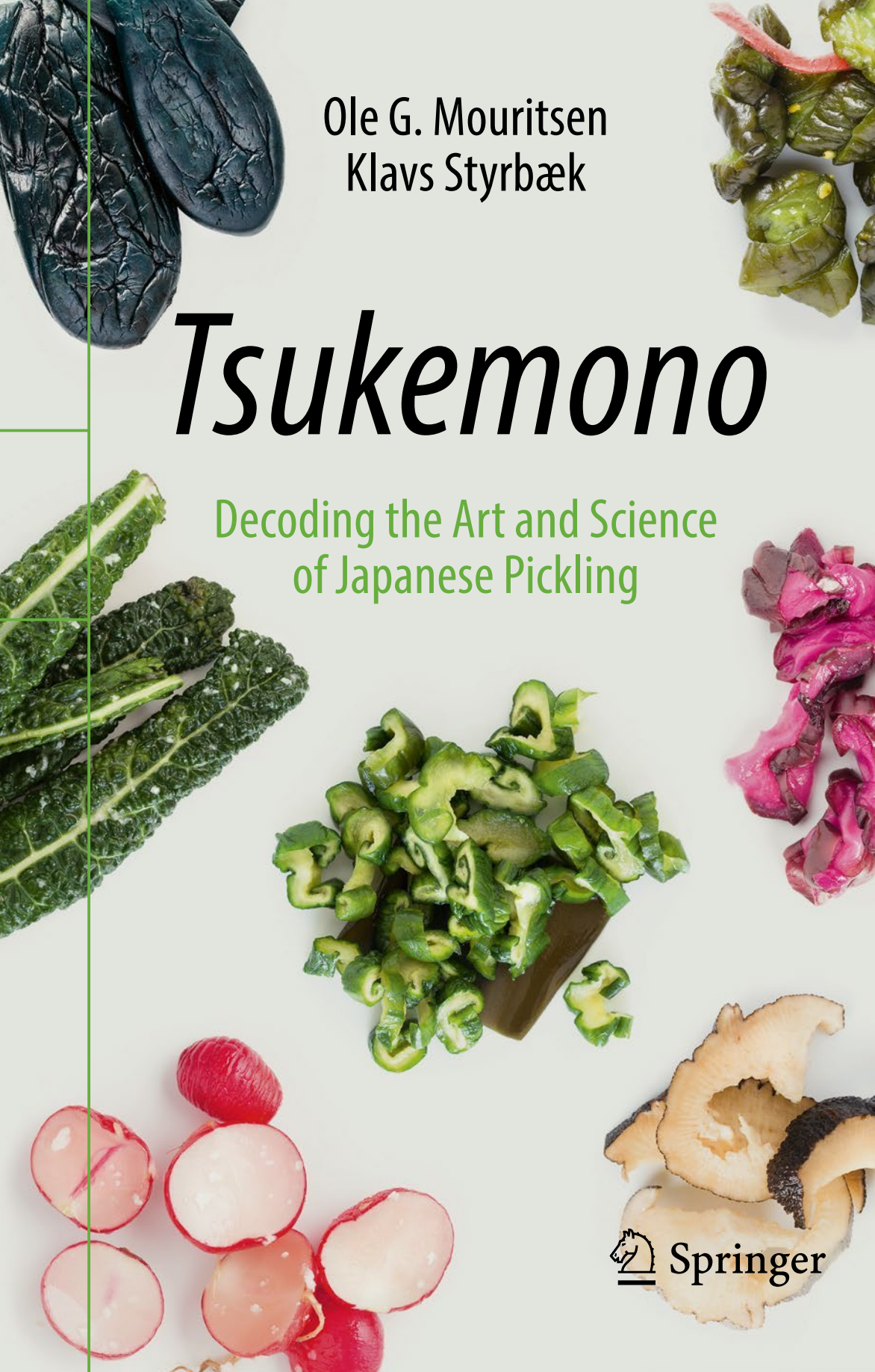
Ole G. Mouritsen
Klavs Styrbæk
Tsukemono
Decoding the Art and Science of Japanese Pickling
Springer

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Ole G. Mouritsen • Klavs Styrbæk

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Decoding the Art and Science of Japanese Pickling

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Preface

For the past five years or so Ole and Klavs have been preoccupied with exploring various aspects of the texture of food, referred to more formally as its *mouthfeel*. This quality has an incredibly important effect on the sensory experience of eating—whether a particular food is considered interesting, whether its 'taste' lives up to expectations, and whether people like or reject it. Another special focus of ours has been the fifth taste, umami, described as 'meaty,' 'savoury,' or 'brothy,' which is also central to our enjoyment of, and craving for, certain types of food. The end result of our work on these two topics has been the publication of a book devoted to each subject. Additional research has been carried out under the auspices of *Taste for Life*, an interdisciplinary Danish centre that combines the study of the scientific underpinnings of taste with wide-ranging efforts to disseminate this information to the general public—from school children to seniors—to emphasize how healthy food choices can be made more appealing and lead to a better quality of life.

