

Gastronomia computacional

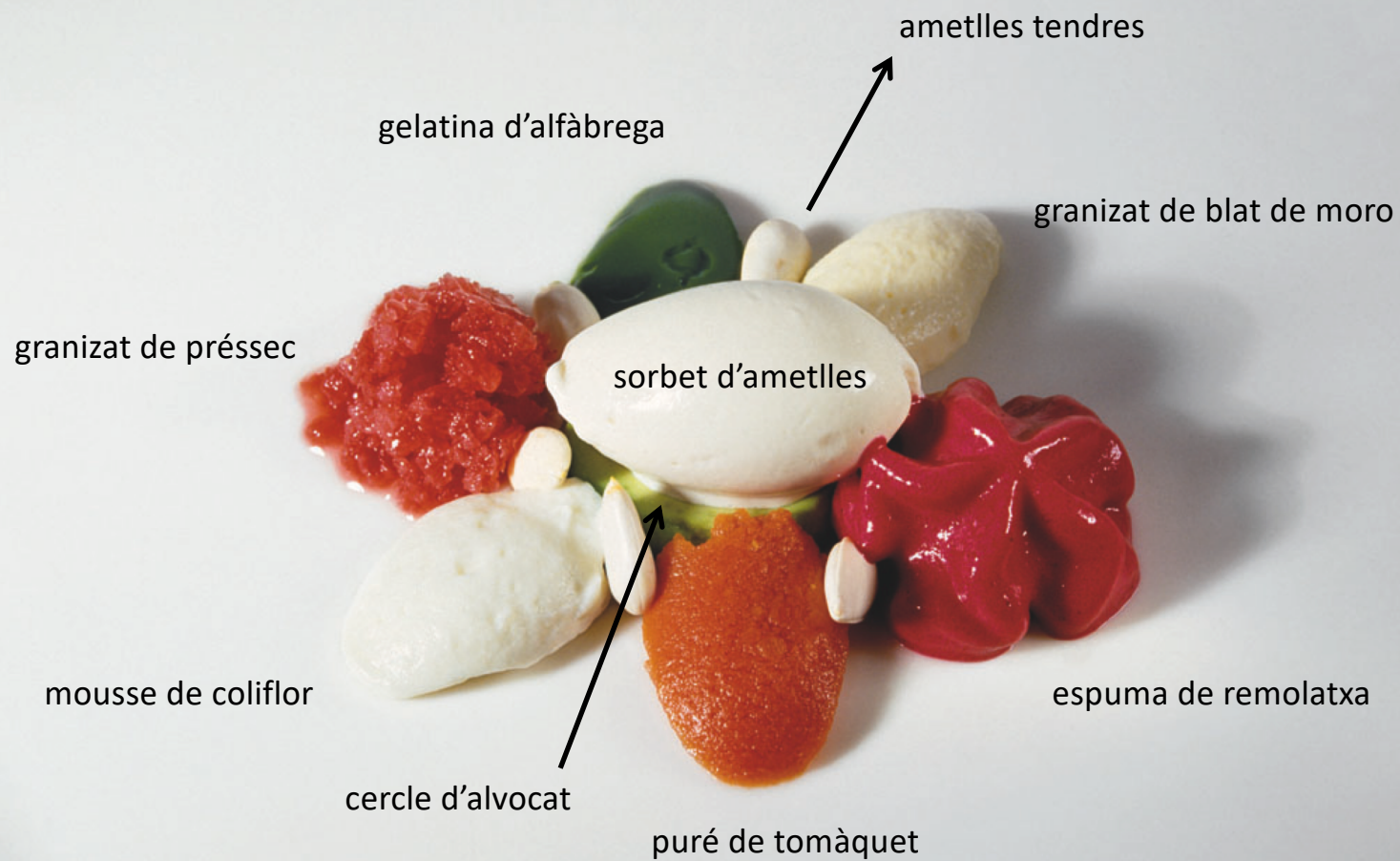
Axel Bidon-Chanal i Marta Vila Rigat

Departament de Nutrició, Ciències de l'Alimentació y Gastronomia
Facultat de Farmàcia i Ciències de l'Alimentació
Campus de l'Alimentació de Torribera
Universitat de Barcelona





Minestra en textures



elBulli, 1994



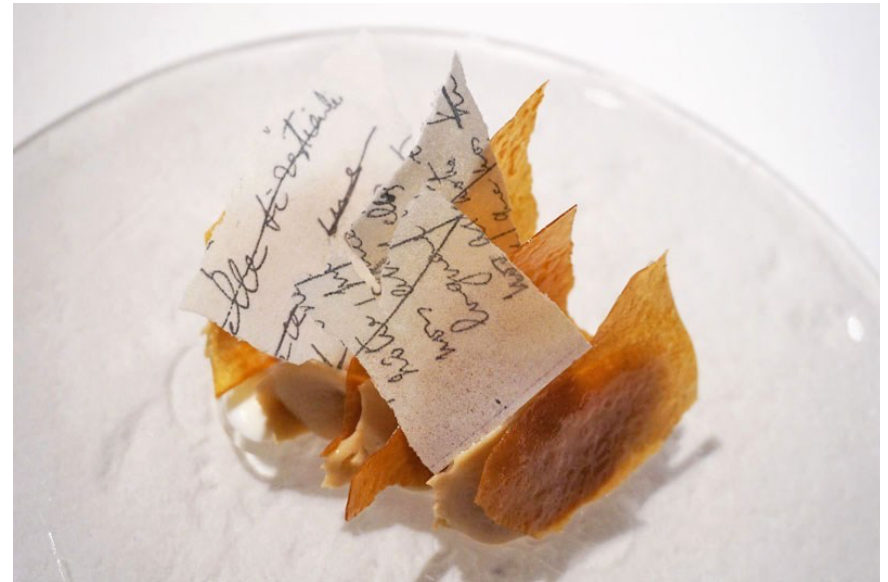
Rotavapor (Rotaval)



EL CELLER DE CAN ROCA
GIRONA



*Milfulles de galeta de mantega amb crema de té darjeeling i
essència de llibre vell*



<https://www.facebook.com/ElCellerdeCanRoca/videos/10154575023179513/>



Nicholas Kurti

(Budapest 1908-Oxford 1998)

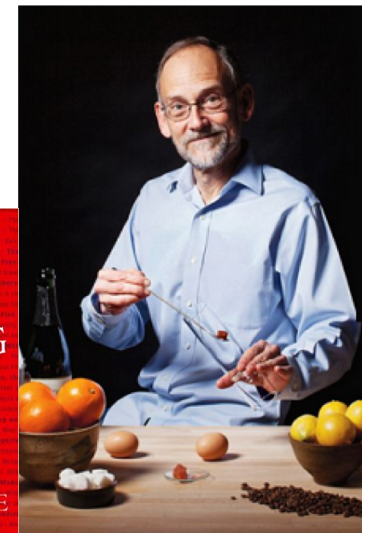
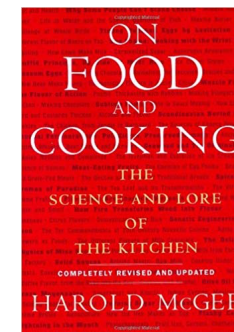
The Physicist in the Kitchen (14 de març de 1969)

“I think it is a sad reflection on our civilization that while we can and do measure the temperature in the atmosphere of Venus we do not know what goes on inside our soufflés”

Harold McGee
(Cambridge 1951-)

On Food and Cooking: The Science and Lore of the Kitchen (1a edició, 1984, 2a edició, 2004)

“...translate technical food science into cook-friendly kitchen science...”





MENU ▾

nature
International journal of science

Letter | Published: 12 April 1984

Why whip egg whites in copper bowls?

Harold J. McGee, Sharon R. Long & Winslow R. Briggs

Nature **308**, 667–668 (1984) | [Download Citation](#) 

Abstract

Foams of chicken egg albumen have been an important element in Western cuisine for at least 300 yr¹; they lower the density of such otherwise ponderous preparations as soufflés and sponge cakes, and in the heat-annealed form known as meringues they support or crown various sucrose-rich mixtures². The raw protein foam is delicate and easily ruined by overheating. Over the past 200 yr, protocols for the production of albumen foams have frequently specified the use of copper reaction vessels^{3–5}. In keeping with the line of thought that holds culinary practice to be worthy of philosophical and scientific analysis^{6–8}, we have investigated the nature and consequences of the copper protocol. We report here that copper utensils reduce the danger of overheating albumen foams, and propose that the mechanism involves the metal-binding protein, conalbumin (ovotransferrin).

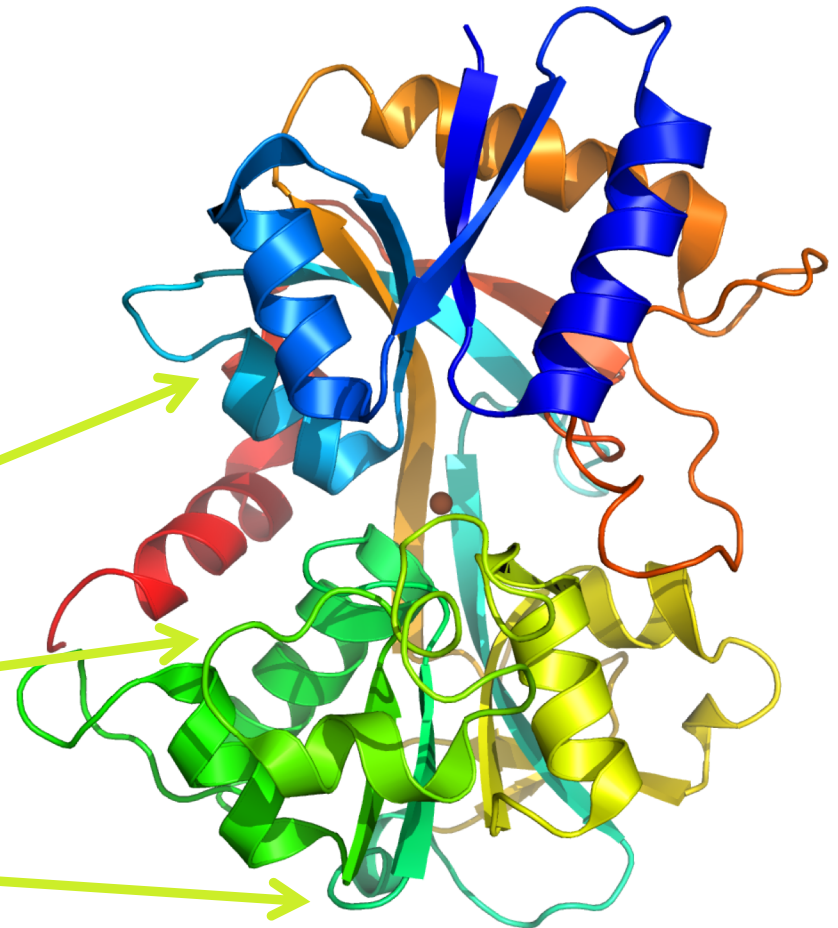
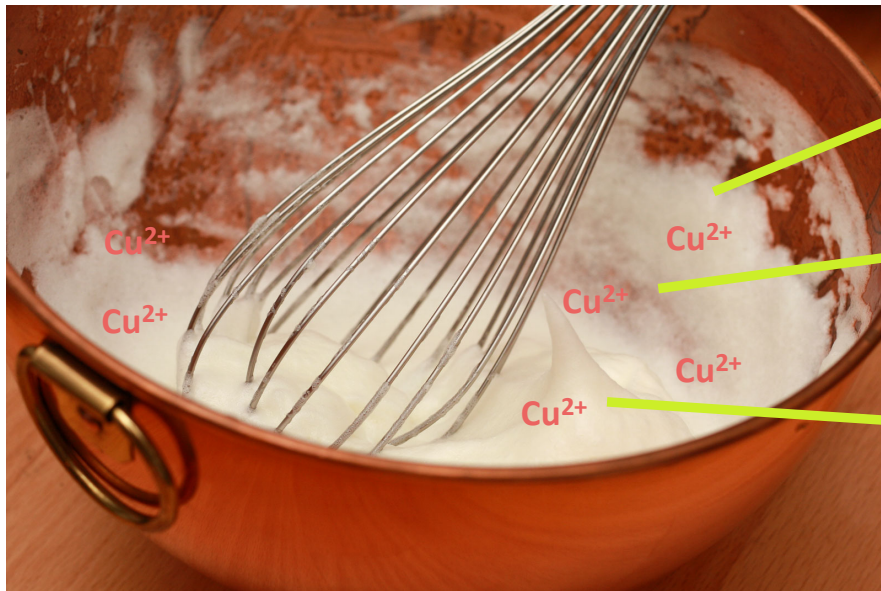
Letter | Published: 12 April 1984

Why whip egg whites in copper bowls?

