Contents

It all starts with mother's milk 35

ix Umami as a global presence 36 ACKNOWLEDGMENTS Umami has won acceptance as a distinct taste 38 And umami is still controversial ... 39 PROLOGUE: HOW IT ALL BEGAN xiii 1 + 1 = 8: GUSTATORY SYNERGY WHAT EXACTLY IS TASTE, AND WHY IS IT 41 Amazing interplay: Basal and synergistic umami 41 IMPORTANT? The basic tastes: From seven to four to Detecting umami synergy on the tongue and in the brain 42 five and possibly many more 1 Japanese dashi: The textbook example Why do we need to be able to taste our food? 4 of umami synergy 43 There is more to it: Sensory science, taste, smell, aroma, flavor, mouthfeel, The art of making Japanese dashi 45 Nordic dashi 47 texture, and chemesthesis 5 Is there a taste map of the tongue? 7 Dashi closer to home—a Japanese soup Why are some foods more palatable than others? 8 with a Scandinavian twist 48 Seaweeds enhance the umami in fish 52 A few words about proteins, amino acids, nucleotides, nucleic acids, and enzymes 9 How to make smoked shrimp heads 53 Many substances interact synergistically Glutamic acid, glutamate, and the glutamate ion 11 with umami 54 Glutamic acid and glutamate in our food 12 A breakthrough discovery of yet How does glutamate taste, and how little is required for us to taste it? 13 another synergistic substance 54 The interplay between glutamate and the four classic tastes 55 THE FIRST FOUR: A simple taste test: Umami vs. salt 56 SOUR, SWEET, SALTY, AND BITTER 15 The physiology and biochemistry of taste 15 Umami-rich 'foie gras from the sea' 57 The interplay between sweet and bitter 16 Food pairing and umami 60 Taste receptors: This is how they work 17 Creating tastes synthetically 60 When words fail us: Descriptions of tastes 20 Umami: Either as little or as much as you like 62 UMAMI FROM THE OCEANS: SEAWEEDS, THE FIFTH TASTE: WHAT IS UMAMI? 23 65 Science, soup, and the search for the fifth taste 23 FISH, AND SHELLFISH Glutamic acid and glutamate 24 Seaweeds and konbu: The mother lode of umami 65 A world of konbu in Japan 66 What is the meaning of the word umami? 26 From laboratory to mass production 27 Fresh fish and shellfish 69 How MSG is made 28 Cooked fish and shellfish dishes and soups 69 Umami and the art of killing a fish 72 A little letter with a huge impact: A traditional clambake: The 'Chinese restaurant syndrome' 32 New England method, Danish ingredients 74 The Japanese discover other umami substances 34 Everyday umami in ancient Greece and Rome 79

Fish sauces and fish pastes 81 Dairy products 146 Blue cheeses 146 Modern garum 85 Aged, dried, and hard cheeses 148 Shellfish paste 87 Oyster sauce 87 Eggs and mayonnaise 151 Sushi and fermented fish 88 Harry's crème from Harry's Bar 151 Katsuobushi 90 UMAMI: THE SECRET BEHIND Catching katsuo to optimize umami 91 Niboshi 91 THE HUMBLE SOUP STOCK 155 The hardest foodstuff in the world 92 Soup is umami 155 Osmazome and The Physiology of Taste 158 Kusaya 96 Amino acids in soup stocks 160 Nordic variations: Horrible smells A real find: A dashi bar 160 and heavenly tastes 96 The taste of a beef stock 162 Fish roe 98 Seven friends, The Compleat Angler, and a pike 100 Ready-made umami 164 Knorr and Maggi: European umami pioneers 165 UMAMI FROM THE LAND: FUNGI AND PLANTS 105 MAKING THE MOST OF UMAMI Umami from the plant kingdom 105 167 MSG as a food additive 167 Dried fungi 110 Fermented soybeans 111 Other commercial sources of umami 168 Soy sauce 112 Hydrolyzed protein 169 Production of shōyu 113 Umami in a jar 170 Yeast extract 172 Miso 114 Nutritional yeast 172 Production of miso 114 The Asian answer to cheese: Fermented More sources of umami for vegans 173 Ketchup 174 soybean cakes 118 Nattō 120 Bagna càuda 175 Black garlic 122 Worcestershire sauce 176 Shōjin ryōri: An old tradition with Umami in a tube 177 Twelve easy ways to add umami 178 a modern presence 122 Quintessentially Danish: Brown gravy, The enlightened kitchen 124 medisterpølse, and beef patties 180 Tomatoes 126 Slow cooking: The secret of more umami 182 Green tea 134 Ratatouille and brandade 190 This is why fast food tastes so good 191 UMAMI FROM LAND ANIMALS: MEAT, Green salads and raw vegetables 194 EGGS, AND DAIRY PRODUCTS Umami in dishes made with small fowl 196 The animal kingdom delivers umami in spades 137 Homo sapiens is a cook 140 Cooked potatoes: Nothing could be simpler 197 Rice and sake 197 Preserving meats in the traditional ways 142 Air-dried hams 143 Beer 200 Salted beef: Pastrami and corned beef 144 Umami in sweets 202