These two factors relate particularly closely to the consumption of vegetables, which are a vital component of our diet. Nevertheless, many people will readily admit that on a daily basis they frequently fail to eat them in sufficient quantities. We think that the underlying reason is that there is little emphasis on preparing them in the right way. The secret often lies in ensuring that they remain crispy and crunchy, have visual appeal, and taste of umami.

These ideas prompted us to turn our attention to *tsukemono*—pickled foods made from vegetables and occasionally fruits that are preserved according to centuries-old traditions in Japan. Our point of departure was twofold. Klavs has extensive experience with preparing vegetables in high-end restaurants, at innovative gastronomic workshops, and in cooking schools. Ole has a lifelong passion for Japanese cuisine, coupled with a scientist's understanding of the chemical and physical principles that can influence the texture and taste of raw ingredients. This led us to a series of experiments in the kitchen and in the laboratory to test classical recipes for *tsukemono*, as well as to develop modern techniques for preparing these preserves. We make no secret of the fact that this venture was enlightening and has been a great deal of fun.

We decided to put our findings, along with the personal experiences we have accumulated over the years, together in book form in the hope of introducing both the art and the science behind these special pickled foods to a broad international audience. To do so, we are providing recipes and outlining techniques for preparing them at home using ingredients that are readily available from local sources or in stores that sell Asian products. But we also go well beyond simply explaining the secrets of making crisp *tsukemono*. We have included various aspects of the cultural

history and traditions that are associated with this ancient culinary art. At the same time, we have unpacked some of the fascinating science that explains how the preservation methods work. We will furthermore describe their tastes and the healthful benefits and basic nutritional value to be found in the various types of pickles and show how easy it is to serve them on a daily basis to stimulate the appetite or as condiments to accompany vegetable, fish, and meat dishes.

Since the topic of our book is inspired by Japanese cuisine, we have found it natural and convenient to adopt Japanese expressions for some kinds of *tsukemono* and the various techniques used to prepare them. Also, there are sometimes no English terms that adequately convey their meaning. In cases where there are both English and Japanese terms for the same ingredient, for example, Chinese radish (*daikon*), we have used these terms interchangeably. We have included a glossary of these Japanese words with English explanations.

Our ultimate goal is to encourage the readers of this book to join us in a small culinary adventure that will allow us to expand and diversify our consumption of plant-based foods, which are so vital to our overall well-being. And along the way, there may be a few surprises. Most of us are familiar with the little mound of deliciously tangy pickled ginger that is served with sushi and sashimi, but how many have ever imagined that one could eat preserved cherry blossoms?

Selection of *tsukemono*.

The People behind the Book

Ole G. Mouritsen
is a research scientist and professor of gastrophysics and culinary food innovation at Copenhagen University. His work focuses on basic sciences and their applications within the fields of biotechnology, biomedicine, and food. He is the recipient of numerous prizes for his work and for research communication. His extensive list of publications includes a number of monographs, several of them co-authored with Klavs Styrbæk, which integrate scientific insights with culinary perspectives and have been nominated three times for Gourmand Best in the World Awards. Currently, Ole is president of The Danish Gastronomical Academy and director of the National Danish Taste Centre *Taste for Life*, which is generously supported by the Nordea Foundation. This is a cross-disciplinary centre that aims to foster a better understanding of the fundamental nature of taste impressions and how we can use this knowledge to make much more informed and healthier food choices. Its extensive educational program reaches out to audiences of all ages, with a special effort directed toward children to shape their dietary habits from an early age. For many years, Ole has been fascinated with the Japanese culinary arts and in explaining the extent to which its techniques and taste elements can be adapted for the Western kitchen. In recognition of his efforts, he was appointed in 2016 as a Japanese Cuisine Goodwill Ambassador by the Japanese Ministry of Agriculture, Forestry, and Fisheries, and in 2017 the Japanese Emperor bestowed upon him The Order of the Rising Sun, Gold Rays with Neck Ribbon, *Kyokujitsu chujusho* 旭日中綬.