Harold J. McGee, Sharon R. Long & Winslow R. Briggs

Nature **308**, 667–668 (1984) | [Download Citation](#)

Estabilització per la incorporació d'ions Cu^{2+} .





Elizabeth Cawdry Thomas, Sharon Long, Nicholas Kurti, Hervé This, Harold McGee, Astri Riddervold.

1992 – 1999 International Workshop on Molecular and Physical Gastronomy

2001 – 2013 International Workshop on Molecular Gastronomy N. Kurti

2013 – International Workshop on Molecular Gastronomy

Temes

Brous: concentrar per ebullició a baixa pressió

Salses roux

Salses emulsionades (Maionesa, Holandesa, etc.)

Escumes, Merengues, Mousses, Soufflés

Masses, Pans, Pastissos

Llet i Nata: pasteuritzada vs. fresca. Viscositat, idoneïtat per muntar

Formatges: Paper dels microorganismes

Transformar plantes no comestibles en comestibles

Cuina al microones

Ultracongelació. Irradiació d'aliments.

ETTORE MAJORANA CENTRE FOR SCIENTIFIC CULTURE

INTERNATIONAL WORKSHOP ON MOLECULAR AND PHYSICAL GASTRONOMY

ERICE-SICILY: 8 - 13 AUGUST 1992

Sponsored by the: Italian Ministry of Education
Italian Ministry of University and Scientific Research
Sicilian Regional Government

TOPICS AND DISCUSSION LEADERS

<i>Bouillon: concentrating by boiling at reduced pressure</i>	R. BLANC, Restaurant «Manoir aux Quat'Saisons», Nr. Oxford, UK
<i>Roux sauces</i>	K.E. BLOCH, Harvard University, Cambridge, MA, USA
<i>Emulsion sauces (Mayonnaise, Hollandaise, etc.)</i>	A.S.V. BURGEN, University of Cambridge, UK
<i>Foams, Meringues, Mousses, Soufflés</i>	D.M. CONNING, British Nutrition Foundation, London, UK
<i>Doughs, Breads, Cakes</i>	S.O. CORRIHER, Atlanta, GA, USA
<i>Milk and Cream: pasteurized vs. fresh. Viscosity, Whippability</i>	J.A. ELLISON, London, UK
<i>Cheeses: The role of micro-organisms</i>	P. ETIEVANT, Laboratoire de Recherches sur les Aromes, Dijon, France
<i>Rendering inedible plants edible</i>	A. DE GENNES, Restaurant «Le Boudin Sauvage», Orsay, France
<i>Microwave cooking</i>	P.G. DE GENNES, Collège de France, Paris, France
<i>Deep Freezing. Food Irradiation</i>	R. GOUTEFONGEA, Labor. «Molécules Alimentaires», Nantes, France
	B. HEALY, «Healy-Lucullus» School of Cooking, Boulder, CO, USA
	T.J. HUMPHREY, Public Health Laboratory, Exeter, UK
	C.G. JONES, Institute of Ecosystem Studies, Millbrook, NY, USA
	N. KURTI, University of Oxford, UK
	H. MCGEE, Palo Alto, CA, USA
	H. MAIER-LEIBNITZ, Technical University of Munich, Germany
	U. PALMA, University of Palermo, Italy
	P. POTIER, Inst. de Chimie des Subst. Naturel., Gif-sur-Yvette, France

Ferran Adrià



elBulli***

Pere Castells



Universitat de Barcelona

Pierre Gagnaire



Pierre Gagnaire***

Hervé This



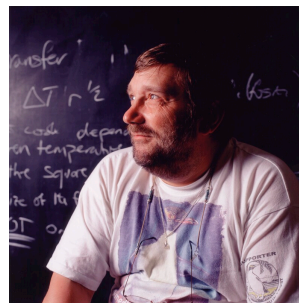
AgroParisTech

Heston Blumenthal



The Fat Duck***

Peter Barham



University of Bristol

Massimiliano Alajmo



Le Calandre***

Davide Cassi



Università degli Studi di Parma



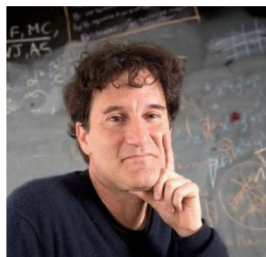
INFLUÈNCIA EN LA CUINA DEL SEGLE XXI



Dave Weitz

Universitat de Harvard

Mallinckrodt Professor of Physics & Applied Physics, Harvard University, 2005-
Director, Harvard Materials Research Science & Engineering Center 2001-
Instructor Science and cooking course. Harvard.



Michael Brenner

Universitat de Harvard

Glover Professor of Applied Mathematics and Applied Physics.
Harvard College Professor. School of Engineering and Applied Sciences. Kavli Institute for Bionano Science and Technology. Harvard University.
Instructor Science and cooking course Harvard



Harold McGee

Escriptor de Ciència i Cuina

És un referent importantíssim en Ciència i Cuina.
El seu llibre *On Food and Cooking: The Science and Lore of the Kitchen* publicat el 1984 i revisat el 2004.
Escriu *The curious cook* al New York Times.
Profesor de Science and cooking course a Harvard.



Ferran Adrià

ElBulliFoundation

Ha estat el cuiner més influent del món durant el segle XXI.
La seva trajectòria en Ciència i Cuina el va portar a encapçalat el projecte del curs *Science and Cooking* a Harvard. Sempre interessat per la ciència continua sent un capdavanter.



Joan Roca

Restaurant Celler de Can Roca

Gran referent en la cuina actual, sempre ha estat amb projectes de investigació en Ciència i cuina.
La gran projecció de les seves recerques envers *La cuina baixa temperatura* amb el Salvador Brugués ha estat referent a tot el món.
També les investigacions amb la destil·lació i els aromes han estat capdavanteres en Ciència i Cuina.
Ha estat diversos anys professor al curs de ■ Harvard.



Massimiliano Alajmo

Restaurant Le Calandre

En el seus restaurants ha tractat de relacionar la ciència i la cuina des de diferents perspectives.
El 2008, va treballar amb el mestre perfumista Lorenzo Dante Ferro, estudiant el sentit de l'olfacte pel que fa a l'experiència gastronòmica.
Al Congrés es vol presentar una activitat conjunta amb Davide Cassi al voltant de la relació ciència i cuina.



Carles Tejedor

Oïllab

Gran defensor de la interacció de ciència i cuina.
A partir de la seva presència al Curs de Science and Cooking a Harvard va iniciar el seu gran projecte Oïllab en el que la Ciència i la cuina es molt present.



Pere Planagumà

Cuiner

Cuiner format les gran cuines del Celler de Can Roca i el Bulli va ser cap de cuina al restaurant Les Cols i actualment al Restaurant Rom.
Des del seu pas com a professor al curs de Science and cooking a Harvard va iniciar projectes de recerca en ciència i cuina amb la seva proposta gastronòmica.



Nandu Jubany

Cuiner

Cuiner multidisciplinari, ha dut a terme infinitats de projectes en els que la ciència, la cuina i també la nutrició n'han format part. El seu pas com a professor del curs *Science and Cooking* a la Universitat Harvard també va contribuir a aquesta relació amb la ciència.



Hervé This

Agro Paris Tech

Director del International Centre for Molecular Gastronomy AgroParisTech-INRA : Fondation Science & Culture Alimentaire (Académie des sciences).
Ha escrit molts llibres de Ciència i cuina, el més referent és *Casseroles et Epreuves*.



Davide Cassi

Universitat de Parma

És un referent del moviment Ciència i Cuina des d'Itàlia.
El seu llibre "La ciencia en los fogones. Historia, técnicas y recetas de la cocina molecular italiana", juntament amb el cuiner Ettore Bocchia obre les portes de la Cuina Molecular.
Profesor dels estudis Scienze Gastronomiche (U. Parma).
Gran especialista en Estructures Soft Matter.



Mariana Koppmann

G.M. Argentina

Des de Buenos Aires ha liderat el moviment Ciència i Cuina i els seus Manuals de Gastronomia Molecular 1 el 2009 i posteriorment el 2 al 2014, han contribuït a introduir la ciència i cuina a Argentina i a tota Iberoamèrica.
És també especialista en Seguretat Alimentària i el seu llibre *Cazabacterias* en la cocina és un referent.



BARCELONA, 4, 5 I 6 DE MARÇ 2019

<http://www.cienciaicuina.cat/wp-content/uploads/2019/03/Manifest-Scientific-Gastronomy-Barcelona-2019.pdf>



Food pairing

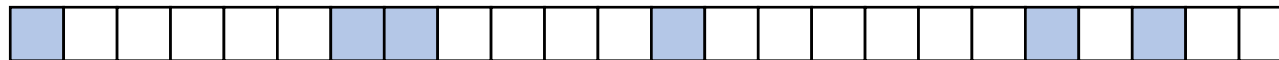


Similitud molecular

Tanimoto index (Jaccard)

$$T(A,B) = \frac{N(A \cap B)}{N(A \cup B)} = \frac{\text{intersection}}{\text{union}} = \frac{3}{10} = 0.3$$

