

Attachment 63a

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Investigation of the boiled potato flavor by human sensory and instrumental methods

[D. Ulrich](#) , [E. Hoberg](#), [W. Neugebauer](#), [H. Tiemann](#) & [U. Darsow](#)

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Abstract

The flavor of boiled potatoes was investigated using sensory and instrumental methods to get basic information concerning sensory features and aroma compounds for use in breeding research and quality control. The sensory odor profiles of three genotypes were found to differ especially in negative sensations like “burnt”, “fodder” and “musty”. The aroma volatiles were isolated by a modified simultaneous steam distillation and extraction method. Nineteen character impact compounds of boiled potato aroma were pointed out by gas chromatography with nitrogen specific detection, gas chromatography —mass spectrometry and gas chromatography —olfactometry. The comparison of the quantified odor impressions in three genotypes by chromatography —olfactometry revealed the substances responsible for the typical boiled potato odorants and off-flavor notes.

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Additional Key Words

Cooked potato **potato flavor** **potato aroma** **human sensory**
quantitative descriptive analysis **gas chromatography**
gas chromatography olfactometry **character impact compounds**

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362 1#\$aBegan with v. 75, no. 1 (Jan. 1998).
500 ##\$aRefereed/Peer-reviewed
550 ##\$a"An official publication of the Potato Association of
America."
588 ##\$aDescription based on: Vol. 75, no. 1 (Jan. 1998); title
from pdf image of article (SpringerLink, viewed Nov. 14, 2011).
588 ##\$aLatest issue consulted: Vol. 92, no. 5 (Oct. 2015)
(viewed Nov. 10, 2015).
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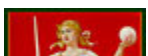
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BLAST Basic Local Alignment Search Tool

BLAST finds regions of similarity between biological sequences. [more...](#)

The Basic Local Alignment Search Tool (BLAST) finds regions of local similarity between sequences. The program compares nucleotide or protein sequences to sequence databases and calculates the statistical significance of matches. BLAST can be used to infer functional and evolutionary relationships between sequences as well as help identify members of gene families.

[Learn more](#) about how to use the new BLAST design

BLAST Assembled Genomes

Choose a species genome to search, or [list all genomic BLAST databases](#).

- [Human](#)
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- [Arabidopsis thaliana](#)
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Basic BLAST

Choose a BLAST program to run.

nucleotide blast	Search a nucleotide database using a nucleotide query <i>Algorithms:</i> blastn, megablast, discontinuous megablast
protein blast	Search protein database using a protein query <i>Algorithms:</i> blastp, psi-blast, phi-blast
blastx	Search protein database using a translated nucleotide query
tblastn	Search translated nucleotide database using a protein query
tblastx	Search translated nucleotide database using a translated nucleotide query

Specialized BLAST

Choose a type of specialized search (or database name in parentheses.)

- Make specific primers with [Primer-BLAST](#)
- Search [trace archives](#)
- Find [conserved domains](#) in your sequence (cds)
- Find sequences with similar [conserved domain architecture](#) (cdart)

- Search sequences that have [gene expression profiles](#) (GEO)
- Search [immunoglobulins](#) (IgBLAST)
- Search for [SNPs](#) (snp)
- Screen sequence for [vector contamination](#) (vecscreen)
- [Align](#) two sequences using BLAST (bl2seq)
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News

[Find specific primers with Primer-BLAST!](#)

[Primer-BLAST](#) combines primer design (using Primer3) and a specificity check with BLAST.
2008-07-22 09:26:51

[More BLAST news...](#)

Tip of the Day

Using Tree View to Examine Relationships Between Sequences.

The new Tree View option on the NCBI Web BLAST service presents a dendrogram or tree display that clusters sequences according to their distances from the query sequence. This display is helpful for recognizing the presence of aberrant or unusual sequences or potentially natural groupings of related sequences such as members of a gene families or homologs from other species in the BLAST output.

[More tips...](#)

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Codes Used in Sequence Description

Nucleotide

Nucleotide Base Codes

The nucleotide base codes that are used with the International Nucleotide Sequence Database is as follows.
Sequence data is expressed with small letters only. Capital letter will be automatically converted to small letter.

Symbol	Meaning	Explanation
a	a	adenine
c	c	cytosine
g	g	guanine
t	t	thymine in DNA; uracil in RNA
m	a or c	amino
r	a or g	purine
w	a or t	
s	c or g	
y	c or t	pyrimidine
k	g or t	keto
v	a or c or g	not t
h	a or c or t	not g
d	a or g or t	not c
b	c or g or t	not a
n	a or c or g or t	any

[References]



- Cornish-Bowden, A. Nucl Acid Res 13, 3021-3030 (1985)
- [Feature Table Definition: 7.4.1 Nucleotide base codes \(IUPAC\)](#)

Modified Base Abbreviations

An example for description of the modified base in FEATURES line.

Example

FEATURES	Location/Qualifiers
modified_base	15
	/mod_base="m2g"

Abbreviation	Modified base description
ac4c	4-acetylcytidine
chm5u	5-(carboxyhydroxymethyl)uridine
cm	2'-O-methylcytidine
cmnm5s2u	5-carboxymethylaminomethyl-2-thiouridine
cmnm5u	5-carboxymethylaminomethyluridine
dhu	dihydrouridine
fm	2'-O-methylpseudouridine
gal q	beta,D-galactosylqueuosine
gm	2'-O-methylguanosine
i	inosine
i6a	N6-isopentenyladenosine
m1a	1-methyladenosine
m1f	1-methylpseudouridine
m1g	1-methylguanosine
m1i	1-methylinosine
m22g	2,2-dimethylguanosine
m2a	2-methyladenosine
m2g	2-methylguanosine



Abbreviation	Modified base description
m3c	3-methylcytidine
m4c	N4-methylcytosine
m5c	5-methylcytidine
m6a	N6-methyladenosine
m7g	7-methylguanosine
mam5u	5-methylaminomethyluridine
mam5s2u	5-methoxyaminomethyl-2-thiouridine
man q	beta,D-mannosylqueuosine
mcm5s2u	5-methoxycarbonylmethyl-2-thiouridine
mcm5u	5-methoxycarbonylmethyluridine
mo5u	5-methoxyuridine
ms2i6a	2-methylthio-N6-isopentenyladenosine
ms2t6a	N-((9-beta-D-ribofuranosyl-2-methyltiopurin-6-yl)carbamoyl)threonine
mt6a	N-((9-beta-D-ribofuranosylpurine-6-yl)N-methyl-carbamoyl)threonine
mv	uridine-5-oxyacetic acid methylester
o5u	uridine-5-oxyacetic acid (v)
osyw	wybutoxosine
p	pseudouridine
q	queuosine
s2c	2-thiocytidine
s2t	5-methyl-2-thiouridine
s2u	2-thiouridine
s4u	4-thiouridine
m5u	5-methyluridine
t6a	N-((9-beta-D-ribofuranosylpurine-6-yl)carbamoyl)threonine
tm	2'-O-methyl-5-methyluridine
um	2'-O-methyluridine



Abbreviation	Modified base description
yw	wybutosine
x	3-(3-amino-3-carboxypropyl)uridine, (acp3)u
OTHER	Other (/note qualifier に修飾塩基を記載します)

[References]

- Sprinzl, M. and Gauss, D.H. Nucl Acid Res 10, r1 (1982).(note that in Cornish_Bowden, A. Nucl Acid Res 13, 3021-3030 (1985)the IUPAC-IUB declined to recommend a set of abbreviations for modified nucleotides)
- [Feature Table Definition: 7.4.2 Modified base abbreviations](#)

Amino Acid

Amino Acid Codes

The amino acid code that is used with the International Nucleotide Sequence Database is as follows.

These amino acids are described with one letter abbreviation in [/translation](#) qualifier of [CDS feature](#).

The listed amino acid abbreviations are legal values for qualifiers [/transl_except](#) and [/anticodon](#).

Those that are not included in "Amino acid codes", please refer to [Modified and unusual Amino Acids](#).