Klavs Styrbæk
is a professional chef who owns and operates STYRBÆKS together with his wife, Pia. By combining a high standard of craftsmanship, sparked by curiosity-driven enthusiasm, he has created a gourmet centre where people can enjoy excellent food and where they can come to learn and take their culinary skills to a whole new level. Klavs is especially committed to seeking out unique, local raw ingredients that can be incorporated into new taste adventures or used to revisit traditional Danish recipes that might otherwise be forgotten. This delicate balance between innovation and renewal is demonstrated in his award-winning cookbook *Mormors mad* (*Grandmother's Food*) (2006), which was honoured with a special jury prize at the Gourmand World Cookbook Awards in 2007. In 2008 and 2019 he was awarded an honours diploma for excellence in the culinary arts by the Danish Gastronomical Academy. Many of the recipes that appear in the books co-authored with Ole originated in the test kitchens at STYRBÆKS.

Jonas Drotner Mouritsen
is a graphic designer and owner of the design company Chromascope that specializes in graphic design, animation, and film production. His movie projects have won several international awards. In addition, he has been responsible for layout, photography, and design of several books about food, some of which have been nominated for Gourmand World Cookbook Awards.

Mariela Johansen
who has Danish roots, lives in Vancouver, Canada, and holds an MA in Humanities with a special interest in the ancient world. Working with Ole and Klavs, she has translated several monographs, adapting them for a wider English language readership. Two of these, *Umami: unlocking the secrets of the fifth taste* and *Mouthfeel: How Texture Makes Taste*, won a Gourmand World Cookbook Award for the best translation of a cookbook published in the USA in 2014 and 2017, respectively.

Thanks and Acknowledgements

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- Our co-workers at *Taste for Life* for inspiration and collaboration regarding taste.
- Mathias Porsmose Clausen for providing unpublished microscopy images of the cell structures of various vegetables and *tsukemono*.
- The Japanese Embassy in Denmark for assistance in making contacts in Japan.
- Dr. Kumiko Ninomiya, Umami Information Center in Tokyo, for arranging visits to *tsukemono* factories in the Gunma Prefecture in Japan and for tracking down information about *tsukemono* production.
- Hideyo Shitara for his hospitality and for showing Ole around the Shitara *tsukemono* factory in Takasaki.
- Masami Kobayashi and Shuji Sawaguchi for showing Ole around the Shin-Shin *tsukemono* enterprise in Maebashi.
- Dr. Koji Kinoshita for priceless assistance with the correct use of Japanese words and expressions.
- Mette Holm for Japanese translation of the titles of the book chapters and for guidance regarding Japanese pronunciation.
- Anders Møller Pedersen from FSG Foods Scandinavia for providing a variety of Japanese specialty ingredients for the preparation of *tsukemono*.
- The Holistia Organic Market Garden in Odense for delivering top quality fresh produce.

The individuals who have generously made illustrations available for this volume are listed along with the picture credits.

Jonas Drotner Mouritsen has participated in the production of this book from its inception and has taken most the photographs.

This book was originally written and published in Danish, the mother tongue of the authors. The present volume is a fully updated and carefully revised version that was translated and adapted for a broader international audience by Mariela Johansen. Mariela undertook the challenging task of working with the interdisciplinary material to produce a coherent, scientifically sound, and very accessible book. This involved not only translating the text, but also checking facts, ensuring consistency, and suggesting new material and valuable revisions. The authors are extremely appreciative of her devotion to this project.

Tsukemono— a Japanese Culinary Art Based on the Science of Preservation

One of the best-kept secrets of Japanese cuisine, which the wider world has yet to discover in depth, is a range of side dishes known as *tsukemono* (つけもの, 漬物). The word, which is pronounced like 'tskay-moh-noh,' literally means 'something that has been steeped or marinated' (*tsuke* 'steeped' and *mono* 'things'). Most readers are already familiar with Japanese foods such as sushi, sashimi, ramen, teriyaki, tempura, and soy sauce. But where do *tsukemono* fit in? While they may not yet have appeared over the horizon in Western cuisines, these pickles are just as common a part of every traditional Japanese meal—breakfast, lunch, and dinner—as cooked rice and *miso* soup.