Mirin is a sweet rice wine with umami 203

Bacon and sausages 145

UMAMI AND WELLNESS	207	Umami synergy 220	
Umami and MSG: Food without 'chemicals' 207		The taste of amino acids 222	
Umami satisfies the appetite 209		Taste thresholds for umami 223	
Why does umami make us feel full?		Content of glutamate and 5'-ribonucleotides	
The 'brain' in the stomach 209		in different foods 223	
Umami for a sick and aging population 210			
Umami for life 211		BIBLIOGRAPHY	233
		ILLUSTRATION CREDITS	237
EPILOGUE: UMAMI HAS COME TO STAY	213	GLOSSARY	239
		INDEX	25
TECHNICAL AND SCIENTIFIC DETAILS	217		
Umami and the first glutamate receptor 217		THE PEOPLE BEHIND THE BOOK	264
Yet another receptor for umami 218			

RECIPES

Potato water dashi with smoked shrimp heads 53	Parmesan biscuits with bacon and yeast flakes 150
Monkfish liver au gratin with	Harry's crème 152
crabmeat and vegetables 58	Chicken bouillon 157
Pearled spelt, beets, and lobster 70	Green pea soup with scallops and seaweed 163
Crab soup 76	Dressing with nutritional yeast 173
Clambake in a pot 78	Eggplant gratinée with garlic, anchovies,
Patina de pisciculis 82	and nutritional yeast 174
Garum 86	Oysters au gratin with a crust of nutritional
Quick-and-easy garum 86	yeast and smoked shrimp head powder 175
Smoked quick-and-easy garum 87	Bagna càuda 176
Seriously old-fashioned sourdough rye bread 107	Old-fashioned Danish medisterpølse 181
Anchovies, grilled onions, sourdough bread,	Beef patties, Danish style 183
pata negra ham, and mushrooms 108	Chicken Marengo 185
Deep-fried eggplants with miso (nasu dengaku) 115	Cassoulet 186
White asparagus in miso with oysters,	Beef estofado 188
cucumber oil, and small fish 116	Sicilian ratatouille 190
Grilled shōjin kabayaki: 'Fried eel'	Brandade with air-dried ham and green peas 191
made from lotus root 123	Three-day pizza with umami—not
Baked monkfish liver with raspberries	really a 'fast food' 192
and peanuts 128	Quail pâté 196
Slow-roasted sauce with tomatoes,	Risotto 197
root vegetables, and herbs 130	Oxtails braised in wheat beer 201
Fried mullet with baked grape tomatoes,	Umami sorbet with maccha and tomato 202
marinated sago pearls, and black garlic 132	White chocolate cream, black sesame seeds,
Mushrooms, foie gras, and mushroom essence 138	Roquefort, and brioche with nutritional yeast 203

Contents vii