * M^{(3/4)}$



Out of Scale



Scaling law for metabolic rate: $Y = Y_0 * M^{(3/4)}$

human: Y = 50 - 100 Watt



Out of Scale



Scaling law for metabolic rate: $Y = Y_0 * M^{(3/4)}$

human: Y = 50 - 100 Watt

Extended metabolic rate: $Y_E = Y + C_E$

(C_E: total energy consumption)



Out of Scale



Scaling law for metabolic rate: $Y = Y_0 * M^{(3/4)}$

human: Y = 50 - 100 Watt

Extended metabolic rate:

 $Y_{\rm E} = Y + C_{\rm E}$

(C_E: total energy consumption)

Energy consumption per capita: Global Average: $Y_E = 2,835$ Watt M = 10 metric tons





Scaling law for metabolic rate: $Y = Y_0 * M^{(3/4)}$ human: Y = 50 - 100 Watt Extended metabolic rate: $Y_E = Y + C_E$ (C_E: total energy consumption) Energy consumption per capita: Global Average: $Y_E = 2,835$ Watt M = 10 metric tons

Humanity has an extended metabolic rate equivalent to 14 Billion elephants (2.7 Billion for the U.S. alone)









Breaking Scaling Laws

How could Homo sapiens "break" the scaling law?



Breaking Scaling Laws

The Remarkable (But Not Extraordinary) Human Brain

A novel technique for counting neurons is changing our appraisal of just how special the human brain really is

By Suzana Herculano-Houzel

ILLUSTRATION BY JEAN FRANCOIS PODEVIN





Breaking Scaling Laws

Brain is the most energy-demanding part in an organism.

Brain to body ratio is limited by energy available to the organism to sustain the metabolic rate.

Remarkable (But Not Extraordinary) Human Brain

A novel technique for counting neurons is changing our appraisal of just how special the human brain really is

By Suzana Herculano-Houzel

ILLUSTRATION BY JEAN FRANÇOIS PODEVIN





Breaking Scaling Laws

Brain is the most energy-demanding part in an organism.

Brain to body ratio is limited by energy available to the organism to sustain the metabolic rate.

Great apes such as gorillas and orangutans need to spend hours foraging to have enough energy to sustain the large body frames.

They cannot afford larger brains.

Brain

A novel technique for counting neurons is changing our appraisal of just how special the human brain really is

By Suzana Herculano-Houzel

ILLUSTRATION BY JEAN FRANÇOIS PODEVIN



MARCH/APRIL 2017



Breaking Scaling Laws

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The human brain represents 2% of body mass, but it uses about 25% of the metabolic rate.

> A novel technique for counting neurons is changing our appraisal of just how special the human brain really is By Suzana Herculano-Houzel ILLUSTRATION BY JEAN FRANÇOIS PODEVIN




Breaking Scaling Laws

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Supporting a large, more efficient brain requires high-energy, easy to process food: Homo sapiens achieved this by using fire to process food (particularly meat)

RATION BY JEAN FRANCOIS PODEVIN



MARCH/APRIL 2D1



Breaking Scaling Laws

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ION BY JEAN FRANCOIS PODEVIN



CATCHING

HOW COOKING MADE US HUMAN



MARCH/APRIL 201







































A Poem by John Doyle

Our attachments. All can vanish in an instant. They will vanish from us sooner or later anyway, but abrupt insult is another matter. Outrage and grief become the new reality. Use it to alter habits and create new norms. Extract purpose. Be intransigent about your new norms rather than merely being disobedient. Live a life that others will accommodate just to have your company. Be good company.