Although *tsukemono* are usually made from vegetables, some fruits, as well as a few rhizomes, and even flowers are also preserved this way. It is, therefore, more accurate to characterize them as 'pickled foods.' This is especially so in the sense that their preparation makes use of one or more conservation techniques, involving ingredients such as salt, sugar, vinegar, alcohol, seasonings, and fermentation media, in combination with methods including dehydration, marinating in salt and acidic liquids, fermentation, and curing. The process of making *tsukemono* amounts to more than just a simple way of preserving otherwise perishable fresh produce.

Tsukemono are normally prepared without any cooking and are eaten cold, so just about anyone can quite easily make many versions of them at home. Apart from their nutritional value, their contribution is to stimulate the appetite, add delicious taste sensations, and improve digestion, all while remaining an exceptionally elegant study in simplicity and esthetic presentation. The ordinary lightly marinated cucumber salad that is so common in many northern European cuisines can be tasty, but it comes up short when compared to a crisp Japanese *kyuri asa-zuke* made with small Japanese cucumbers. And even though pickled beets are wonderfully sweet and sour, the taste impressions we get from them are not nearly as complex as those from *shiro-uri kasu-zuke*, which are Asian pickling melons marinated in the lees left over from brewing sake. Preserved prune plums can be delicious, but again they cannot really compete with *umeboshi*, the small brined plum-like apricots that are placed in a mixture of plum wine and aromatic red *shiso* leaves.

When we eat *tsukemono* all of our five senses are engaged. The presentation of these pickles is simple and inspired by Zen esthetics—it combines different colours

***Tsukemono* terminology.** When *tsuke* follows another word it is changed to *–zuke*, for example in *miso-zuke*, which are vegetables marinated in *miso*. *Tsukemono* are sometimes called *oshinko*, *konomono*, and *okoko*—as *ko* means fragrant, the words can all be translated as 'things that have a good aroma.' These expressions underscore the idea that preparing *tsukemono* is not merely a method for preserving raw ingredients, but to an equal extent a way of creating interesting new tastes and aromas.

and shapes in a way that delights the eyes. When a piece of *tsukemono* moves past the lips and enters the mouth, the initial impression is a feeling of limpness, but the first bite reveals a completely different story. Its mouthfeel is surprisingly crisp and it is so crunchy that the sound immediately brings our sense of hearing into play. The taste impressions on the tongue are derived from salt and acid, as well as umami-rich compounds. Sometimes sugar and other seasonings that have been used to prepare the pickles enhance the flavour. Finally, when we chew on the *tsukemono*, the sense of smell is engaged as aromatic substances are released up into, and out through, the nose. These multi-sensory aspects of *tsukemono* are an intrinsic part of their appeal.

'The Taste and Smell of Home'

In traditional Japanese cuisine, *tsukemono* are the foods most closely associated with one's home. In his comprehensive work, *Japanese Cooking: A Simple Art*, the famous Japanese food writer Shizuo Tsuji states that for the Japanese these pickled foods are what bread and cheese are for the English and bread and wine for the French. The ways in which they are prepared are steeped in local traditions that are specific to communities, and even to individual families. These preparation methods are considered inviolable and dictate how the resulting *tsukemono* should taste.

Over the years, *tsukemono* have taken on a symbolic value and are regarded as a tangible expression of a mother's love for her family and concern for its well-being and good health. They are the very embodiment of solicitude and are an example of what is known as *ofukuro no aji* (an expression that describes the nurturing food prepared by one's mother). This is really no different from the nostalgia many of us feel for our own mother's home cooking and the taste of the comfort food of our childhood.

While *tsukemono* are evocative of 'the taste of home,' their special smell is even more strongly associated with a household. In a traditional Japanese house, this unmistakably pungent odour has permeated the whole building and greets one as soon as one opens the door. It is the heavy smell of *miso*, fermented rice bran, and the lees from sake brewing, or the sharp, acidic smell of vegetables in the pickling crocks. Although this is the so-called 'smell of home,' not everyone finds it particularly agreeable.

A simple Japanese meal consisting of cooked white rice, *miso* soup, green tea, and a small assortment of *tsukemono*.

Tradition and Renewal

The population shift from the countryside to the urban centres that started during World War II has had a profound impact on many aspects of Japanese life, including its culinary culture. Globalization and the adoption of Western fast foods has led to a decrease in the consumption of *tsukemono* and, to an even greater extent, undermined the tradition of making them at home. Most of these pickled foods are now produced in factories and their popularity has been on the wane since 1991. Whereas they were once an important and integral part of a meal, many now think of them as optional. There has also been a movement away from the more traditional and stronger tasting varieties in favour of lightly marinated vegetables with a lower salt content and a less complex taste.