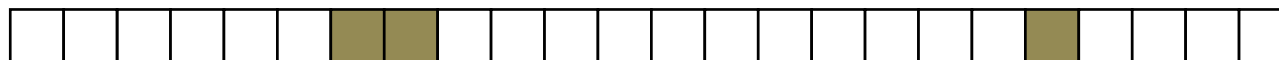
A



B

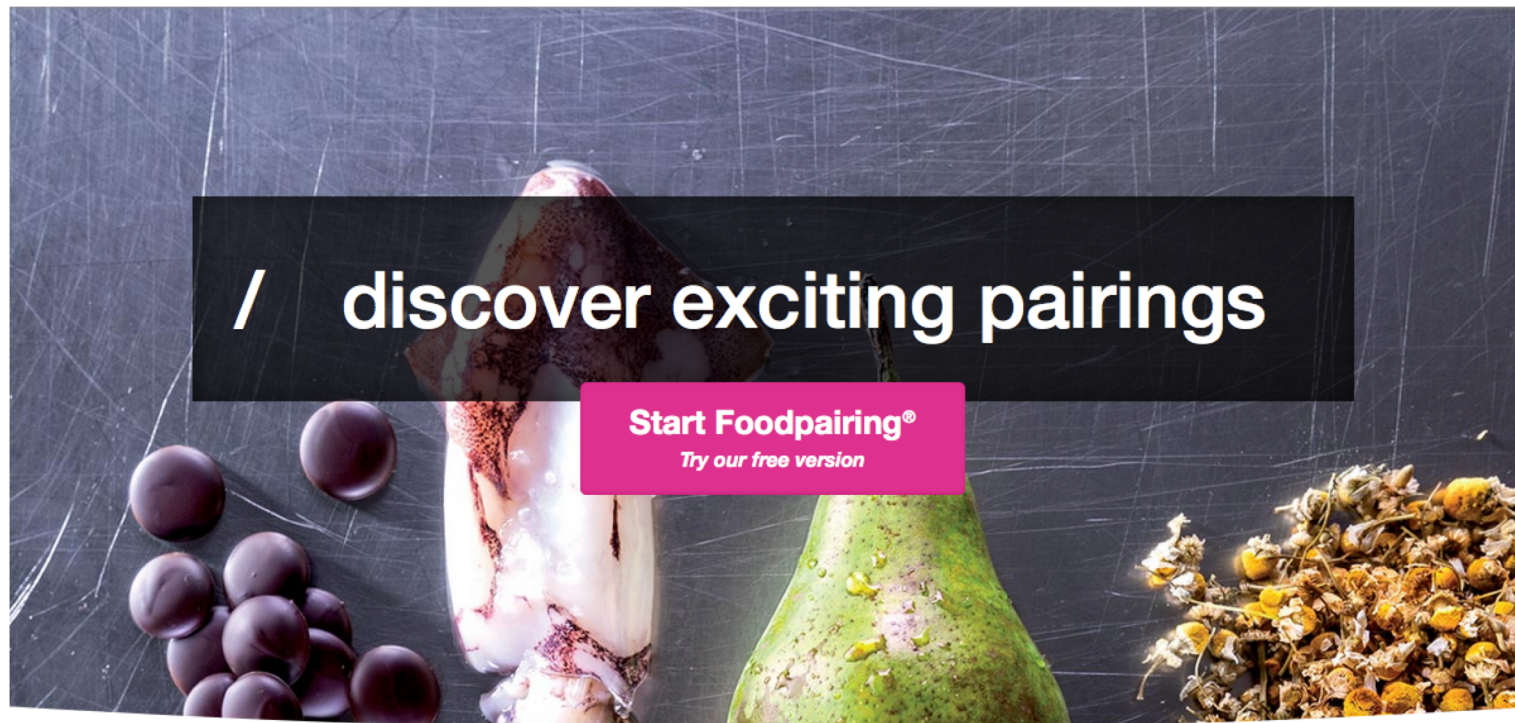


$N(A \cap B)$



$N(A \cup B)$





<https://www.foodpairing.com/en/home>



EMMENTAL

Agrega un ingrediente compatible



BUSCAR

Categoría

Subcategoría

Cocina

Temporadas

Aroma PRO

Todo



Todo



Todo



Todo



Mejor combinación



Jamón de Bayona
secado al aire France



Gorgonzola
Italy



Tostada



Aceite de oliva 'Family
Reserve' Arbequina
Castillo de Canena
Spain



Chocolate negro



Mantequilla
fresco



Ciabatta



Angostura bitters®



Fresa



Piña
fresco



Café 'Arabica'



Gueuze Fond Tradition
St Louis Belgium



Salchichón
Arturo Sanchez Spain



Panceta de cerdo
horneado VLAM
Belgium



Ternera
crudo



Té negro



Bourbon whiskey
America



Frambuesa
fresco



Generic Stout



Ganda ham
dried Ganda Belgium



CARGAR MÁS

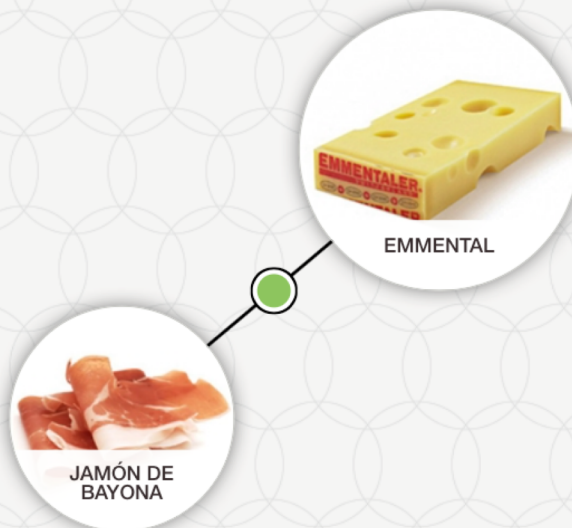
- Mejor combinación
Excelente combinación aromática
- Buena combinación
Buena combinación aromática
- Combinación
Combinación aromática

Cambia a la versión superior para utilizar todas las herramientas de Foodpairing

upgrade to PRO



Marta Vila
FOODPAIRING FREE



Emmental - Jamón de Bayona

Ingredientes

Emmental	Cantidad
Jamón de Bayona	Cantidad

Pasos de la preparación

Agrega aquí los pasos de la preparación

Guardar en mis combinaciones

Crea una nueva combinación

Food**d**-bridging





Food-Bridging: A New Network Construction to Unveil the Principles of Cooking

Tiago Simas^{1,2}, Michal Ficek¹, Albert Diaz-Guilera^{3,4}, Pere Obrador¹ and Pablo R. Rodriguez¹*

¹ Telefonica Research, Edificio Telefonica, Barcelona, Spain, ² Department of Psychiatry, University of Cambridge, Cambridge, United Kingdom, ³ Departament de Física de la Materia Condensada, Universitat de Barcelona, Barcelona, Spain,

⁴ Universitat de Barcelona Institute of Complex Systems (UBICS), Universitat de Barcelona, Barcelona, Spain

In this manuscript, we propose, analyze, and discuss a possible new principle behind traditional cuisine: the Food-bridging hypothesis and its comparison with the food-pairing hypothesis using the same dataset and graphical models employed in the food-pairing study by Ahn et al. (2011). The Food-bridging hypothesis assumes that if two ingredients do not share a strong molecular or empirical affinity, they may become affine through a chain of pairwise affinities. That is, in a graphical model as employed by Ahn et al., a chain represents a path that joints the two ingredients, the shortest path represents the strongest pairwise chain of affinities between the two ingredients. Food-pairing and

OPEN ACCESS



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**Campus
de l'Alimentació**

Universitat de Barcelona



**UNIVERSITAT DE
BARCELONA**

<http://appetit.lab.tid.es>

Emmenthal



Guisante congelado



Pollo cocinado



Ternera



Chucrut



Estragón

Walk

©18 Telefonica IP, S.A.U.



Ternera

Pollo cocinado

Chucrut

Guisante congelado

Estragón

Insertar ingrediente

+ Biblioteca



Vaciar

Conectar

Walk

Insertar ingrediente

+ Biblioteca



CHUCRUT

CONEXIONES



EMMENTHAL



Tenera

Añadir



Pan

Añadir



Zanahoria

Añadir



Añadir

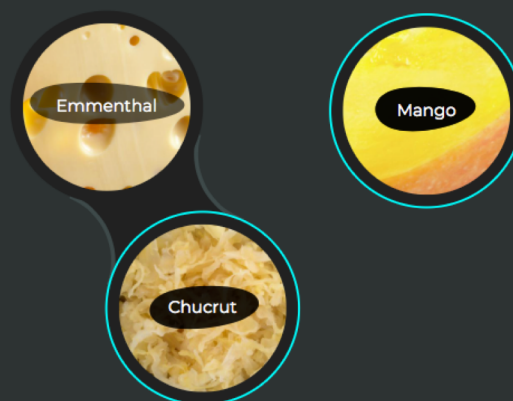
Vaciar

Conectar

Walk

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+ Biblioteca



Vaciar

 Conectar

Walk

Insertar ingrediente

 Biblioteca



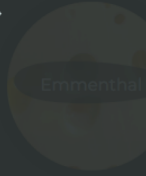
MANGO

CONEXIONES

- 1 +



CHUCRUT



Emmenthal



Cebolla

Añadir



Mango



Comino

Añadir



Mostaza

Añadir



Añadir

Vaciar

Conectar

Walk

+ Biblioteca



Vaciar

 Conectar

Walk

Insertar ingrediente

 Biblioteca

La gastronomía computacional



OPINION

Open Access

Network analysis and data mining in food science: the emergence of computational gastronomy

Sebastian E Ahnert

Abstract

The rapidly growing body of publicly available data on food chemistry and food usage can be analysed using data mining and network analysis methods. Here we discuss how these approaches can yield new insights both into the sensory perception of food and the anthropology of culinary practice. We also show that this development is part of a larger trend. Over the past two decades large-scale data analysis has revolutionized the biological sciences, which have experienced an explosion of experimental data as a result of the advent of high-throughput technology. Large datasets are also changing research methodologies in the social sciences due to the data generated by mobile communication technology and online social networks. Even the arts and humanities are seeing the establishment of 'digital humanities' research centres in order to cope with the increasing digitization of literary and historical sources. We argue that food science is likely to be one of the next beneficiaries of large-scale data analysis, perhaps resulting in fields such as 'computational gastronomy'.

Keywords: Networks, Data mining, Sensory science, Computational gastronomy, Flavour compounds

OPINION

Open Access

Network analysis and data mining in food science: the emergence of computational gastronomy

Sebastian E Ahnert

Abstract

The rapidly growing body of publicly available data on food chemistry and food usage can be analysed using data

We argue that food science is likely to be one of the next beneficiaries of large-scale data analysis, perhaps resulting in fields such as ‘computational gastronomy’.

literary and historical sources. We argue that food science is likely to be one of the next beneficiaries of large-scale data analysis, perhaps resulting in fields such as ‘computational gastronomy’.

Keywords: Networks, Data mining, Sensory science, Computational gastronomy, Flavour compounds

SCIENTIFIC REPORTS



Flavor network and the principles of food pairing

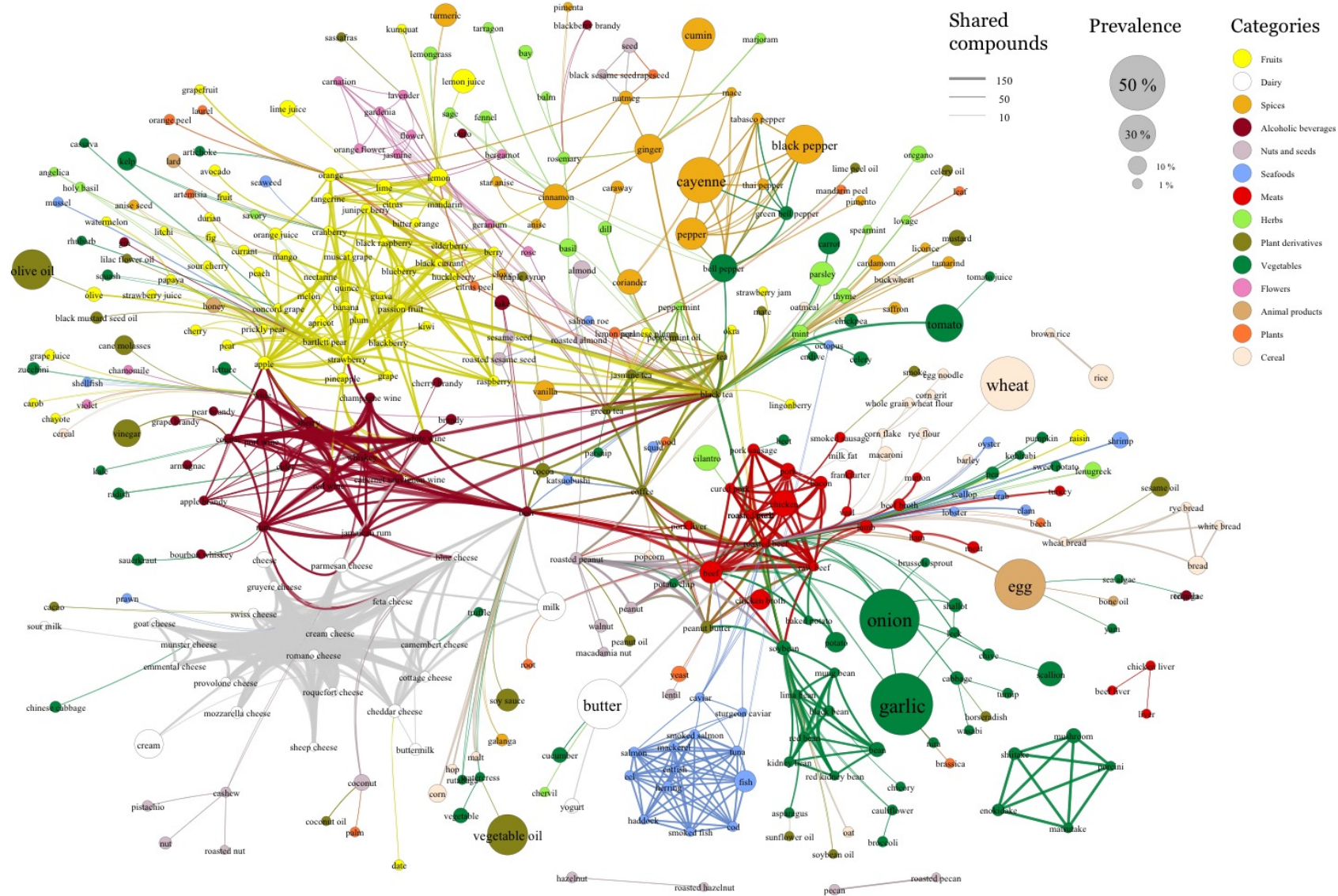
Yong-Yeol Ahn^{1,2,3*}, Sebastian E. Ahnert^{1,4*}, James P. Bagrow^{1,2} & Albert-László Barabási^{1,2}

