FOOD CHAIN

an overview

A non-profit (501-3-c) organization with activists and scientists
in Massachusetts, New Hampshire, Maine, Canada, and Italy

Roger Warner
founder & coordinator, Green Crab R & D

Green Crab R & D

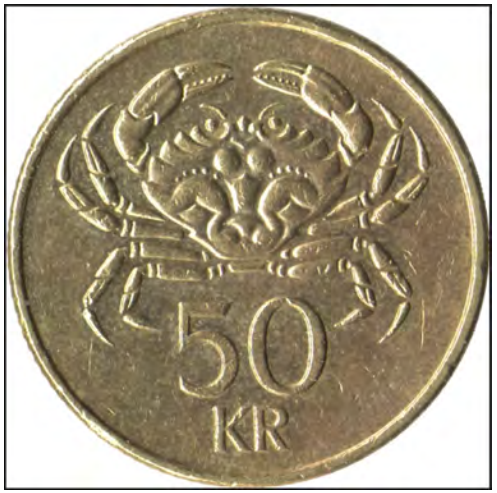
a small, informal grassroots nonprofit organization

for scientists, activists, and seafood industry people

in Massachusetts, New Hampshire, Maine, the Canadian Maritimes, California, Washington State, and Venice Italy

funding from Massachusetts Division of Marine Fisheries and other sources

Presenters of The Crabby Awards, for excellence



Our small-scale hands-on projects include:

Trapping (of course)

Experimental production of soft-shell crabs

Development of green crab food products with our partners

Food tasting events & public outreach

But primarily:

WE ARE AN INFORMATION-SHARING NETWORK

Helping find measures to counteract

the green crab invasion

And working with our colleagues to jump-start a

new branch of the seafood industry

monthly email newsletter (from Roger Warner)

www.greencrab.org + Facebook + Instagram pages

(from Mary Parks — who has also put together the world's first green crab cookbook)

The food chain concept is basic, and obvious

Crabs grow with the intake of nutrients and minerals

They are predators of small shellfish

They are marauders of eelgrass

But …

Green crabs are also prey

Other critters eat them

And, after death, crab carcasses break down into nutrients and minerals useful to others including humans

Predators in the wild include:

Larger crustaceans

(lobsters, blue crabs, big green crabs)

Striped bass

sea turtles, wolffish and large finfish

In their own way, green crabs are highly vulnerable

The commercial BAIT TRADE

Mostly for tautog and conch/whelk traps

from south of Cape Cod down to Virginia

with tantalizing, and not-yet-fulfilled possibilities for lobster trap bait

Steve Jury will address this and related subjects next

Our WORKING HYPOTHESIS

not yet proven:

Humans are the ultimate green crab predators

If we are right, green crab population MIGHT be managed and reduced

through commercial trapping to

create a variety of gourmet foods and food additives

Why do we think this might be true?

UMAMI

Japanese word for flavor-enhancing

Green crabs not only have a taste of their own similar to other crabs

But they also AMPLIFY AND EXTEND

the experience of other foods' flavor and taste

on the palate

Green crabs create a long, pleasing flavor trail

from the Journal of Food Science, 2011

Comprehensive Analysis of Umami Compounds by Ion-Pair Liquid Chromatography Coupled to Mass Spectrometry

Leon Coulier, Richard Bas, Maarten Hekman, Bianca J. C. van der Werff, Maurits Burgering, and Uwe Thissen

Abstract: An ion-pair LC-ESI-MS method was developed capable of analyzing various reported umami or umami-enhancing compounds, including glutamic acid and 5′-ribonucleotides. The method was validated using tomato and potato samples and showed overall good analytical performance with respect to selectivity, detection limit, linearity, and repeatability. The method was applied to various tomato samples resulting in concentrations of glutamic acid and 5′-ribonucleotides that were in good comparison with literature. The methodology might also be used for the discovery of new umami (enhancing) compounds in an untargeted mode. This was to a certain extent demonstrated for tomato samples by correlating all peaks observed with the ion-pair liquid chromatography-mass spectrometry (LC-MS) method to sensory properties using multivariate statistics.

The main two umami-producing compounds are:

Glutamic acid
Aspartic acid

Table 1–Umami (enhancing) compounds or compounds with structural similarity analyzed by IP-LC-MS.