Abbreviation	1 letter abbreviation	Amino acid name
Ala	A	Alanine
Arg	R	Arginine
Asn	N	Asparagine
Asp	D	Aspartic acid
Cys	C	Cysteine
Gln	Q	Glutamine
Glu	E	Glutamic acid
Gly	G	Glycine
His	H	Histidine
Ile	I	Isoleucine
Leu	L	Leucine



Abbreviation	1 letter abbreviation	Amino acid name
Lys	K	Lysine
Met	M	Methionine
Phe	F	Phenylalanine
Pro	P	Proline
Pyl	O	Pyrrolysine
Ser	S	Serine
Sec	U	Selenocysteine
Thr	T	Threonine
Trp	W	Tryptophan
Tyr	Y	Tyrosine
Val	V	Valine
Asx	B	Aspartic acid or Asparagine
Glx	Z	Glutamic acid or Glutamine
Xaa	X	Any amino acid
Xle	J	Leucine or Isoleucine
TERM		termination codon

[References]

- IUPAC-IUB Joint Commission on Biochemical Nomenclature.Nomenclature and Symbolism for Amino Acids and Peptides. Eur. J. Biochem. 138: 9-37 (1984).
- [Feature Table Definition: 7.4.3 Amino acid abbreviations](#)

Modified and Unusual Amino Acids

For other amino acids, those that are not included in [Amino Acid Codes](#), abbreviation listed below is used. All of these amino acids are described with one letter abbreviation "X" in [/translation](#) qualifier of [CDS feature](#).

Abbreviation	Amino acid name
Aad	2-Aminoadipic acid
bAad	3-Aminoadipic acid



Abbreviation	Amino acid name
bAla	beta-Alanine, beta-Aminopropionic acid
Abu	2-Aminobutyric acid
4Abu	4-Aminobutyric acid, piperidinic acid
Acp	6-Aminocaproic acid
Ahe	2-Aminoheptanoic acid
Aib	2-Aminoisobutyric acid
bAib	3-Aminoisobutyric acid
Apm	2-Aminopimelic acid
Dbu	2,4-Diaminobutyric acid
Des	Desmosine
Dpm	2,2'-Diaminopimelic acid
Dpr	2,3-Diaminopropionic acid
EtGly	N-Ethylglycine
EtAsn	N-Ethylasparagine
Hyl	Hydroxylysine
aHyl	allo-Hydroxylysine
3Hyp	3-Hydroxyproline
4Hyp	4-Hydroxyproline
Ide	Isodesmosine
alle	allo-Isoleucine
MeGly	N-Methylglycine, sarcosine
MeIle	N-Methylisoleucine
MeLys	6-N-Methyllysine
MeVal	N-Methylvaline
Nva	Norvaline
Nle	Norleucine
Orn	Ornithine



Abbreviation	Amino acid name
OTHER	Other ((Amino acid not found in this list should be described in /note qualifier)

[References]

- [Feature Table Definition: 7.4.4 Modified and unusual Amino Acids](#)

Last modified: 2018-02-09



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- Cryogenic grinding possible

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Description	Materials	Resources
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The Mikro Pulverizer® consists of a high speed rotor assembly fitted with hammers. The grinding chamber is fitted with a cover containing a multiple deflector liner and a retaining screen at the point of mill discharge.

A screw mechanism is often used to introduce feed material into the grinding chamber. The grinding process is affected by three basic variables: the type of hammers, the rotor speed, and the size and shape of the screen opening.

There are two types of hammers: the “stirrup,” recommended where a fine particle size is desired; and the “bar,” which generates a coarser grind with a minimum of fines. Both types are tipped at the wearing edge with various abrasion resistant alloys. Rotor speed affects the fineness of the grind as follows: low speeds result in a coarse grind and high speeds produce a fine grind. Size and shape of the retaining screen openings also affect the product. In general, a finer screen opening will result in a finer grind. The retaining screen does not function as a sifting screen, except in coarse granulations.

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Optimum particle size reduction can greatly affect chemical reaction speeds, solubility, weight, color, volume, appearance and strength of ground products. Mikro-Pulverizers® provide accuracy in particle size control because the grinding action is entirely mechanical. Once a mill is set to deliver a certain product, it will continue to produce exactly the same result without adjustment.

Grind, Blend and Disperse

Mikro Pulverizers® grind, blend and disperse in a single operation. Intensive action thoroughly mixes dissimilar ingredients into a finished product. Heat sensitive materials are handled by adjustment of mill speed, hammers, screen and discharge air relief, as well as with pneumatic conveying. Conditioned air may be bled into a grinding chamber, or the feed may be pre-conditioned or chilled. The MikroPulverizers® comes in many model sizes from small pilot scale to massive production models.

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EGGS

PICKLES

MEAT

SEASONING



Beef



Pork



Fish

What Gives Meat Its Color?

There are basically two types of meat: dark and white.

Red, or dark meat is made up of muscles with fibers that are called slow-twitch. These muscles are used for extended periods of activity, such as standing or walking, and need a consistent energy source. The protein *myoglobin* stores oxygen in muscle cells, which use oxygen to extract the energy needed for constant activity. Myoglobin is a richly pigmented protein. The more myoglobin there is in the cells, the redder, or darker, the meat.

When dark meat is cooked, myoglobin's color changes depending on what the meat's interior temperature is. Rare beef is cooked to 140° F, and myoglobin's red color remains unchanged. Above 140° F, myoglobin loses its ability to bind oxygen, and the iron atom at the center of its molecular structure loses an electron. This process forms a tan-colored compound called *hemichrome*, which gives medium-done meat its color. When the interior of the meat reaches 170° F, hemichrome levels rise, and the myoglobin becomes *metmyoglobin*, which gives well-done meat its brown-gray shade.

White meat is made up of muscles with fibers that are called fast-twitch. Fast-twitch muscles are used for quick bursts of activity, such as fleeing from danger. These muscles get energy from glycogen, which is also stored in the muscles.

White meat has a translucent "glassy" quality when it is raw. When it's cooked, the proteins denature and recombine, or *coagulate*, and the meat becomes opaque and whitish.

Cows and pigs are both sources of dark meat, though pig is often called "the other white meat." Pigs' muscles do contain myoglobin, but the concentration is not as heavy as it is in beef. Chickens have a mixture of both dark and white meat, and fish is mainly white meat.

Different types of meat require different cooking times. The best way to determine if meat is done is to use a meat thermometer to check the internal temperature. Beef can be cooked to a variety of temperatures: rare (140° F), medium (160° F), and well-done (170° F). Pork, chicken, and fish

have less leeway. It's recommended that pork be cooked to 170° F, chicken to 180° F, and fish to 165° F.

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Volume 345, 30 May 2021, 128761

Reinvestigation of 2-acetylthiazole formation pathways in the Maillard reaction

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Received 17 August 2020, Revised 15 October 2020, Accepted 27 November 2020, Available online 2 December 2020, Version of Record 10 December 2020.

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Highlights

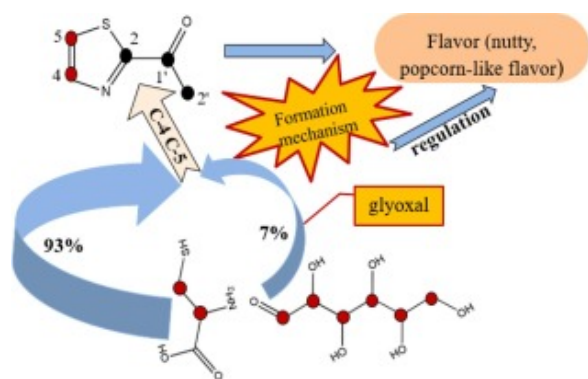
- The C-4 and C-5 of 2-acetylthiazole were also derived from the carbons of glucose.
- The potential of glyoxal in the formation of 2-acetylthiazole for the first time.
- The formation pathways of 2-acetylthiazole were elucidated.

Abstract

2-Acetylthiazole possesses a nutty, cereal-like and popcorn-like aroma and a low odor threshold, and this compound has been identified in some processed foods, while the formation pathway of 2-acetylthiazole has not been clearly elucidated. Here, a model reaction of D-glucose and L-cysteine was constructed to

investigate the formation pathway of 2-acetylthiazole. L-Cysteine, D-glucose and the corresponding intermediates, namely, dicarbonyl compounds (DCs), were involved in the formation of 2-acetylthiazole and detected by high-performance liquid chromatography with tandem mass spectrometry (HPLC-MS/MS), high-performance ion chromatography (HPIC) and HPLC, respectively. The carbon module labeling (CAMOLA) technique revealed that the C-4 and C-5 of 2-acetylthiazole were derived from the carbons of glucose. The potential of glyoxal, which is degraded by glucose, to form 2-acetylthiazole was revealed for the first time. A novel route to form 2-acetylthiazole by the reaction of glyoxal and methylglyoxal produced by D-glucose with H_2S and NH_3 produced by L-cysteine was proposed.