SUBJECT AREAS:
STATISTICAL PHYSICS,
THERMODYNAMICS AND
NONLINEAR DYNAMICS
APPLIED PHYSICS
SYSTEMS BIOLOGY
STATISTICS

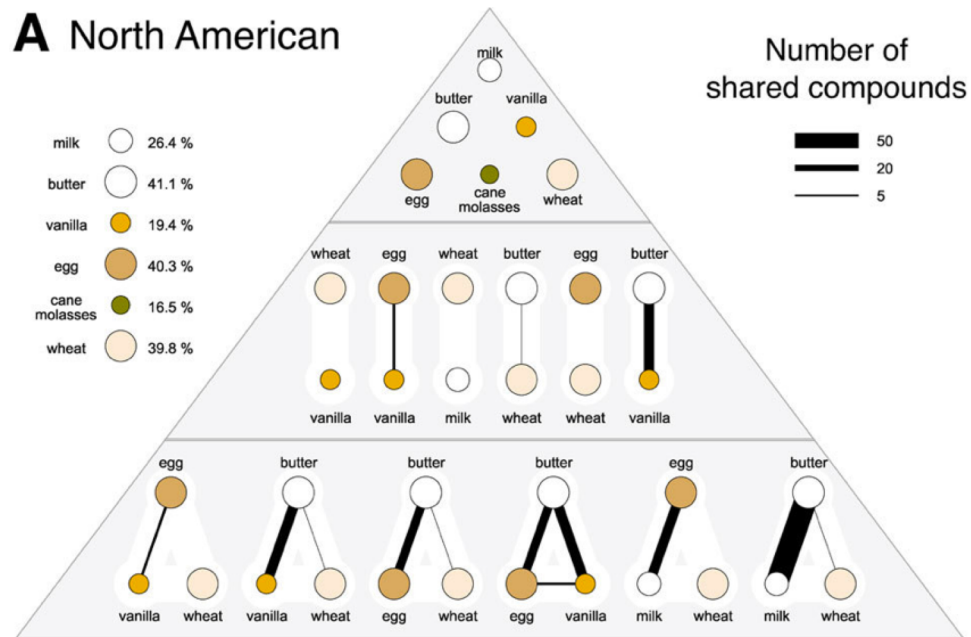
¹Center for Complex Network Research, Department of Physics Northeastern University, Boston, MA 02115, ²Center for Cancer Systems Biology Dana-Farber Cancer Institute, Harvard University, Boston, MA 02115, ³School of Informatics and Computing Indiana University, Bloomington, IN 47408, ⁴Theory of Condensed Matter, Cavendish Laboratory, University of Cambridge, Cambridge CB3 0HE, UK.

Received
18 October 2011
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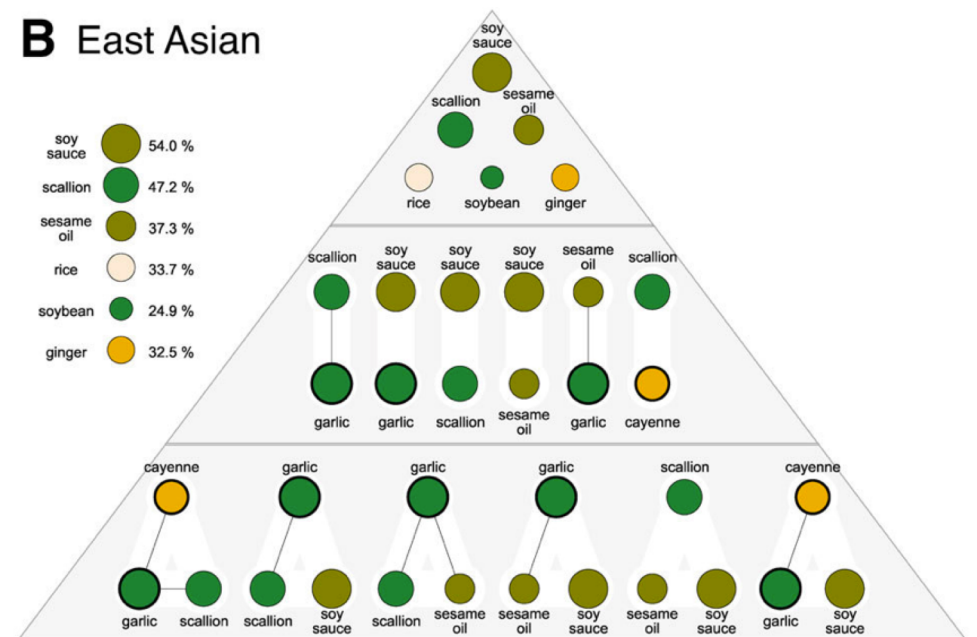
The cultural diversity of culinary practice, as illustrated by the variety of regional cuisines, raises the question of whether there are any general patterns that determine the ingredient combinations used in food today or principles that transcend individual tastes and recipes. We introduce a flavor network that captures the flavor compounds shared by culinary ingredients. Western cuisines show a tendency to use ingredient pairs that share many flavor compounds, supporting the so-called food pairing hypothesis. By contrast, East Asian cuisines tend



A North American



B East Asian



Recipe recommendation using ingredient networks

Full Text:  PDF  [Get this Article](#)

Authors: [Chun-Yuen Teng](#) [University of Michigan, Ann Arbor, MI](#)
[Yu-Ru Lin](#) [IQSS, Harvard University, CCS, Northeastern University, Boston, MA](#)
[Lada A. Adamic](#) [University of Michigan, Ann Arbor, MI](#)



 2012 Article

Published in:

· Proceeding
[WebSci '12](#) Proceedings of the 4th Annual ACM Web Science Conference
 Pages 298-307

[ACM](#) New York, NY, USA ©2012

[table of contents](#) ISBN: 978-1-4503-1228-8 doi>[10.1145/2380718.2380757](#)



Bibliometrics

- Downloads (6 Weeks): 20
- Downloads (12 Months): 265
- Downloads (cumulative): 791
- Citation Count: 10

<http://dl.acm.org/citation.cfm?id=2380757>

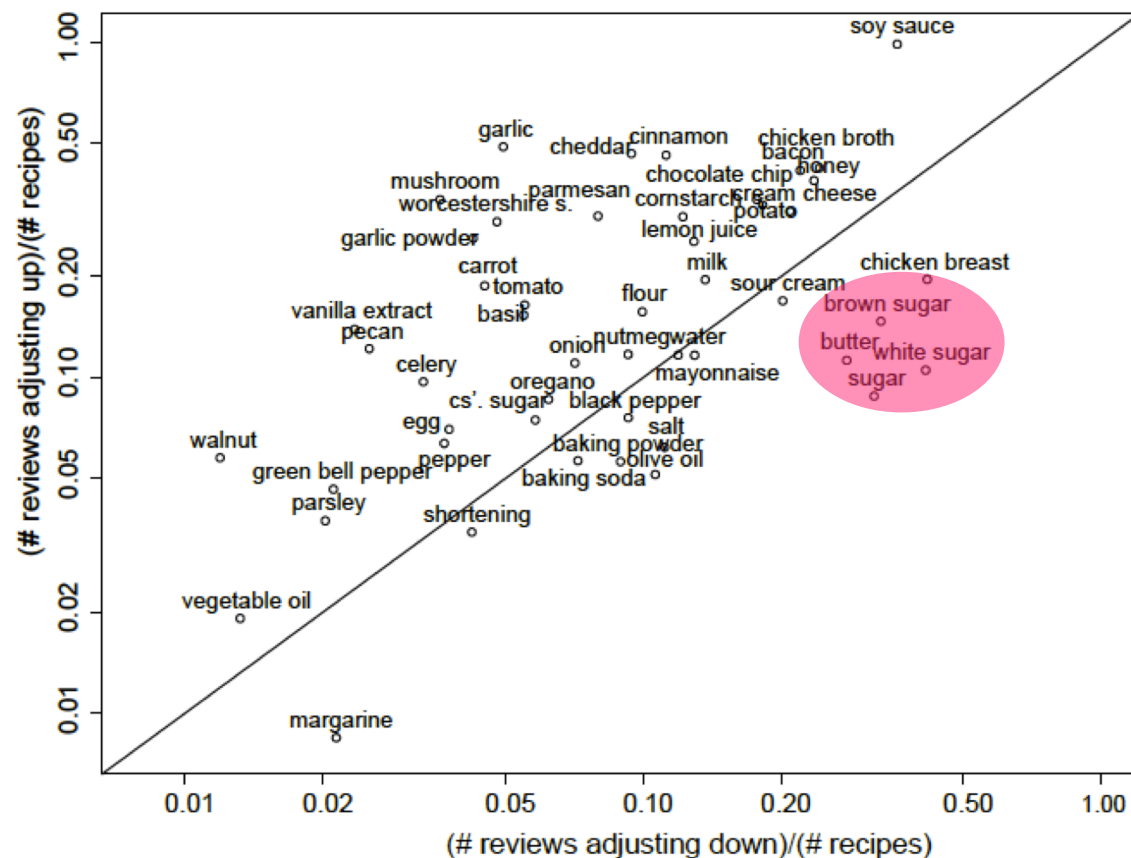


Figure 4: Suggested modifications of quantity for the 50 most common ingredients, derived from recipe reviews. The line denotes equal numbers of suggested quantity increases and decreases.

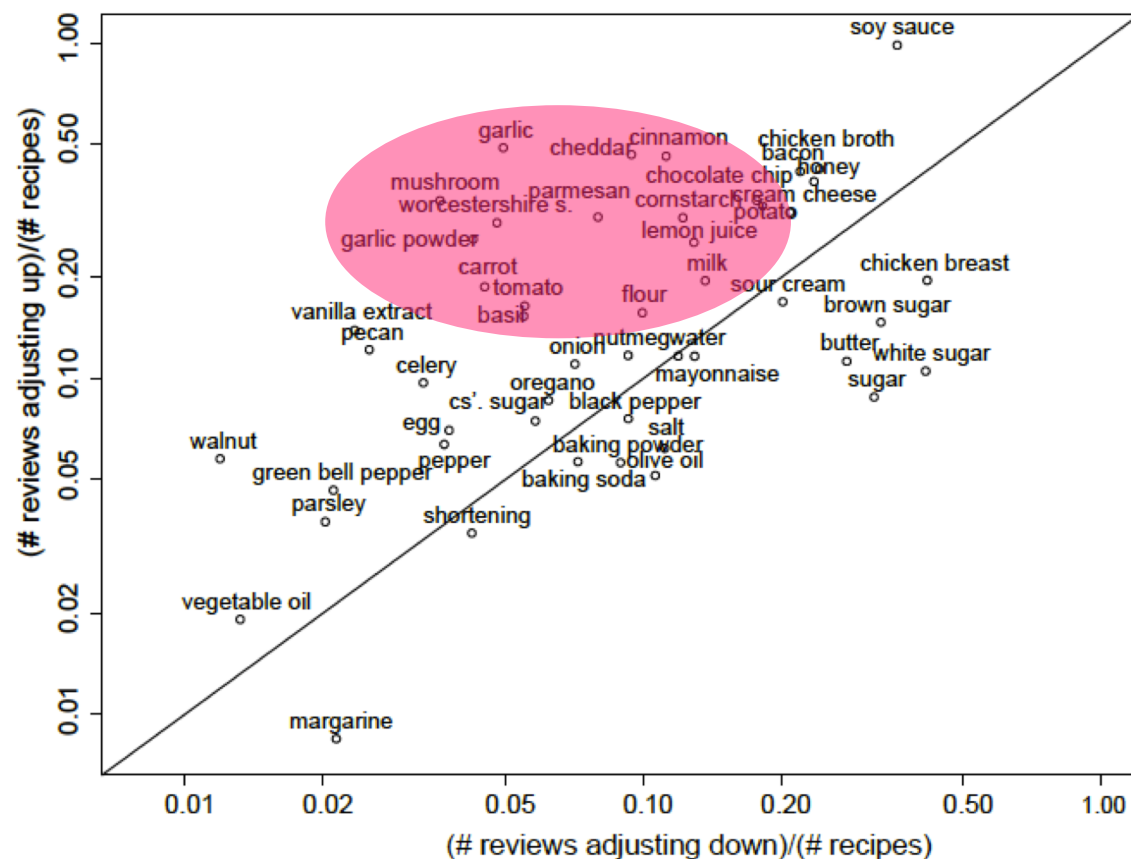


Figure 4: Suggested modifications of quantity for the 50 most common ingredients, derived from recipe reviews. The line denotes equal numbers of suggested quantity increases and decreases.