This development has taken place in parallel with another, more striking change in Japanese food culture, namely, that households no longer make *dashi* on a daily basis. It takes time to make *dashi* from scratch and time is a precious commodity in a modern society. *Dashi*, which is a broth made from seaweed (*konbu*) and a preserved fish product (*katsuobushi*), is ubiquitous in the Japanese kitchen. In fact, umami, the special savoury fifth taste, was originally identified by analysing *dashi*. It is used not only in soups but can also be regarded as the focal point around which all Japanese cuisine revolves. It is difficult to picture

a real Japanese meal without cooked rice, *dashi*, and *tsukemono*, although the broth is now usually made from store-bought powders to which water is added.

The art of canning and pickling, which had virtually disappeared from many Western food cultures, is now enjoying a bit of a revival. This is also true of *tsukemono* in Japan, where there is a nascent, if somewhat nostalgic, movement to make them, once again, at home. And as has happened with other foods that have been mass-produced, the preferred taste of the *tsukemono* has undergone a change. The factory-made products with a variety of additives now on the market have a milder taste. As a result, many people find that those made according to the traditional preservation techniques have much stronger and more lingering tastes, which are quite different from those to which they have become accustomed. This is especially true of the intense taste and pungent odour of fermented products such as *kasu-zuke* and *miso-zuke*, which are made with sake lees and *miso* paste, respectively.

Pickling and fermentation of vegetables in crocks and jars, stored in a cold, dark place.

An analogy can be made with one of the most traditional foods found in Nordic cuisine, marinated herring. In former times, the herring were prepared in the old-fashioned way—ungutted, whole fish were placed in a

barrel with layers of salt and left for several months. The intestinal enzymes of the fish fermented and tenderized the flesh and it took on a strong, yeasty taste. Now they are usually made in factories that have introduced other ways of curing herring more cheaply and much more rapidly. The fish filets are marinated in a strong vinegar mixture, leaving the pieces firmer, but with a sharper, sour taste. Most consumers now prefer this taste, adopting it as the norm, and herring prepared in the traditional way have fallen out of favour.

Some Western food enthusiasts are once again turning to fermentation using natural lactic acid bacteria to preserve vegetables and fostering an appreciation of the resulting unique tastes and aromas. Many of the techniques involved in preparing *tsukemono* can be adapted for use with local ingredients that are readily available in other parts of the world. A more extensive knowledge of the Japanese preserving methods can serve as an additional inspiration for this revival and inform the evolution of what was until recently considered a 'lost art.'

Vegetables and *Tsukemono*—Made for Each Other

Every food culture in all parts of the world, regardless of its ethnic background, turns to the local plant kingdom for many of the ingredients that make up the daily diet. This is where we find fruits, vegetables, tubers, rhizomes, berries, nuts, seeds, legumes, and cereals, as well as large and small herbs. Vegetables, as such, are not a well-defined botanical category and we tend to classify raw ingredients from plants according to how they are used as food rather than on their genetic makeup and morphology. This is why we often refer to mushrooms, large seaweeds, and some fruits as vegetables—think of champignons, kelp, and cucumbers. Similarly, rhubarb is a true vegetable that we think of as a fruit.

Of the hundreds of thousands of different species of plants found on Earth, there are about two hundred that are regarded as vegetables. It is thought that humans started to cultivate plants at least 10,000 years ago and that the first domesticated vegetable was a type of marrow that was grown in the Middle East. The vegetables that we eat today have evolved and been improved by selective breeding over thousands of years to such an extent that they bear little resemblance to their ancestors that grew in the wild. As a result, those that are inedible or poisonous have largely been eliminated from our diet and the individual vegetables themselves are both larger and more nutritious. Unfortunately, in the past few decades the advent of agribusiness-style market gardening on an industrial scale has promoted the production of vegetables that grow quickly, contain more water, and are less flavourful.

Only some vegetables can be eaten raw and many are very perishable once they have been harvested. The question then arises as to how to make prepared vegetables more appealing and this is where storage, preservation, and the culinary arts come into the picture. But before turning our attention to how *tsukemono* can help us to overcome these challenges, let us digress briefly to consider why solving them is of increasing importance.

Moving toward a More Plant-Based Diet

Plant-based food plays a very prominent role in the cuisines of many parts of the world. But in others, including our own, where there is fairly ready access to meat it is either not particularly deeply embedded in the food culture or undervalued. It is to readers where the latter holds true that this section is addressed.