Graphical abstract



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Keywords

2-Acetylthiazole; L-cysteine; D-glucose; Glyoxal; Formation pathway

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Volatile Character-Impact Sulfur Compounds and their Sensory Properties

Apr 6th, 2016 | By Mans H. Boelens, Leo J. van Gemert

Volatile organic sulfur compounds are important constituents for the flavor of food, beverages and natural isolates. Character-impact sulfur compounds have been found in foods (bread, potato and prepared meat), beverages (beer and coffee), vegetables (allium species, truffle and radish), fruits (grapefruit, pineapple, grape, tomato, melon, passion fruit and black currant) and natural isolates like essential oils, absolutes and oleoresins (rose, hop, galbanum, absinth, cassia, patchouli, pepper, helichrysum and geranium). These character-impact sulfur compounds are, often in a certain low concentration, characteristic for the sensory properties of the material. Although these facts are generally accepted in the flavor and fragrance industry, still some questions can be put forward, namely:

1 What are the identities of these compounds?

1 What are their sensory properties? That is, what is their odor and flavor character and in which concentration can they be perceived?

In this article we will try to answer these questions as much as possible mainly based on a survey of the available literature.

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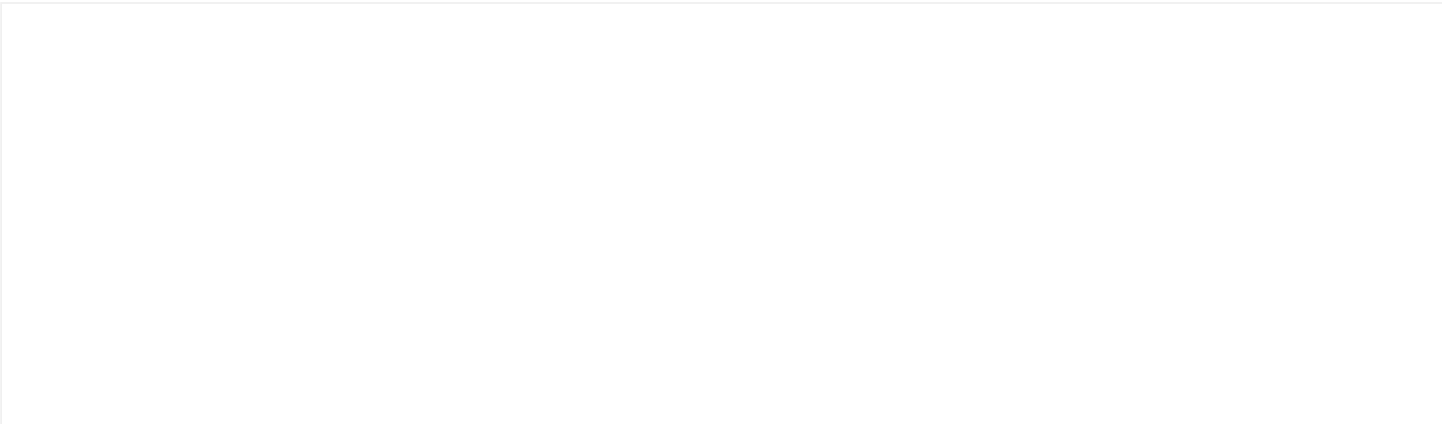


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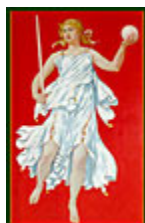
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Beyond Meat vs. Impossible Foods: The very real battle between the biggest 'fake-meat' competitors



Adam McQueen

As is my usual routine, I watched an embarrassing amount of basketball over the weekend. You know the days where you sit for so long that all you have to show for your past eight hours of existence is a full body imprint on the couch.

I'd say I'm ashamed to admit this, but anyone who knows me won't be surprised at all.

More importantly, there are three big questions that have been bouncing around my brain following an ungodly amount of television consumption.

- How can anyone think playoff basketball isn't the best?
- What species is LeBron, because he's definitely not human?
- Does *every* single restaurant now boast a plant-based meat alternative?

Nearly every single food-related commercial I sat through advertised their newest plant-based alternative. Starbucks. Burger King. McDonald's.

You name it, and they're likely spending serious advertising money to showcase their newest plant-based recipes.

It got me thinking: how big has this market gotten, and who's cashing in?

As it turns out, there's some very *real* competition happening in the 'fake-meat' world.

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Who sits atop the meatless food chain?

According to **Bloomberg**,

(<https://web.archive.org/web/20220331013638/https://www.bloomberg.com/news/articles/2021-04-16/beyond-meat-bynd-impossible-foods-battle-over-future-of-fake-meat-industry>) the market for plant-based meat alternatives is expected to reach \$450 billion by 2040. In the U.S. alone, plant-based meat sales **grew by 45%**, (<https://web.archive.org/web/20220331013638/https://www.foooddive.com/news/plant-based-food-worth-7b-in-2020-posting-27-growth/597865/>) for a total of \$1.4 billion.

And leading the way for this plant-based revolution has been Beyond Meat. The company established themselves in 2009 and enjoyed a significant first mover advantage as the first to market with mainstream 'meatless meat' products.

Beyond's products are found in 42,000 U.S. restaurants, 80+ international markets, and account for 22% of the frozen/refrigerated retail meat alternatives. After going public in 2019, the company quickly blew up to a **\$13 billion valuation**.

(<https://web.archive.org/web/20220331013638/https://www.forbes.com/sites/oliviergarret/2019/09/11/missed-out-on-beyond-meat-buy-these-2-ipos-this-week/?sh=5212d3a31b60>) They were considered disruptors in the market, trying to make a dent in the gargantuan (and seemingly unsustainable) meat industry.

Meat alternatives were nothing new. But Beyond's strategy was. Rather than confining themselves to the niche vegetarian audience, Beyond targeted the much larger market of meat-eaters.

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Vox wrote in a 2019 article,

(<https://web.archive.org/web/20220331013638/https://www.vox.com/2019/5/28/18626859/meatless-meat-explained-vegan-impossible-burger>) that Beyond's strategy was to “ensure that their product has the flavour, macronutrient balance, and cooking experience of meat.”

If they could nail these key parts of their food and cater more towards meat-eaters, not only did it create a much larger total addressable market of consumers, but their product would already be differentiated within that market.

As it turned out, the feel-good ethical and health reasons for consuming meat alternatives actually helped their product stand out far better than having to compete against other vegetarian food options.

They even commissioned the **University of Michigan** to research and compare the environmental impact of producing a Beyond Burger and a regular beef patty.

(<https://web.archive.org/web/20220331013638/http://css.umich.edu/publication/beyond-meats-beyond-burger-life-cycle-assessment-detailed-comparison-between-plant-based>) Talk about some data-backed marketing!



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Beyond set out to lower the barrier to turn meat-eaters into consumers, and their distribution strategy followed suit. Their focus was to make plant-based alternatives mainstream.

“The promise there was, ‘we’re going to have plant-based protein’, we’re not going to sell it in the frozen veggie food aisle, we’re going to sell it in the meat aisle of the grocery store, we’re going to go to restaurants, we’re going to go to retail. We’ll expand our distribution and go overseas. There’s a constant flow of product innovation and a constant expansion of product distribution,” said Al Root, Sr. Writer at Barron’s on ‘**The Readback**’ podcast.

(<https://web.archive.org/web/20220331013638/https://open.spotify.com/episode/3Z3LUxcIFHyE5BH51kZiRz>)

Beyond’s partnership with dine-in restaurants was a strong brand play, and it also normalized their product to meat-eaters. While some consumers might be skeptical about cooking it themselves, there’s more comfort in trying it at a restaurant.

Although this strategy allowed Beyond to climb atop of the meatless food chain and make a dent in the larger meat industry, the early success of their approach has paved the way for serious competition to enter the fray.

Impossible Foods are coming for the crown

Just like my weekend viewing showcased the new generation of hoopers that are in line to take over the league from the elder statesmen, there are newer plant-based meat alternatives that are taking bites out of Beyond Meat's lead.

Their competitive advantage in terms of having a monopoly of power in the market has been dwindling, and Impossible Foods has emerged as their most serious competitor. There are two main reasons why Impossible has made inroads.

The pandemic dip

Beyond's strategy to place their product within dine-in restaurants took a significant hit due to the pandemic.