Table 2: Clusters of ingredients that can be substituted for one another. A maximum of 5 additional ingredients for each cluster are listed, ordered by PageRank.

main	other ingredients
chicken	turkey, beef, sausage, chicken breast, bacon
olive oil	butter, apple sauce, oil, banana, margarine
sweet potato	yam, potato, pumpkin, butternut squash, parsnip
baking powder	baking soda, cream of tartar
almond	pecan, walnut, cashew, peanut, sunflower s.
apple	peach, pineapple, pear, mango, pie filling
egg	egg white, egg substitute, egg yolk
tilapia	cod, catfish, flounder, halibut, orange roughy
spinach	mushroom, broccoli, kale, carrot, zucchini
italian seasoning	basil, cilantro, oregano, parsley, dill
cabbage	coleslaw mix, sauerkraut, bok choy napa cabbage

Computational Gastronomy - Food in the Age of Data

[Home](#)[Program](#)[Venue & Travel](#)[Participants](#)[Contact](#)

ABOUT

Food is central to our lives, and our lives are becoming increasingly digitized. The amount of data about our food preferences, food preparation and food consumption is growing rapidly. Examples include online recipes, databases of chemical compounds in foods, and restaurant reviews, among many others. How is food consumption changing in the 21st century? How can the new abundance of data help us to study the way we eat food? And how does the availability of this data shape our culinary habits and preferences?

Computational Gastronomy - Food in the Age of Data is a Royal Society International Scientific Seminar that aims to bring together leading researchers and practitioners from the fields of food science, computer science, neuroscience, sociology, and gastronomy to discuss these questions and exchange ideas. Recent research in this field has already shown how crowdsourcing, data mining, large-scale data analysis, machine learning, and network analysis can give us new insights into food choice, suggest novel ingredient combinations, and identify cultural, anthropological, psychological, nutritional and chemical factors that determine which foods we enjoy and why.

<http://yongyeol.com/workshops/2014/fooddata/>

PARTICIPANTS

[participants.pdf](#)

Harold McGee

Food scientist and author, based in the US - studied chemistry at Caltech and Yale University before writing the highly influential *On Food & Cooking: The Science & Lore of the Kitchen*, that has become one of the defining books for a whole generation of scientifically-minded chefs. In addition to a number of additional books McGee has published reviews and original research in *Nature*, as well as contributing to the *New York Times* and *Physics Today* among many other publications.

Peter Barham

Professor of Physics, University of Bristol, UK - is a leading scientist in the field of Molecular Gastronomy and has collaborated extensively with Heston Blumenthal. He has also co-authored 'Molecular Gastronomy: A New Emerging Scientific Discipline.' (*Chemical Reviews*, 2010), and is one of the two Editors-in- Chief of the journal *Flavour*.

Michael Bom Frøst

Sensory Scientist at the Department of Food Science, University of Copenhagen and the Director of the Nordic Food Lab - has ensured that the Nordic Food Lab (founded by the highly regarded restaurant Noma) is at the forefront of pioneering research into new ways to source food sustainably and to identify new sources of edible ingredients.

Jonathan Lake

Head Chef at The Fat Duck restaurant, Bray, Berkshire, UK - has a degree in Physics and Biology and heads the kitchen of one of the leading restaurants in the UK. The Fat Duck is widely known for its scientific approach to cooking and the integration of multi-sensory perception into the restaurant experience.

Dan Jurafsky

Professor of Linguistics and Computer Science, Stanford University, USA - is a leading expert of Natural Language Processing. He is a MacArthur Fellow and studies language of food.

Dana Small

Associate Professor of Psychiatry at Yale University, USA - is a leading expert in neuroscience. She studies neurophysiology of feeding and the neural mechanisms underlying taste and flavor.

Lav Varshney

Professor at the Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, and formerly at IBM - has been studying recipe data on a large scale at IBM Research and is interested in mapping and predicting food ingredient usage patterns.

Ole Mouritsen

Professor of Biophysics at the University of Southern Denmark and Director of the Center for Biomembrane Physics - is a leading figure in the field of Molecular Gastronomy and another co-author of the review paper on this topic in *Chemical Reviews*.

Rachel Edwards-Stuart

Independent food consultant, based in the UK - holds a degree in biochemistry from the University of Cambridge and a PhD from the University of Nottingham in the Science of Cooking. During her career she has worked as a food scientist for Sainsbury's, consulted three-Michelin star restaurants on the application of scientific techniques to food, taught Molecular Gastronomy at the Ecole Grégoire Ferrandi and set up the highly successful London Gastronomy Seminars.

Ramus Bro

Professor in the Department of Food Science, University of Copenhagen, Denmark - is an expert in Chemometrics and large-scale data analysis, and led a research project on "Food Informatics: A New Integrated Systems Science".

Pablo Rodriguez

Research and Innovation Director at Telefonica Digital, Adjunct professor, Columbia University, USA - is a prominent computer scientist who leads Telefonica's research department at Barcelona. He has made significant contributions to various fields of computer science including networks, systems, web, and mobile communications. He has initiated a collaboration with El Bulli Foundation and analysis of food data and organized the GastroTech Days event in Barcelona in 2011, bringing together a wide range of researchers interested in food and data analysis.

Otto Römer

Senior Development Chef at The Fat Duck restaurant, Bray, Berkshire, UK - has a degree in Chemical Engineering and is responsible for researching new techniques, textures and flavour combinations that can be used in a gastronomical context, often in collaboration with scientists in academia and industry.

Ben Reade

Research and Development Chef - has a Bachelor's degree from the University of Gastronomic Sciences and was until recently Head of Culinary Research and Development at the Nordic Food Lab.

Jens Risbo

Associate Professor in the Department of Food Science, University of Copenhagen, Denmark - is a food scientist interested in flavour perception and flavour chemistry, and another co-author on the review paper of Molecular Gastronomy in Chemical Reviews.

Hyejin Youn

Research Fellow, Mathematical Institute, University of Oxford, UK - is a physicist working on complex networks and statistical physics, with broad interdisciplinary interests. As a postdoctoral fellow at the Santa Fe Institute she investigated the extent to which the complexity and evolution of biological and social systems are governed by similar quantitative principles.

Ben Nijssen

TNO, Rotterdam, The Netherlands - is a scientist at the company TNO, which provides the widely used VCF flavour compound database to the food industry.

Peter Todd

Provost Professor of Cognitive Science, Psychology, and Informatics at Indiana University, Bloomington — is an expert on human decision making. He studies how people search for and choose important resources including food and information.

Comparació de corpus de receptes de cuina

El projecte CC-Cuina

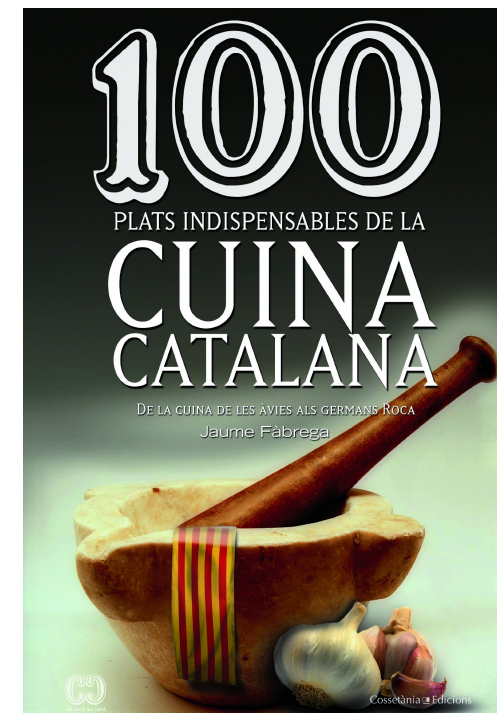


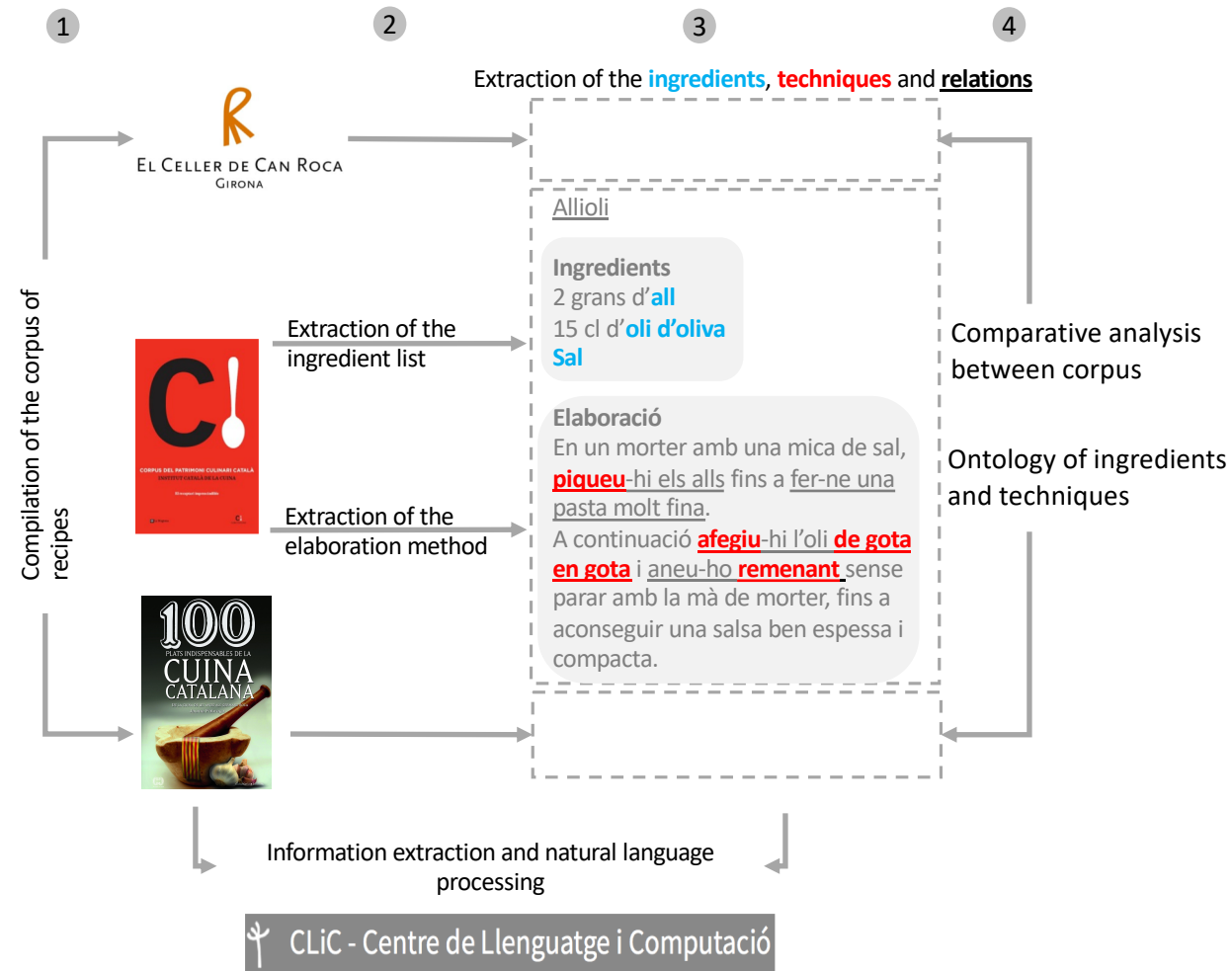
CC-Cuina

Recipe Corpus Comparison



vs.