Compound	$[M-H]^-$	t_r (min)
Glutamic acid	146.1	2.7
Aspartic acid	132.0	2.6
N-acetylglutamic acid	188.1	6.7
N-acetylglycine	116.1	3.9
Pyroglutamic acid	128.0	3.9
Glu-Ala	217.0	4.2
Glu-Glu	275.1	7.0
Glu-Val-Phe	392.2	8.9
Asp-Glu	261.1	7.0
Succinic acid	117.3	6.7
Lactic acid	89.1	3.4
Gallic acid	169.0	3.9
5′-AMP	346.0	7.1
5′-GMP	362.1	6.8
5′-UMP	323.0	6.7
5′-IMP	347.1	6.9
5′-XMP	363.0	8.2

A USDA study on green crabs …

POTENTIAL USE OF THE INVASIVE EUROPEAN GREEN CRAB (*CARCINUS MAENAS*) AS AN INGREDIENT IN ATLANTIC SALMON (*SALMO SALAR*) DIETS; A PRELIMINARY ANALYSIS

Gary Burr and Bill Wolters

National Cold Water Marine Aquaculture Center

USDA-ARS

Franklin, ME

… shows that both
aspartic acid and glutamic acid
are present in green crabs in relatively large amounts

Amino Acid analysis

	Green Crab		Menhaden
Amino Acid	Meat	Guts	Fishmeal
Taurine	**1.12**	**0.66**	
Aspartic Acid	6.29	3.48	9.35
Threonine	**2.96**	**1.89**	**4.25**
Serine	2.52	1.48	4.07
Glutamic Acid	9.65	3.98	13.64

	Green Crab		Menhaden
Amino Acid	Meat	Guts	Fishmeal
Methionine	**1.78**	**0.78**	**2.49**
Isoleucine	**3.03**	**1.43**	**3.81**
Leucine	**4.99**	**2.44**	**7.11**
Tyrosine	2.67	1.54	3.02
Phenylalanine	**2.84**	**1.72**	**3.77**

(A tip of the hat to the scientists here who know

much, much more about food chemistry than I do,

including

Denise Skonberg

Elizabeth Fairchild and

Bouhee Kang)

Because of their umami flavor,

and in spite of their small size and tough shells

green crabs present four main

food opportunities

as gourmet food for humans

Stock or broth

Soft-shell green crabs

a centuries-old recipe from Venice, Italy

Brought to North America by Sophie St.-Hillaire and Luke Poirier
Evangelized by Jonathan Taggart

Conference co-organizers Marissa MacMahan and Gabby Bradt,
Jonathan Taggart, Luke Poirier and others are
working on increasing
the efficiency of soft-shell production

Various recipes based on green crab roe

including a green crab version of

“She-Crab Soup,” a bisque

traditionally made with BLUE crab roe

Jonathan Taggart has evangelized

Mary Parks has produced a free cookbook of recipes

Jamie Basset has some amazing

ideas and photographs

… and, finally, green crab MINCE

the soft innards, separated mechanically from the shell …

which makes for great crabcakes!

experimentally produced, in small quantities, by Bouhee Kang

in the U. of Maine Orono food lab

under the directions of Denise Skonberg

(both of them here at this conference)

So …

We have successful PROOF OF CONCEPT

of four green crab recipe groups

They all taste GREAT

But none of them are in full-scale production YET …

The fishing industry has not yet figured out how to make

MONEY from green crabs

Mary Parks of Green Crab R & D

will address the practical obstacles

to large-scale production

and profitability

later on in this session.

Meanwhile …

We need to ask ourselves …

What if our hypothesis isn't true?

Or isn't completely true?

Or even if somewhat true,

Can't make a decisive difference

In reducing the wild green crab population?

Then we'd probably have to look

for help

elsewhere in the food chain.

We need to help the other

NATURAL PREDATORS

Especially striped bass.

We need to outlaw

commercial striper fishing

and make it a recreational fish only

if we want to give our clams and mussels

a decent chance.

And we need to explore a

new fascinating, if unproven hypothesis

from Ed Grosholz (University of California / Davis),

Andy Chang (Smithsonian Marine Invasives Research Lab)

and others from their work at Stinson Beach. California

(We hope to get Ed via video at 11:00 a.m. Thursday)

Their hypothesis in brief:

Use crab traps with much finer mesh size, to get the tiny crabs

and

Let the big male crab CANNIBALIZE the rest!

Let the big males become significant predators of their own species

It will take a few years of

testing to prove or disprove

this new hypothesis

But it’s a fascinating idea

Conclusion:

There's an EMERGING CONSENSUS

That we have to explore ALL MEANS

to control green crabs

Improve our trapping equipment,

Get more efficient at creating soft-shell crabs,

Market green crabs with more sophistication

And see how we can make crab-based derivative products

from fertilizer on upwards.

A non-profit (501-3-c) organization with activists and scientists in Massachusetts, New Hampshire, Maine, Canada, and Italy