Their revenue split from big restaurants to small operators **went from 30%-70% in 2019, to 42%-58% in mid 2020.**

(<https://web.archive.org/web/20220331013638/https://www.bloomberg.com/news/articles/2021-04-16/beyond-meat-bynd-impossible-foods-battle-over-future-of-fake-meat-industry>) And this revenue change wasn't because of adding large chains, but due to the rapid decline in smaller businesses.

Meanwhile, the majority of Impossible Food's initial partnerships were with large chain restaurants that offered drive-thru and delivery options. These distributors were more resilient during the pandemic, allowing Impossible to scale quickly and reduce costs.

Beyond is now pivoting towards larger chain partnerships, most notably with McDonalds and Yum Brands!, but they're in the unfamiliar territory of playing catch-up.

Pricing wars in the battle for market share

When a first mover like Beyond has a monopoly advantage, they can price its product without the competitive pressures from a rival.

It's a necessary evil for consumers **as the Rutgers Business Review explains**

(<https://web.archive.org/web/20220331013638/https://rbr.business.rutgers.edu/article/sustaining-first-mover-advantage-fast-growing-meat-substitute-market>):

"The first-mover spends a considerable amount of time and resources in creating and introducing its product in the market."

But, this high price point limits your consumer base. And while Beyond's strategic decision to compete against meat products has paid off, they were still a long way away from matching cheap meat prices.

Meanwhile, Impossible Food's rapid growth over the pandemic — hitting production records and achieving greater economies of scale — allowed them to drastically slash their prices by 20% in restaurants and grocery stores earlier this year in an attempt to better compete with meat. They made their product more buyable to the broader consumer base, and with an eye on taking advantage of Beyond's leader status.

"We were thinking about cost reductions and getting to the cost structure of commodity ground beef from the very beginning," said David Lee, chief financial officer of Impossible Foods, in **an interview with Vox**.

(<https://web.archive.org/web/20220331013638/https://www.vox.com/future-perfect/2021/2/2/22260454/impossible-foods-burger-plant-based-meat>) "We knew that if we had the best product at the same cost, then consumers would vote with their stomachs."

The more competition... the better?

While Impossible Foods has stolen market share from Beyond in the meat alternative space, ultimately the roadmap that Beyond has set out actually means that these competitors are working in lockstep.

Yes, they're competing against each other as the preeminent meat alternative, but both are angling to take market share from agricultural companies producing animal meats.

Considering that plant-based meats are only **an estimated 3% of packaged meat sales in the U.S.**, (<https://web.archive.org/web/20220331013638/https://www.bloomberg.com/news/articles/2021-04-16/beyond-meat-bynd-impossible-foods-battle-over-future-of-fake-meat-industry>) the rise in meat alternative competition can lift all boats. Beyond's year-over-year sales growth continues to accelerate despite their market share shrinking.

And many other companies — even massive meat producers — are now **creating their own meatless product lines**, (<https://web.archive.org/web/20220331013638/https://www.forbes.com/sites/greatspeculations/2020/09/14/competition-will-eat-beyond-meat-alive/?sh=63fc73b02946>) allowing even more consumers to try plant-based options.

—

The lessons of Beyond's approach are applicable across any business. They thought about their competitive set beyond just the narrow scope of the vegetarian meat market — they went after all meats. Being able to see the forest from the trees is how unicorn businesses are born.

And now Beyond has paved the way for competitors to flood the market, which isn't bad for them either! As the established leader that still possesses the best brand awareness amongst customers, more products in the category will only help. As Crispin Read mentioned in his article, **'Positioning Done Right':**

(<https://web.archive.org/web/20220331013638/https://www.productmarketinghive.com/positioning-done-right-are-you-marketing-your-competitor/>)

"A challenger in a competitive market is guilty until proven innocent. The leader is the obvious choice. If you fail to differentiate, buyers will assume that there is no difference, and buy from the leader."

However, Beyond must continue innovating its product, distribution, and partnerships in order to hold off competitors like Impossible from taking not only a slice of the pie, but the whole damn thing.

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Attachment 72a

Original Article | [Published: 06 November 2010](#)

Hydrocolloids as thickening and gelling agents in food: a critical review

[Dipjyoti Saha](#) & [Suwendu Bhattacharya](#) [Journal of Food Science and Technology](#) **47**, 587–597 (2010)**14k** Accesses | **649** Citations | **80** Altmetric | [Metrics](#)

Abstract

Hydrocolloids are widely used in many food formulations to improve quality attributes and shelf-life. The two main uses are as thickening and gelling agents. As thickening agents, they find uses in soups, gravies, salad dressings, sauces and toppings while as gelling agents, they are extensively used in products like jam, jelly, marmalade, restructured foods and low sugar/calorie gels. The role of specific hydrocolloids for thickening and for gel formation is reviewed pinpointing specific applications in food formulations and for product development.

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710 2_ \$aAmerican Chemical Society.

710 2_ \$aAmerican Chemical Society.\$bBooks and Journals Division.

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- 222 0 \$aJournal of agricultural and food chemistry\$b(Online)
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- 246 30 \$aAgricultural and food chemistry
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- 310 \$aWeekly,\$b2012-
- 321 \$aBiweekly,\$b2002-2011
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- 336 \$atext\$btxt\$2rdacontent
- 337 \$acomputer\$bcb\$2rdamedia
- 338 \$aonline resource\$bcrb\$2rdacarrier
- 362 1 \$aPrint began with vol. 1, no. 1 (Apr. 1953).
- 500 \$aRefereed/Peer-reviewed
- 525 \$aSome issues accompanied by supplementary materials or supporting information.
- 588 \$aDescription based on print version record, (ACS Publications, viewed Aug. 29, 2006);
title from contents page.

588 \$aLatest issue consulted: Volume 69, issue 43 (November 3, 2021), (ACS Publications, viewed Nov. 9, 2021).

650 _0 \$aAgricultural chemistry\$vPeriodicals.

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210 0 J. agric. food chem.

222 0 Journal of agricultural and food chemistry

245 00 Journal of agricultural and food chemistry.

246 17 Agricultural and food chemistry

260 [Easton, Pa.] \$b [American Chemical Society, Books and Journals Division]

300 volumes \$b illustrations \$c 31 cm

310 Weekly, \$b 2012-

321 Biweekly, \$b 2002-2011

321 Monthly, \$b <Dec. 1990-2001

321 Bimonthly, \$b Jan./Feb. 1960-Nov./Dec. 1989

321 Monthly, \$b 1955-1959

321 Biweekly, \$b Apr. 1, 1953-<Dec. 22, 1954

336 text \$b txt \$2 rdacontent

337 unmediated \$b n \$2 rdamedia

338 volume \$b nc \$2 rdacarrier

362 0 v. 1- Apr. 1, 1953-

510 2 Chemical abstracts \$x 0009-2258

525 Some issues <1978-Jan. 1995 accompanied by supplementary material on microfiche; Feb. 1995-
<Feb. 1998, by supporting information on microfiche; current (1995-) supporting information also
available online.

530 Also issued on microfiche, microfilm, and online.

550 Volumes for 1953-<54 published by the American Chemical Society; <Jan./Feb. 1976- by the Books
and Journals Division, American Chemical Society.

650 0 Agricultural chemistry \$v Periodicals.

650 0 Food \$x Analysis \$v Periodicals.

650 0 Plants \$x Nutrition \$v Periodicals.

650 2 Chemistry, Agricultural. \$0 (DNLM)D002622

650 2 Food-Processing Industry. \$0 (DNLM)D005525

650 6 Chimie agricole \$v Périodiques.

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650 6 Plantes \$x Nutrition \$v Périodiques.

650 7 58.34 food technology. \$0 (NL-LeOCL)07760671X \$2 bcl

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655 7 Periodicals. \$2 lcgft

710 2 American Chemical Society. \$b Books and Journals Division.

776 08 \$i Online version: \$t Journal of agricultural and food chemistry (Online) \$x 1520-5118 \$w (DLC)sn
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Attachment 74a

MARC Bibliographic Record

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246 17 \$aAgricultural and food chemistry

260 \$aEaston, Pa. :\$bAmerican Chemical Society, Books and Journals Division.

300 \$avolumes :\$billustrations ;\$c31 cm

310 \$aMonthly

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321 \$aBiweekly,\$bApr. 1, 1953-<Dec. 22, 1954>

336 \$atext\$btxt\$2rdacontent

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362 1_ \$aBegan with Apr. 1, 1953 issue.\$zCf. OCLC.