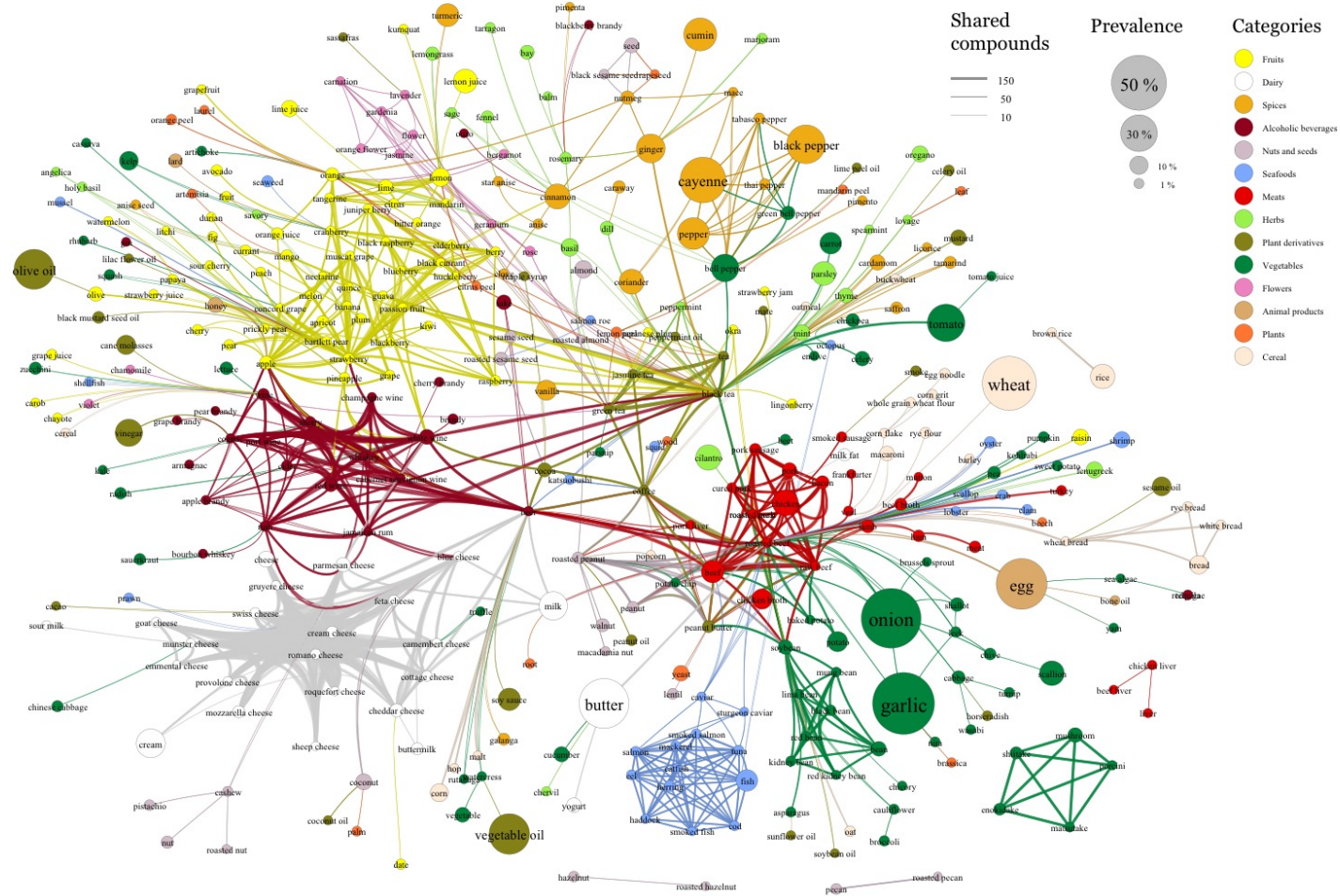




Flavor Network

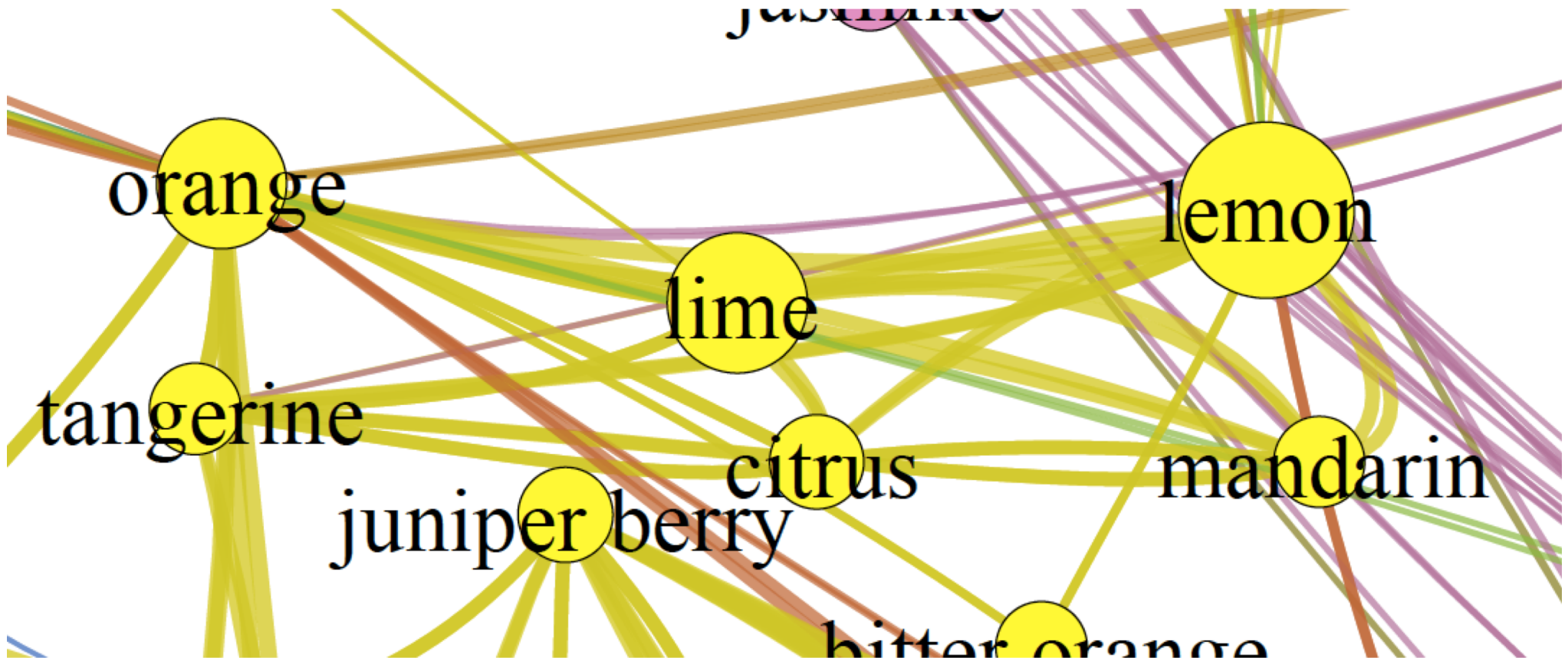
Yong-Yeol Ahn, Sebastian Ahnert, James P. Bagrow, and A.-L. Barabási

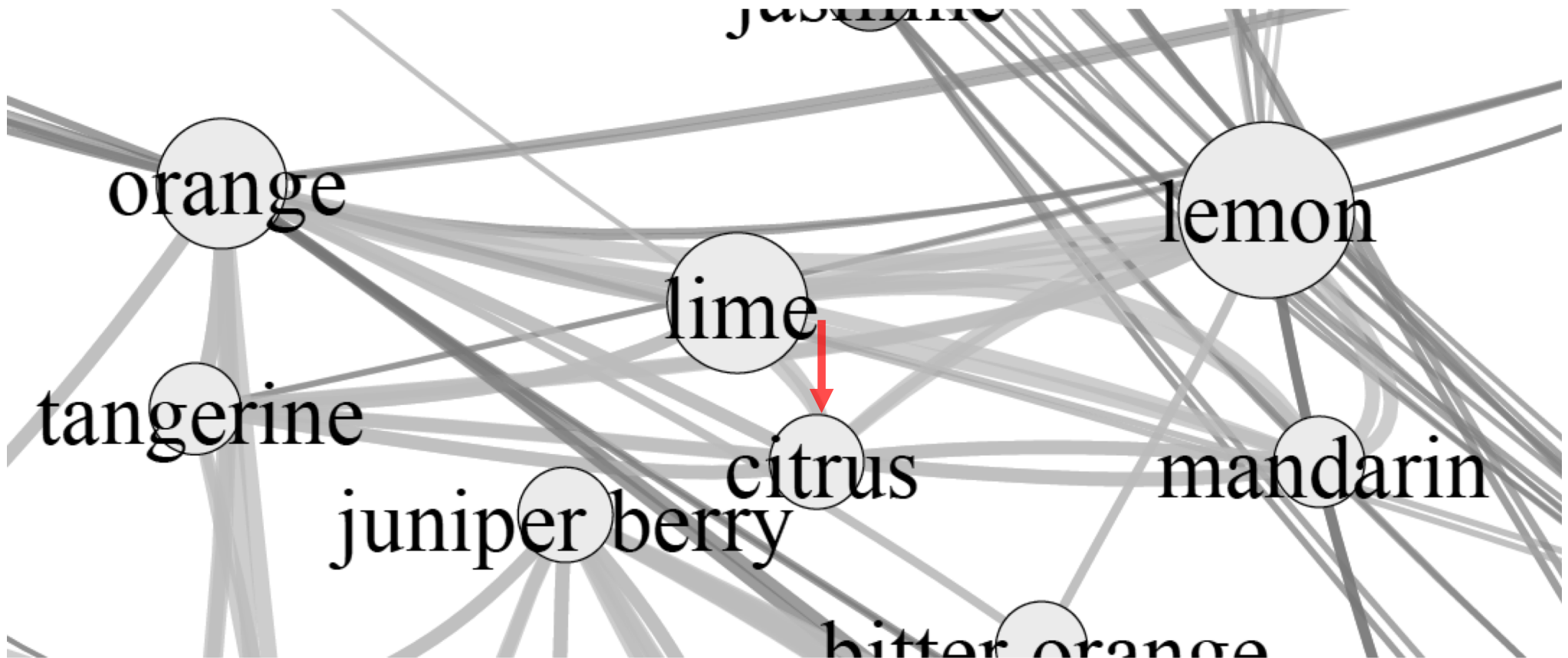
"Flavor network and the principles of food pairing", *Scientific Reports* 1, 196 (2011)