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500 \$a"An American Chemical Society publication."

500 \$aPlace of publication varies.

530 \$aAlso available on the Internet.

530 \$aAlso available on microfiche and microfilm.

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510 2_ \$aBibliography of agriculture\$x0006-1530

510 2_ \$aChemical abstracts\$x0009-2258

510	2_	\$aCoal abstracts\$x0309-4979
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650	_0	\$aAgricultural chemistry\$vPeriodicals.
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650 _2 \$aFood\$xchemistry\$Vperiodicals.

650 _2 \$aChemistry, Agricultural\$Vperiodicals.

710 2_ \$aAmerican Chemical Society.

710 2_ \$aAmerican Chemical Society.\$bBooks and Journals Division.

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997 \$aMARCIVE

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- 222 0 \$aJournal of agricultural and food chemistry\$b(Online)
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- 260 \$aWashington, DC :\$bAmerican Chemical Society,\$c1953-
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- 336 \$atext\$btxt\$2rdacontent
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- 362 1 \$aPrint began with vol. 1, no. 1 (Apr. 1953).
- 500 \$aRefereed/Peer-reviewed
- 525 \$aSome issues accompanied by supplementary materials or supporting information.
- 588 \$aDescription based on print version record, (ACS Publications, viewed Aug. 29, 2006); title from contents page.

588 \$aLatest issue consulted: Volume 69, issue 43 (November 3, 2021), (ACS Publications, viewed Nov. 9, 2021).

650 _0 \$aAgricultural chemistry\$vPeriodicals.

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510 2 Chemical abstracts \$x 0009-2258

525 Some issues <1978-Jan. 1995 accompanied by supplementary material on microfiche; Feb. 1995-
<Feb. 1998, by supporting information on microfiche; current (1995-) supporting information also
available online.

530 Also issued on microfiche, microfilm, and online.

550 Volumes for 1953-<54 published by the American Chemical Society; <Jan./Feb. 1976- by the Books
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650 0 Agricultural chemistry \$v Periodicals.

650 0 Food \$x Analysis \$v Periodicals.

650 0 Plants \$x Nutrition \$v Periodicals.

650 2 Chemistry, Agricultural. \$0 (DNLM)D002622

650 2 Food-Processing Industry. \$0 (DNLM)D005525

650 6 Chimie agricole \$v Périodiques.

650 6 Aliments \$x Analyse \$v Périodiques.

650 6 Plantes \$x Nutrition \$v Périodiques.

650 7 58.34 food technology. \$0 (NL-LeOCL)07760671X \$2 bcl

650 7 Agricultural chemistry. \$2 fast \$0 (OCoLC)fst00800560

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655 7 Periodicals. \$2 lcgft

710 2 American Chemical Society. \$b Books and Journals Division.

776 08 \$i Online version: \$t Journal of agricultural and food chemistry (Online) \$x 1520-5118 \$w (DLC)sn
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210 0_ \$aAgric. biol. chem.

222 _0 \$aAgricultural and biological chemistry

245 00 \$aAgricultural and biological chemistry.

260 \$a[Tokyo] :\$bAgricultural Chemical Society of Japan,\$c1961-1991.

300 \$a31 volumes :\$billustrations ;\$c27 cm

310 \$aMonthly

336 \$atext\$btxt\$2ndacontent

337 \$aunmediated\$bn\$2rdamedia

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362 0_ \$aVol. 25, no. 1 (Jan. 1961)-v. 55, no. 4 (Dec. 1991).

510 2_ \$aLife sciences collection

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710 2_ \$aNihon Nōgei Kagakkai.

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785 00 \$tBioscience, biotechnology, and biochemistry\$w(OCOLC)25516229

997 \$aMARCIVE

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037 \$b Japan Publications Trading Co., Ltd., P.O. Box 5030, Tokyo, Japan

042 pcc \$a nsdp

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210 0 Agric. biol. chem.

222 0 Agricultural and biological chemistry

245 00 Agricultural and biological chemistry.

260 Tokyo, Japan : \$b Agricultural Chemical Society of Japan, \$c 1961-1991.

300 31 volumes : \$b illustrations ; \$c 27 cm

310 Monthly

336 text \$b txt \$2 rdacontent

337 unmediated \$b n \$2 rdamedia

338 volume \$b nc \$2 rdacarrier

362 0 Vol. 25, no. 1 (Jan. 1961)-v. 55, 12 (Dec. 1991).

500 Title from cover.
510 2 Chemical abstracts \$x 0009-2258 \$b -1991
650 0 Biochemistry \$v Periodicals.
650 0 Agricultural chemistry \$v Periodicals.
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655 7 Periodicals. \$2 rbgenr
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776 08 \$i Online version: \$t Agricultural and biological chemistry (Online) \$w (DLC) 65058099 \$w
(OCoLC)233145444
780 00 \$t Bulletin of the Agricultural Chemical Society of Japan \$x 0375-8397 \$w (DLC) 92657506 \$w
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856 41 \$u <http://bibpurl.oclc.org/web/15768> \$u <https://www.jstage.jst.go.jp/browse/bbb1961> \$7 0
856 41 \$u <http://bibpurl.oclc.org/web/46806> \$u
http://ci.nii.ac.jp/dirnavi?tourl=/vol_issue/nels/AA00515312_ja.html \$7 0

Attachment 75c

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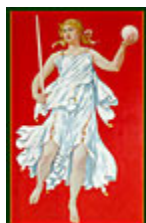
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310 ##$aWeekly, $b1994-
321 ##$aThree times a month, $b<Jan. 6, 1976->
321 ##$a2 times a month, $b<20 Jan. 1985-Dec. 1993>
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510 2#$aEnvironment abstracts $x0093-3287
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650 #0$aMolecular biology $vPeriodicals
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Attachment 76b

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[Help](#)[New Search](#)[Search History](#)[Headings List](#)[Start Over](#)< [Previous](#)[Next](#) >[MARC Display](#)[Labelled Display](#)**LC control no.:** sh2007101986**LCCN Permalink:** <https://lcn.loc.gov/sh2007101986>**HEADING:** Biology Periodicals

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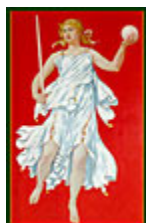
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321 Weekly, \$b 1994-2012
336 text \$b txt \$2 rdacontent
337 unmediated \$b n \$2 rdamedia
338 volume \$b nc \$2 rdacarrier
362 0 Volume 1, number 1 (April 1959)-
510 2 Chemical abstracts \$x 0009-2258
588 0 Volume 1, number 1 (April 1959); title from cover
588 Latest issue consulted: V. 425, issue 20 (Oct. 23, 2013).
650 0 Biology \$v Periodicals.
650 0 Biochemistry \$v Periodicals.
650 0 Molecular biology \$v Periodicals.
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650 0 Biology.
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035 __ |a (DLC)10468

040 __ |a DLC |c DLC |d DLC

053 _0 |a QR

150 __ |a Bacteriology

360 __ |i subdivision |a Microbiology |i under individual animals and groups of animals, individual plants and groups of plants, individual diseases and types of diseases, individual organs and regions of the body, and individual materials and types of materials, e.g. |a Fishes--Microbiology; Corn--Microbiology; Tuberculosis--Microbiology; Heart--Microbiology; Metals--Microbiology

550 __ |w g |a Microbiology

680 __ |i Here are entered works on the science of studying bacteria. Works on bacteria are entered under |a Bacteria.

681 __ |i Note under |a Bacteria

906 __ |t 9351 |u te05 |v 0

953 __ |a xx00 |b td14

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LCCN Permalink: <https://lcn.loc.gov/sh85014171>

HEADING: Biochemistry

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053 _0 |a QH345 |c Biology

053 _0 |a QP501 |b QP801 |c Physiology

150 __ |a Biochemistry

360 __ |i subdivision |a Composition |i under individual animals and groups of animals, e.g.
|a Fishes--Composition; Cattle--Composition

450 __ |w nne |a Biological chemistry

450 __ |a Chemical composition of organisms

450 __ |a Organisms |x Composition

450 __ |w nne |a Physiological chemistry

550 __ |w g |a Biology

550 __ |w g |a Chemistry

550 __ |w g |a Medical sciences

670 __ |a MeSH browser, July 29, 2020 |b (Biochemistry. SN The study of the composition,
chemical structures, and chemical reactions of living things. In MeSH Tree Structures
under Biological Science Disciplines and under Chemistry)

670 __ |a Web. 3.

670 __ |a Hennepin.

670 __ |a McGraw-Hill dict. of sci. and tech. terms, c2003 |b (biochemistry [CHEM] The
study of chemical substances occurring in living organisms and the reactions and
methods for identifying these substances)670 __ |a Tröjbom, M. Chemistry data from surface ecosystems in Forsmark and Laxemar-
Simpevarp, 2010: |b p. 3 ("chemical composition of the regolith and biota of the
terrestrial, limnic, and marine ecosystems")

- 670 __ |a Biology dictionary, via WWW, July 29, 2020 |b (Chemical Biology: a scientific discipline that combines chemistry and biology by using chemistry and chemical techniques to study biological systems. The main difference between chemical biology and biochemistry is that chemical biology involves adding novel chemical compounds to a biological system, while biochemistry is the study of chemical reactions that naturally happen inside organisms. Examples of chemical biology research include controlling cell division and other cell activities, using small molecules as targets for treatment, and manipulating stem cells. Differences between chemical biology and biochemistry: Chemical biology adds chemical compounds to biological systems in order to see what effect these chemicals have on cells and tissues. Chemical biologists often synthesize and add new compounds to cells. The goal of chemical biology research is to develop techniques that can eventually be applied to cells in a living organism, such as treatment options for cancer and other diseases. Biochemistry, on the other hand, is all about the chemical processes that already occur naturally in the cell. Instead of adding chemical compounds to cells to see the effects, biochemistry researchers study the chemical reactions that occur in organisms and the molecular makeup of these compounds. Biochemists also tend to study larger molecules like proteins and nucleic acids, while chemical biologists study smaller molecules) |u https://biologydictionary.net/chemical-biology/
- 680 __ |i Here are entered works on the study of naturally occurring chemical reactions in organisms. Works on the use of chemistry and chemical techniques to study biological systems are entered under |a Chemical biology.
- 681 __ |i Note under |a Chemical biology
- 910 __ |a Proposal saved by tc03 on 07/31/2020 at 10:12:44
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- 952 __ |a LC pattern: Biophysics
- 906 __ |t 1125 |v 0
- 906 __ |t 2009 |v 0

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150 __ |a Biology

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550 __ |a Life (Biology)

550 __ |a Natural history

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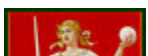
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037 \$bCRC Press, Inc., 2000 Corporate Blvd., N.W., Boca Raton, Fla. 33431

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060 00 \$aw1\$bC555F

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082 0_ \$a664/.005\$219

210 0_ \$aCrit. rev. food sci. nutr.

222 _0 \$aCritical reviews in food science and nutrition

245 00 \$aCritical reviews in food science and nutrition.

246 0_ \$aChemical Rubber Company critical reviews in food science and nutrition

246 10 \$aFood science and nutrition

246 14 \$aCRC critical reviews in food science and nutrition

260 \$aBoca Raton, Fla. :\$bCRC Press,\$c1980-

300 \$avolumes :\$billustrations ;\$c26 cm

310 \$aBimonthly

321 \$aFour issue per year

336 \$atext\$btxt\$2rdacontent

337 \$aunmediated\$bn\$2rdamedia

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362 0_ \$aVol. 12, issue 3 ([June] 1980)-

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510 2_ \$aBibliography of agriculture\$x0006-1530

510 2_ \$aBiological abstracts\$x0006-3169

510 2_ \$aChemical abstracts\$x0009-2258

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510 2_ \$aEnvironment abstracts\$x0093-3287

510 2_ \$aExcerpta medica

510 2_ \$aLife sciences collection

530 \$aAlso available on the Internet.

650 _0 \$aFood industry and trade\$vPeriodicals.

650 _0 \$aNutrition\$vPeriodicals.

650 _2 \$aFood\$vperiodicals.

650 _2 \$aFood-Processing Industry\$vperiodicals.

650 _2 \$aNutritional Physiological Phenomena\$vperiodicals.

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037 \$b CRC Press, Inc., 2000 Corporate Blvd., N.W., Boca Raton, Fla. 33431

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070 0 TP368 \$b .C7

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210 0 Crit. rev. food sci. nutr.

222 0 Critical reviews in food science and nutrition

245 00 Critical reviews in food science and nutrition.

246 3 Chemical Rubber Company critical reviews in food science and nutrition

246 14 CRC critical reviews in food science and nutrition

260 Boca Raton, Fla. : \$b CRC Press, \$c ©1980-

260 3 \$3 2004- : \$a Philadelphia, PA : \$b Taylor & Francis Group, LLC

300 volumes : \$b illustrations ; \$c 26 cm

310 Twenty-two issues a year, \$b 2019-

321 Frequency varies

336 text \$b txt \$2 rdacontent

337 unmediated \$b n \$2 rdamedia

338 volume \$b nc \$2 rdacarrier

362 0 Vol. 12, issue 3 ([June] 1980)-

510 2 Chemical abstracts \$x 0009-2258
525 Supplements accompany some vols.
530 Also issued via the World Wide Web to subscribers of OCLC FirstSearch Electronic Collections Online and CRCnetBASE.
588 Latest issue consulted: Vol. 58, issue 17 (2018) (surrogate).
650 0 Food industry and trade \$v Periodicals.
650 0 Nutrition \$v Periodicals.
650 0 Food.
650 0 Nutrition.
650 2 Food \$0 (DNLM)D005502
650 2 Food-Processing Industry \$0 (DNLM)D005525
650 2 Nutritional Physiological Phenomena \$0 (DNLM)D009747
650 6 Aliments \$0 (CaQQLa)201-0001300 \$x Industrie et commerce \$0 (CaQQLa)201-0001300 \$v Périodiques. \$0 (CaQQLa)201-0378307
650 6 Nutrition \$0 (CaQQLa)201-0064996 \$v Périodiques. \$0 (CaQQLa)201-0378307
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650 6 Nutrition. \$0 (CaQQLa)201-0064996
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650 7 Food industry and trade. \$2 fast \$0 (OCoLC)fst00930843
650 7 Nutrition. \$2 fast \$0 (OCoLC)fst01042187
655 2 Periodical \$0 (DNLM)D020492
655 7 Periodicals. \$2 fast \$0 (OCoLC)fst01411641
655 7 Periodicals. \$2 lcgft \$0 <http://id.loc.gov/authorities/genreForms/gf2014026139> \$0 (uri) <http://id.loc.gov/authorities/genreForms/gf2014026139>
776 1 \$t Critical reviews in food science and nutrition (Online) \$x 1549-7852 \$w (DLC) 2004214411 \$w (OCoLC)40809355
780 00 \$t CRC critical reviews in food science and nutrition \$x 0099-0248 \$w (DLC) 75646640 \$w (OCoLC)2243202
850 AAP \$a C \$a CU-A \$a CU-RivA \$a CaAEU \$a CaSSU \$a DLC \$a DNAL \$a DNLM \$a DeU \$a FU \$a ICarbS \$a InLP \$a LU \$a MBCo \$a MCM \$a MiU \$a MnU \$a MoKL \$a MoSW-M \$a MoU \$a MtBC \$a NIC \$a NN \$a NSyU \$a NcU-H \$a NjP \$a NjR \$a OU \$a OrCS \$a TU \$a ViBlbV \$a WaU
856 41 \$u <http://www.tandfonline.com/loi/bfsn20>
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856 4 \$u <http://firstsearch.oclc.org> \$z Address for accessing the journal using authorization number and password through OCLC FirstSearch Electronic Collections Online. Subscription to online journal required for access to abstracts and full text
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Attachment 78a

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222      #0$aEuropean journal of biochemistry
245      00$aEuropean journal of biochemistry / $cFEBS.
246      00$aEJB
260      ##$aBerlin ; $aNew York : $bPublished by Springer-Verlag on
behalf of the Federation of European Biochemical Societies, $c1967-
300      ##$av. : $bill. ; $c28 cm.
310      ##$aMonthly
362      0#$aVol. 1, no. 1 (Mar. 1967)-
500      ##$aPublisher varies: 1999- , Blackwell Science
500      ##$aBeginning 1989, review articles cumulated annually and
published as EJB reviews.
500      ##$aTitle from cover.
510      1#$aIndex medicus $x0019-3879
510      2#$aBibliography of agriculture $x0006-1530
510      2#$aBiological abstracts $x0006-3169
510      2#$aChemical abstracts $x0009-2258
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510      0#$aNuclear science abstracts $x0029-5612