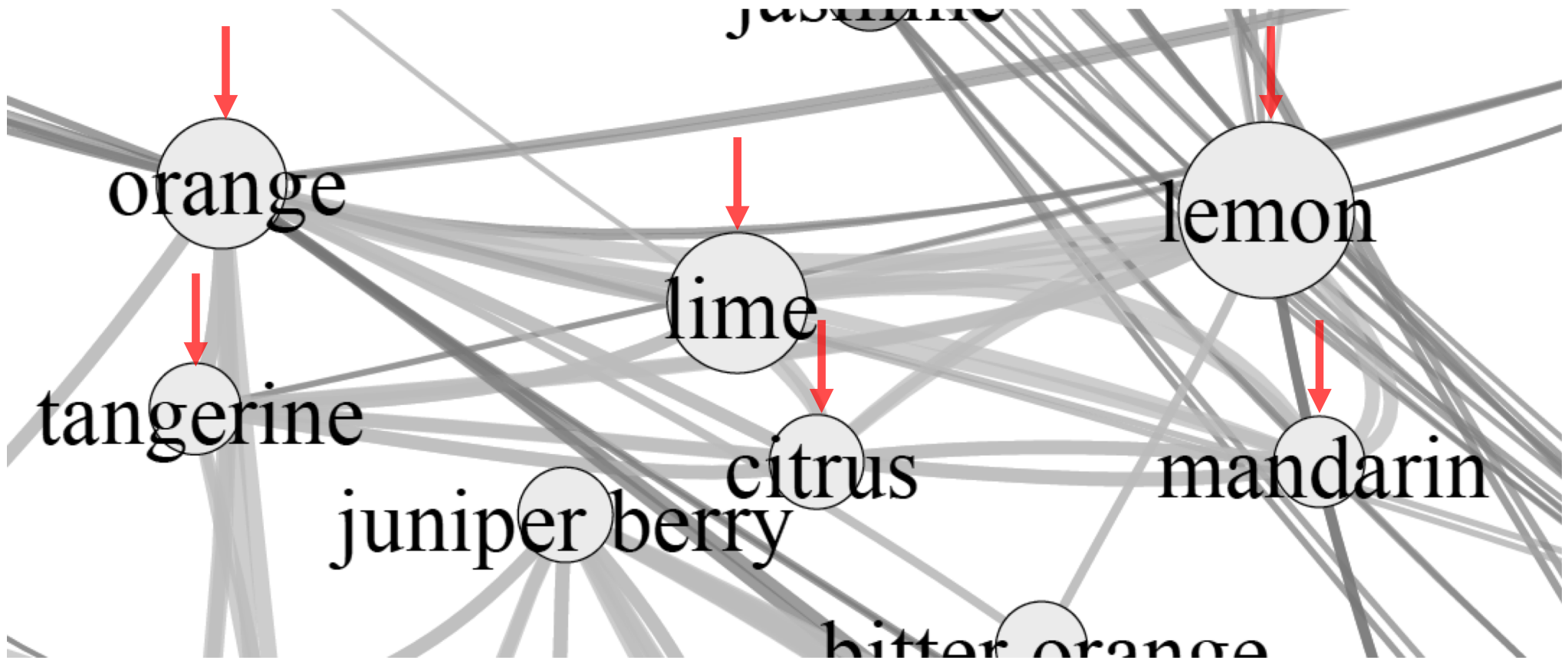


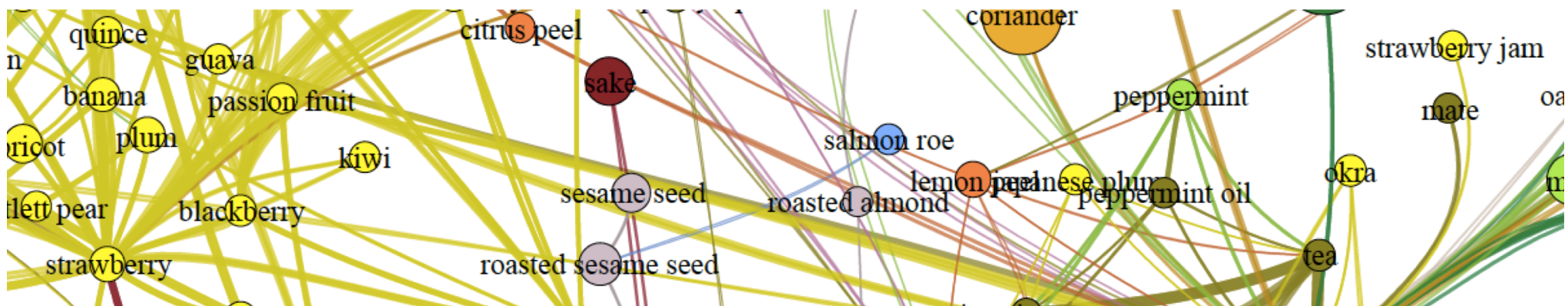
Flavor network. Culinary ingredients (circles) and their chemical relationship are illustrated. The color of each ingredient represents the food category that the ingredient belongs to, and the size of an ingredient is proportional to the usage frequency (collected from online recipe databases: epicurious.com, allrecipes.com, menupan.com). Two culinary ingredients are connected if they share many flavor compounds. We extracted the list of flavor compounds in each ingredient from the book "Fenaroli's handbook of flavor ingredients (7th ed)" and then applied a backbone extraction method by Serrano et al. (*PNAS* 106, 6483) to pick statistically significant links between ingredients. The thickness of an edge represents the number of shared flavor compounds. To reduce clutter, edges are bundled based on the algorithm by Danny Holten (<http://www.win.tue.nl/~dholten/>).

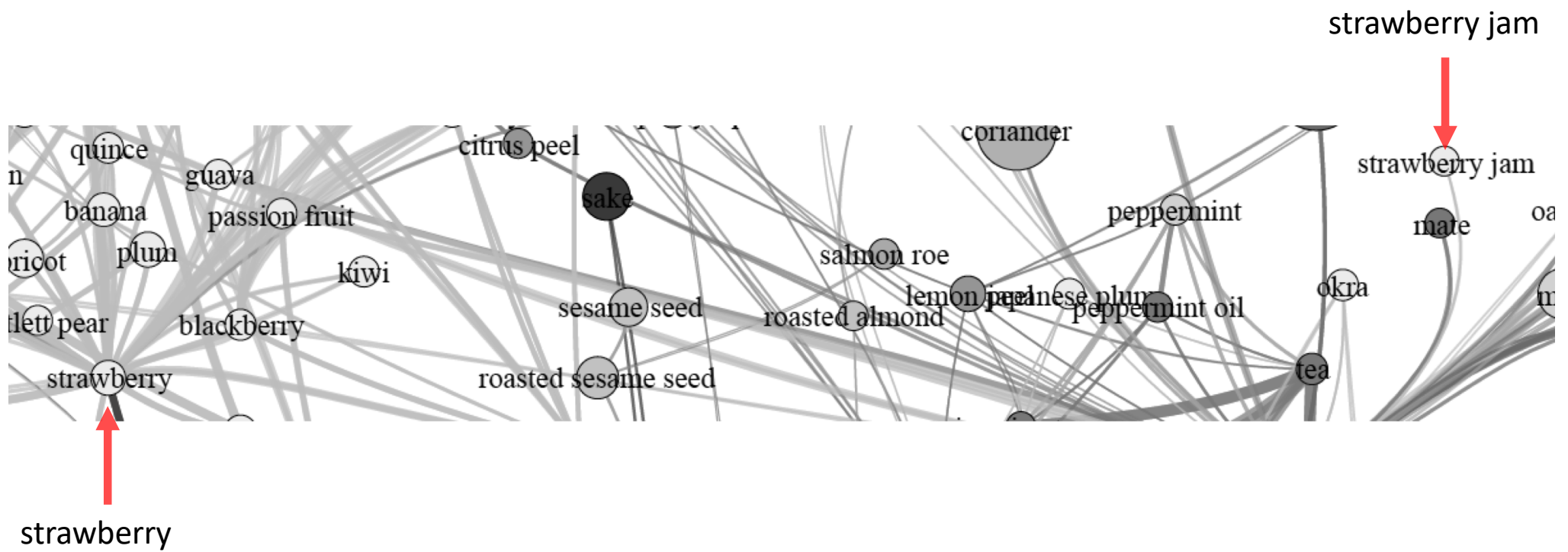
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1 kg de costelló de porc trossejat (*1 kg of sliced pork rib*)

	Quantity	Unit	Base	Property	Elaboration process
Raw text	1	kg	porc	costelló	trossejat
Paraphrase				costella	tallat
Type			animals	part	division

1 kg de costelló de porc trossejat (*1 kg of sliced pork rib*)

	Quantity	Unit	Base	Property	Elaboration process
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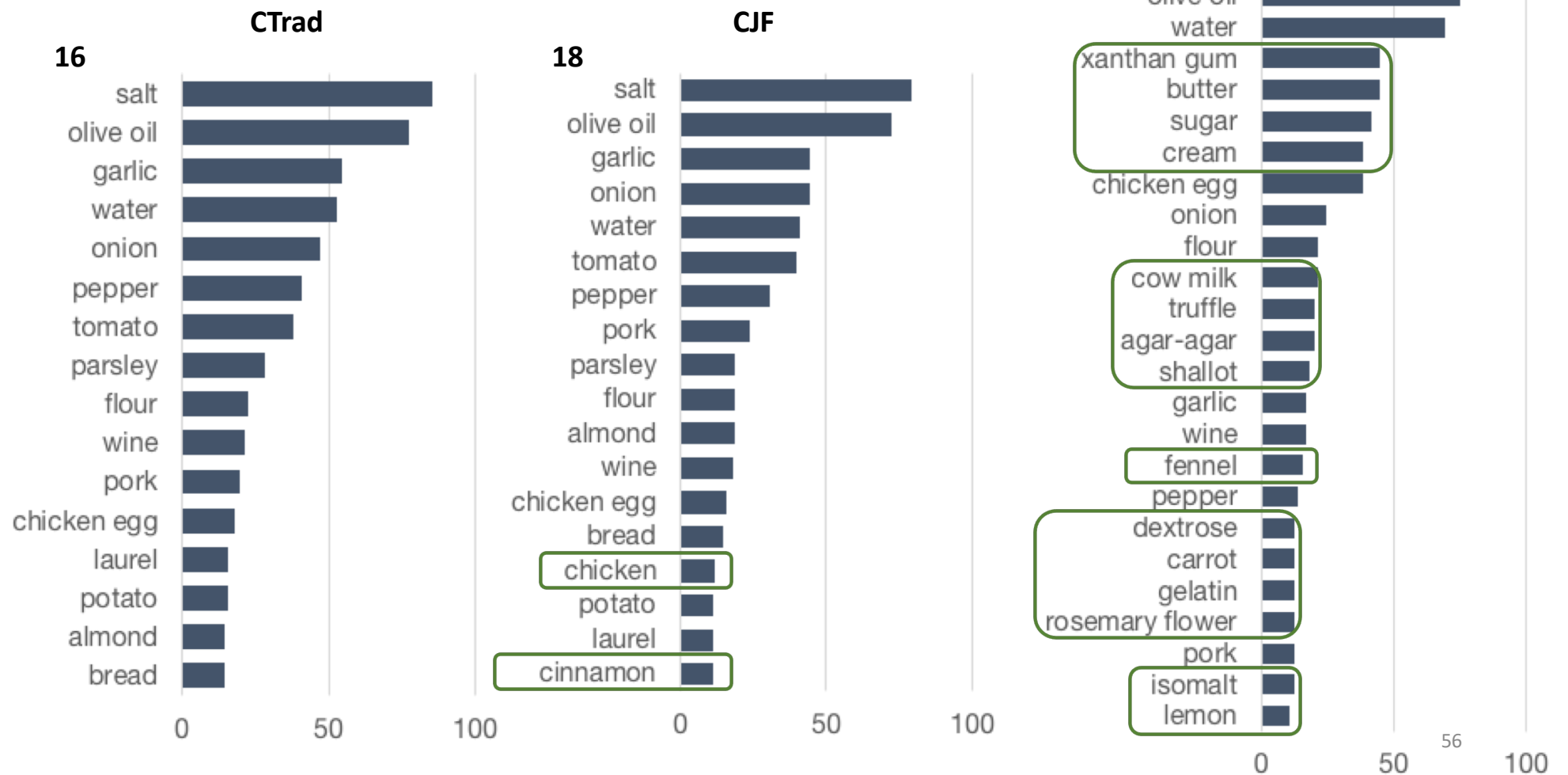
Anàlisis