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530 ##\$aAvailable also on the Internet; restricted to
institutions with a site/user ID and password.
546 ##\$aArticles in English, French, and German; summaries are in
English.
555 0#\$aIndex: 101-110(1979-80) bd w/110, and index to each 10
vols. thereafter bd w/last vol. covered.
650 #0\$aBiochemistry \$vPeriodicals
710 2#\$aFederation of European Biochemical Societies
780 00\$tBiochemische Zeitschrift \$w(DLC)sn 90022308
\$w(OCOLC)1536395
785 00\$aFEBS journal. \$x1742-464X \$w(OCOLC)57352964
850 ##\$aDLC \$aDNAL \$aIaAS \$aMBCo \$aMCM \$aMnU \$aNCH \$aViblbV
890 ##\$aEuropean journal of biochemistry. (Federation of European
Biochemical Societies)
901 ##\$cSer
936 ##\$aVol. 1, no. 4 (June 1967) LIC
948 ##\$aLTI 09/01/2008
948 ##\$aLTI 07/14/2010
948 ##\$aLTI 10/19/2010

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070 QP501.E8

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090 \$b

210 0 Eur. j. biochem. \$b (Print)

222 0 European journal of biochemistry \$b (Print)

245 00 European journal of biochemistry / \$c FEBS.

246 1 \$i Issues for 1999-2004 have title: \$a EJB

264 1 \$3 1967-1998: \$a Berlin ; \$a New York : \$b Published by Springer-Verlag on behalf of the Federation of European Biochemical Societies, \$c 1967-2004.

264 21 \$3 1999-2001: \$a Oxford, UK : \$b Blackwell Science on behalf of the Federation of European Biochemical Societies

264 31 \$3 2002-2004: \$a Oxford, UK : \$b Blackwell Pub.

300 271 volumes : \$b illustrations (some color) ; \$c 28 cm

310 Twice monthly, \$b <1990-2004

321 Monthly, \$b Mar. 1967-

336 text \$b txt \$2 rdacontent

337 unmediated \$b n \$2 rdamedia
338 volume \$b nc \$2 rdacarrier
362 0 Vol. 1, no. 1 (Mar. 1967)-v. 271, no. 23/24 (Dec. 2004).
500 Title from cover.
510 2 Chemical abstracts \$x 0009-2258
515 Some issues combined.
530 Also issued on microfilm and microfiche by University Microfilms International, on CD-ROM, and online.
546 Articles in English, French, and German; summaries in English.
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650 6 Biochimie \$v Périodiques.
650 7 35.70 biochemistry: general. \$0 (NL-LeOCL)077596110 \$2 bcl
650 7 Biochemistry. \$2 fast \$0 (OCoLC)fst00831961
650 17 Biochemie. \$2 gtt
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710 2 Federation of European Biochemical Societies.
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856 41 \$3 Wiley Online Library \$u [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1742-4658](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1742-4658) \$z On website of later title: FEBS journal.
856 4 \$u <http://www.blackwell-synergy.com/servlet/useragent?func=showIssues&code=ejb> \$z This former electronic address redirects to current address when searched on May 1, 2015.
856 4 \$u <http://www.ejbiochem.org/> \$z This former electronic address redirects to current address when searched on May 1, 2015.
856 4 \$u <http://link.springer.de/link/service/journals/00225/index.htm> \$z This electronic address no longer valid as of May 1, 2015.
856 4 \$u <http://firstsearch.oclc.org> \$z Address for accessing the journal using authorization number and password through OCLC FirstSearch Electronic Collections Online. Subscription to online journal required for access to abstracts and full text
856 4 \$u <http://firstsearch.oclc.org/journal=0014-2956;screen=info;ECOIP> \$z Address for accessing the journal from an authorized IP address through OCLC FirstSearch Electronic Collections Online. Subscription to online journal required for access to abstracts and full text

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245 00\$aFood chemistry / \$cedited by Owen R. Fennema.
250 ##\$a2nd ed., rev. and expanded.
260 ##\$aNew York : \$bM. Dekker, \$c©1985.
300 ##\$ax, 991 pages : \$billustrations ; \$c26 cm.
336 ##\$atext \$btxt \$2rdacontent
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490 1#\$aFood science and technology ; \$v15
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700 1#\$aFennema, Owen R.
830 #0\$aFood science and technology (Marcel Dekker, Inc.) ; \$v15.
856 41\$3Table of contents
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070 0 TX541.F65 \$b 1985
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084 58.34 \$2 bcl
084 VN 8000 \$2 rvk
090 \$b
245 00 Food chemistry / \$c edited by Owen R. Fennema.
250 2nd ed., rev. and expanded.
260 New York : \$b M. Dekker, \$c ©1985.
300 x, 991 pages : \$b illustrations ; \$c 26 cm.
336 text \$b txt \$2 rdacontent
337 unmediated \$b n \$2 rdamedia
338 volume \$b nc \$2 rdacarrier
490 1 Food science and technology ; \$v 15
504 Includes bibliographical references and index.
540 Current Copyright Fee: GBP45.00 \$c 0. \$5 Uk
650 0 Food \$x Analysis.
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653 10 Food Chemistry
653 10 Levensmiddelenchemie
700 1 Fennema, Owen R.
776 08 \$i Online version: \$t Food chemistry. \$b 2nd ed., rev. and expanded. \$d New York : M. Dekker,
©1985 \$w (OCoLC)629698267
830 0 Food science and technology (Marcel Dekker, Inc.) ; \$v 15.
856 41 \$3 Table of contents \$u <http://www.gbv.de/dms/bowker/toc/9780824774493.pdf>
856 41 \$3 Table of contents \$u http://bvbr.bib-bvb.de:8991/F?func=service&doc_library=BVB01&local_base=BVB01&doc_number=000642694&line_number=0001&func_code=DB_RECORDS&service_type=MEDIA

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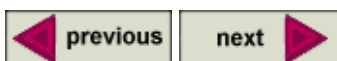
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Type of Work: Text

Registration Number / Date: TX0001651193 / 1985-09-04

Title: Food chemistry / edited by Owen R. Fennema.

Edition: 2nd ed., rev. and expanded.

Imprint: New York : M. Dekker, c1985.

Description: 991 p.

Series: Food science and technology ; 15

Copyright Claimant: Marcel Dekker, Inc.

Date of Creation: 1984

Date of Publication: 1985-05-15

Previous Registration: Prev. reg. as Principles of food science: food chemistry, 1976.

Basis of Claim: New Matter: revisions & additions.

Other Title: Food science and technology ; 15

Principles of food science: food chemistry

Names: [Fennema, Owen R., 1929-](#)
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260 \$a[Tokyo] :\$bAgricultural Chemical Society of Japan,\$c1961-1991.

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510 2_ \$aBiological abstracts\$x0006-3169

510 2_ \$aChemical abstracts\$x0009-2258

510 2_ \$aBibliography of agriculture\$x0006-1530

510 1_ \$aBiological & agricultural index\$x0006-3177

650 _0 \$aAgricultural chemistry\$vPeriodicals.

650 _0 \$aBiochemistry\$vPeriodicals.

650 _0 \$aChemistry, Organic\$vPeriodicals.

710 2_ \$aNihon Nōgei Kagakkai.

780 00 \$tBulletin of the Agricultural Chemical Society of Japan\$w(OCOLC)07387940

785 00 \$tBioscience, biotechnology, and biochemistry\$w(OCOLC)25516229

997 \$aMARCIVE

MMS IDs**Document ID:**

999481975802121

Network Electronic IDs:

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999481975802121

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Attachment 80b

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022 0 0002-1369 \$l 0002-1369 \$2 z

030 ABCHA6

037 \$b Japan Publications Trading Co., Ltd., P.O. Box 5030, Tokyo, Japan

042 pcc \$a nsdp

050 00 QH345 \$b .A35

050 14 QP501 \$b .J68

060 00 W1 \$b AG382

070 0 385 \$b Ag8B

082 04 574.192 \$b A278

090 \$b

210 0 Agric. biol. chem.

222 0 Agricultural and biological chemistry

245 00 Agricultural and biological chemistry.

260 Tokyo, Japan : \$b Agricultural Chemical Society of Japan, \$c 1961-1991.

300 31 volumes : \$b illustrations ; \$c 27 cm

310 Monthly

336 text \$b txt \$2 rdacontent

337 unmediated \$b n \$2 rdamedia

338 volume \$b nc \$2 rdacarrier

362 0 Vol. 25, no. 1 (Jan. 1961)-v. 55, 12 (Dec. 1991).