Counts

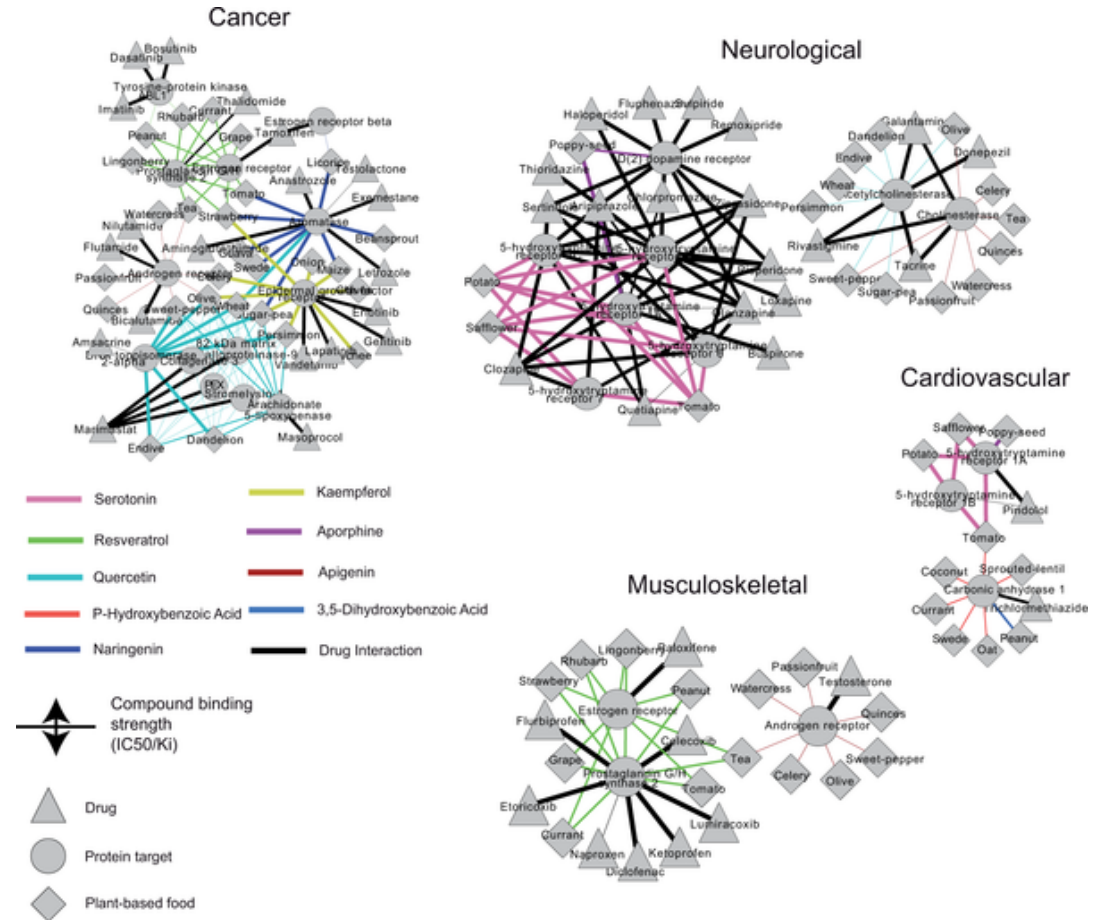
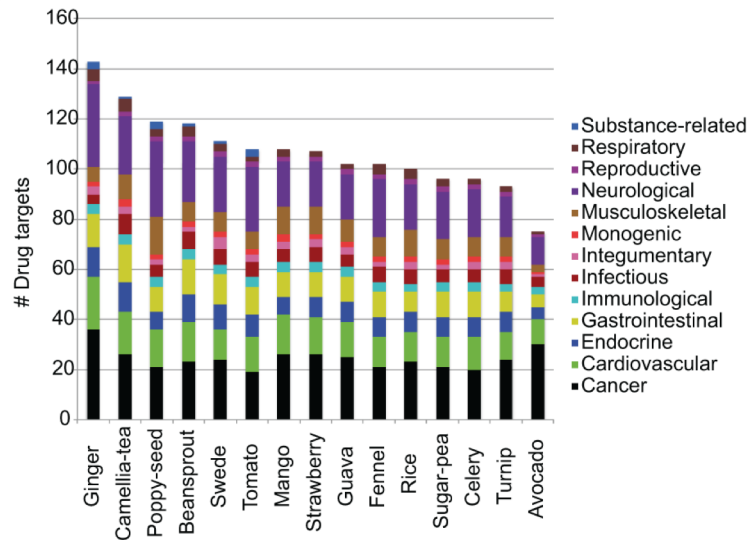
	CTrad	CJF	CRoca
Recipes	623	93	65
Unique Ingredients	241	174	238
Ingredients per recipe	9	9	18
Plants and fungi	43%	43%	33,2%
Animals	15,7%	19%	13,6%
Microorganisms	0,1 %	0,1%	0,3%
Minerals	10%	8,7%	8,8%
Waters	6,5%	4,6%	8,2%
Gastronomic entities	22%	21,4%	22,6%
Recipes	2,5%	2,9%	2,7%
Texturizing agents	0,2%	0,3%	10,6%

Ingredients with an occurrence of at least 10%



Disease-specific networks of drug-food interactions on proteins affecting drug pharmacodynamics.

A



Jensen K, Ni Y, Panagiotou G, Kouskoumvekaki I (2015) Developing a Molecular Roadmap of Drug-Food Interactions. PLOS Computational Biology 11(2): e1004048. <https://doi.org/10.1371/journal.pcbi.1004048>
<https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1004048>

NutriChem

NutriChem 2.0

The NutriChem 2.0 server is an extension of [NutriChem 1.0 server](#). The current version contains data in two sections: "Food-Disease Associations" (including food-compound and food-disease associations) and "Drug-Food Interactions" (see below for details). NutriChem provides a foundation for understanding mechanistically the consequences of eating behaviors on health and therapeutic efforts.

The "Food-Disease Associations" section of NutriChem 2.0 is collection of data generated by text mining of 21 million MEDLINE abstracts, with information that links plant-based foods with their small molecule components and human disease phenotypes. It contains text-mined data for 18,478 pairs of 1,772 plant-based foods and 7,898 phytochemicals, and 6,242 pairs of 1,066 plant-based foods and 751 diseases. In addition, it includes predicted associations for 548 phytochemicals and 252 diseases.

The (New!) "Drug-Food Interactions" section of NutriChem 2.0 contains extensive information on interactions between drugs and plant-based foods identified through the shared protein targets between dietary molecules and drugs. Thus, it offers a global view of the associations between diet and drug targets, drug-metabolising enzymes, drug transporters and carriers currently deposited in DrugBank.

You are welcome to read the "Instructions" in order to get more information about the different search options and output formats.



Drug-Food Interactions: Instructions

Food-Disease Associations: Instructions

SUBMISSION

Search by plant-based food:

"Pomegranate" or
"TAXID:22663"

Select type of interaction

Search by disease:

"Diabetes" or "DOID:9351"

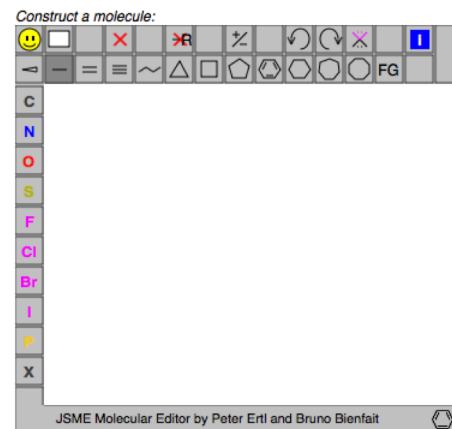
Search by disease class

Select type of interaction (only for disease search)

Search by compound:

"Ellagic Acid" or "CID:5281855"

Search by compound SMILES:



Phenol-Explorer

 [Food Composition](#) ▾ [Food Processing](#) ▾ [Metabolism](#) ▾ [Classifications](#) ▾ [Deposit](#) [Downloads](#) [About](#) ▾ 

 **Phenol-Explorer** Database on polyphenol content in foods Version 3.6

Welcome to Phenol-Explorer 3.6

Phenol-Explorer is the **first comprehensive database on polyphenol content in foods**. The database contains more than 35,000 content values for 500 different polyphenols in over 400 foods. These data are derived from the systematic collection of more than 60,000 original content values found in more than 1,300 scientific publications. Each of these publications has been critically evaluated before inclusion in the database. The whole data on the polyphenol composition of foods is available for download.

Release 2.0 of Phenol-Explorer added **comprehensive data on polyphenol metabolism**. Pharmacokinetic data on 380 metabolites identified in biofluids after the consumption of polyphenol-rich sources are presented. These data have been extracted from 236 publications and originate from 221 intervention studies in human subjects and experimental animals.

Release 3.0 of Phenol-Explorer introduces data on the **effects of food processing and cooking**. Retention factors describe changes in polyphenol content upon food transformation and can be used to estimate composition of processed foods when laboratory measurements are missing and the data are absent from food composition tables. Retention factors are available for 155 foods, 139 polyphenols, and 35 processes. They are derived from 129 publications.

In version 3.6 (June 2015), 1451 new content values for lignans have been added to the database.

A wide range of queries on foods, polyphenols and metabolites, as identified by various analytical methods, can be executed. Simple queries can be made by typing the name of a polyphenol, metabolite or food source at the top of any page. More complex queries can be performed by using the Advanced search. In this search, two or more foods or polyphenols can be selected, to easily compare for example the contents of the various polyphenols in green and black tea. Using the 'Advanced display option' it is also possible to sort results as desired and to calculate total polyphenol contents per class and subclass.

Phenol-Explorer has been developed at [INRA](#) in collaboration with [AFSSA](#), the [University of Alberta](#), the [University of Barcelona](#), [IARC](#) and [In Siliflo](#). The work has been made possible thanks to the financial support of the French government, the Institut National du Cancer (France), Unilever, Danone and Nestlé.

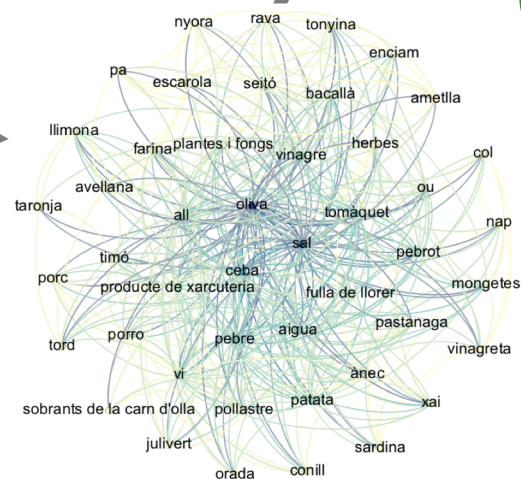
We wish you a fruitful polyphenol exploration!

Augustin Scalbert

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[How to cite us](#)
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	Quantity	Unit	Base	Property	Elaboration process
Raw text	1	kg	porc	costelló	troussejat
Paraphrase				costella	tallat
Type			animals	part	division



Culinary processes

Flavour compounds

Quantity

Composition (active molecules)

Disease adapted recipes



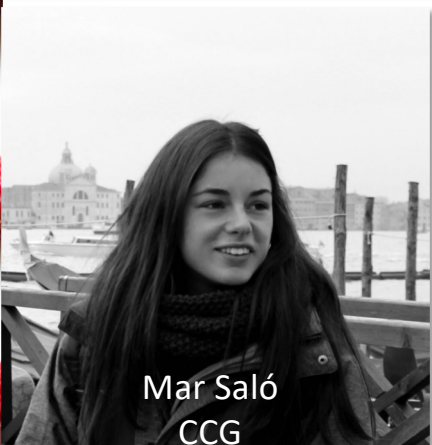
Ivo Pujiula
CCG



Èlia Climent
CCG



Amèlia Sarroca
CCG



Mar Saló
CCG



Txell Sabaté
Lingüística



Ramon Garcia
Física

¡Moltes **gràcies**!