500 Title from cover.
510 2 Chemical abstracts \$x 0009-2258 \$b -1991
650 0 Biochemistry \$v Periodicals.
650 0 Agricultural chemistry \$v Periodicals.
650 0 Chemistry, Organic \$v Periodicals.
650 2 Biochemistry \$0 (DNLM)D001671
650 2 Chemistry, Agricultural \$0 (DNLM)D002622
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650 7 Chemistry, Organic. \$2 fast \$0 (OCoLC)fst00853501
650 17 Biochemie. \$2 gtt
650 17 Landbouwkunde. \$2 gtt
655 2 Periodical \$0 (DNLM)D020492
655 3 Internet resource.
655 7 Periodicals. \$2 fast \$0 (OCoLC)fst01411641
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<http://id.loc.gov/authorities/genreForms/gf2014026139>
655 7 Periodicals. \$2 rbgenr
710 2 Nihon Nōgei Kagakkai.
776 08 \$i Online version: \$t Agricultural and biological chemistry (Online) \$w (DLC) 65058099 \$w
(OCoLC)233145444
780 00 \$t Bulletin of the Agricultural Chemical Society of Japan \$x 0375-8397 \$w (DLC) 92657506 \$w
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785 00 \$t Bioscience, biotechnology, and biochemistry \$x 0916-8451 \$w (DLC) 92659654 \$w
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850 CU-Riv \$a CoU \$a DLC \$a InLP \$a InU \$a KyLoU \$a MBCo \$a MdBj \$a MiDW \$a NN \$a NRU \$a NcRS
\$a NjR \$a PPD \$a PPIU \$a ViBibV \$a WaU
856 41 \$u <http://bibpurl.oclc.org/web/15768> \$u <https://www.jstage.jst.go.jp/browse/bbb1961> \$7 0
856 41 \$u <http://bibpurl.oclc.org/web/46806> \$u
http://ci.nii.ac.jp/dirnavi?tourl=/vol_issue/nels/AA00515312_ja.html \$7 0

Attachment 81a

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655 Avenue of the Americas, New York, NY 10010
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260      ##$aAmsterdam, $bElsevier/North-Holland, $c1976-
300      ##$av. $c24 cm.
310      ##$aBiweekly, $b<15 July 1992->
321      ##$aMonthly, $b<Jan. 1979->
321      ##$aBimonthly, $b1976-
362      0#$av. 1-
500      ##$a"An international journal focusing on gene cloning and
gene structure and function."
510      1#$aExcerpta medica
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510      2#$aBiological abstracts $x0006-3169
510      2#$aChemical abstracts $x0009-2258
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510      2#$aEnergy research abstracts $bMay 1978- $x0160-3604
510      2#$aEnvironment abstracts $x0093-3287
510      2#$aIndex medicus $x0019-3879
510      2#$aLife sciences collection
525      ##$aV.173 includes a separate supplement.

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555 0#\$aAuth., 1-3(1976-78) bd w/3; auth., 1-30(1976-84) bd w/30;
auth., 31-50(1984-86) bd w/50; auth., 51-70(1987-88) bd w/70;
auth., 1-100(1976-91) bd w/100.
580 ##\$aVols. for 1996- includes separately paged section called:
Gene-combis which is printed version of articles published
electronically in Gene-combis on the World-Wide Web.
650 #0\$aGenetic engineering \$vPeriodicals
650 #0\$aMolecular cloning \$vPeriodicals.
650 #0\$aRecombinant DNA \$vPeriodicals.
740 0#\$aGene-combis
850 ##\$aAU \$aArU-M \$aCCC \$aCSt-L \$aCaMWM \$aCaMWU \$aCaOKQH \$aCaOWA
\$aCaOWtU \$aCtW \$aCtY-M \$aDLC \$aINS \$aIU-M \$aIaAS \$aInU \$aInU-M
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901 ##\$cSer
936 ##\$a15 July 1992
948 ##\$aLTI 07/21/2009
948 ##\$aLTI 09/04/2009
948 ##\$aLTI 02/03/2010

Attachment 81b

500 "An international journal focusing on gene cloning and gene structure and function."
510 2 Chemical abstracts \$x 0009-2258
530 Also issued via World Wide Web by subscription through ScienceDirect (Online service).
580 Vols. for 1996- includes separately paged section called: Gene-combis which is printed version of
articles published electronically in Gene-combis on the World-Wide Web.
580 Online version has open access mirror journal: Gene X (Online), published 2019-2020.
588 1 Vol. 295, no. 1 (July 24, 2002).
650 0 Genetic engineering \$v Periodicals.
650 0 Molecular cloning \$v Periodicals.
650 0 Recombinant DNA \$v Periodicals.
650 0 Genetic recombination.
650 2 Molecular Biology \$0 (DNLM)D008967
650 2 Recombination, Genetic \$0 (DNLM)D011995
650 6 Génie génétique \$0 (CaQQLa)201-0022662 \$v Périodiques. \$0 (CaQQLa)201-0378307
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650 7 Genetic recombination. \$2 fast \$0 (OCOLC)fst00940079
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653 RECOMBINANT DNA
653 RECOMBINATION
655 2 Periodical \$0 (DNLM)D020492
655 4 Fulltext.
655 4 Periodicals.
655 4 Internet Resources.
655 7 Periodicals. \$2 fast \$0 (OCOLC)fst01411641
655 7 Periodicals. \$2 lcgft \$0 http://id.loc.gov/authorities/genreForms/gf2014026139 \$0 (uri)
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MChB \$a MH-BL \$a MMeT \$a MSobPR \$a MWhB \$a MdU-H \$a MnSU \$a NBC \$a NCH \$a NNStJ \$a NcU
\$a NhU \$a NjR \$a OrU \$a PBL \$a PPD \$a PPPCPh \$a PPiU \$a PPiU-H \$a ScCleU \$a TxCM \$a ULA \$a UPB
\$a ViBibV \$a ViU-H
856 41 \$u <http://www.sciencedirect.com/science/journal/03781119>

Attachment 82a

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245 04$aThe journal of clinical investigation.
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260 ##$aNew York, N.Y. : $bAmerican Society for Clinical
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300 ##$av. : $bill. ; $c26 cm.
310 ##$aMonthly, $b2005-
321 ##$aBimonthly, $b1924-
321 ##$aMonthly, $b<Sept. 1977>-1995
321 ##$aSemimonthly, $b1996-2004
362 0#$aVol. 1 (Oct. 1924)-
500 ##$aEditor: 1924-<Aug. 1926> G.C. Robinson.
500 ##$aLatest issue consulted: Vol. 115, no. 2 (Feb. 2005).
530 ##$aAlso issued online.
555 ##$aVols. 1 (1924)-17 (1938). 1 v.
580 ##$aAbstracts for meetings of the American Society for
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650 #0$aMedicine, Experimental $vPeriodicals
700 1#$aRobinson, George Canby, $d1878-1960
710 2#$aAmerican Society for Clinical Investigation
776 1#$tJournal of clinical investigation (Online) $x1558-8238
$w (DLC) 2005214318 $w (OCoLC)44430060

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948      ##$aLTI 09/01/2008
948      ##$aLTI 06/30/2011
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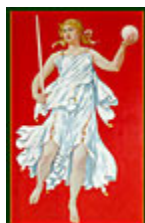
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362 0 Vol. 1 (Oct. 1924)-
500 Editor: 1924-<Aug. 1926 G.C. Robinson.
530 Also issued online.
555 Vols. 1 (1924)-17 (1938). 1 v.
580 Abstracts for meetings of the American Society for Clinical Investigation continued in: Clinical research.
588 Latest issue consulted: Vol. 115, no. 2 (Feb. 2005).
650 0 Medicine, Experimental \$v Periodicals.
650 2 Medicine \$0 (DNLM)D008511
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650 7 44.50 diagnostic and therapy: general. \$0 (NL-LeOCL)077596471 \$2 bcl
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650 7 Medicine, Experimental \$x Periodicals. \$2 sears
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655 4 Fulltext.
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655 7 Periodicals. \$2 rbgenr
700 1 Robinson, George Canby, \$d 1878-1960.
710 2 American Society for Clinical Investigation.
776 08 \$i Online version: \$t Journal of clinical investigation (Online) \$x 1558-8238 \$w (DLC) 2005214318 \$w (OCOLC)44430060
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