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Avoiding the Dire Straits:
An Inquiry into Food Provisions
and the Question of Scurvy
in Premodern Maritime and Military China

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Prologue: building up towards an interdisciplinary project

Food is – as hardly needs any explanation – a primary need of the human beings, as it is for all other living beings. Without a proper diet, it is impossible to sustain life and, since the dawn of humanity, it has been people's first and foremost task to secure their daily livelihood. Since the very early times of the hunter-gatherers, people have roamed around the various regions of the world in search of places that offer the most favourable conditions in terms of habitability regarding both climate and the opportunities for nourishment. Some peoples settled inland, while others would end up on the coast, which eventually determined their ways of life, culture and traditions, of which diet forms an inseparable part. Clearly, a connection can be observed between migration, travel and food. Even when the settlement of certain peoples had eventually reached its conclusion and the great cultural areas of the world had been developed, the food issue continued to provide a vigorous stimulus for leaving the homeland and this type of migration has never ceased to occur. In the more settled areas, food habits were steadily refined, while, among peoples who followed a nomadic or migratory way of life, it was still a matter of securing daily food supplies. Due to hostile climatic conditions, crop failure and resulting famine, people have always moved from one place to another in smaller or larger numbers.

Throughout the course of human history, even down to our own time, people have been mobile and on the move. In fact, history is characterized by a seemingly incessant stream of migrations. The reasons for covering short or long distances are legion. Food and the search for it has always been one of the locomotive factors that pushed people to and fro. A demographical explosion may force parts of a population to look for a larger area, where the inhabitants have more chance of a prosperous future. In addition, economical reasons may trigger the need to touch new horizons. Voyages of discovery, inspired by whatever reason, have occurred at all times and are vividly remembered in the collective memory of many a nation. In all this, food has always played a prominent role, but also provoked unseen challenges. Generally speaking, as time passed, the most urgent concern was no longer the provision of food for a whole people, but was narrowed down to specific situations.

Since time immemorial, many peoples of the world have lived in close contact with the sea and have answered its call for many different reasons. As a result, the world has witnessed the emergence of maritime cultures and the development of a whole complex of nautical technologies and skills. Yet, as soon as humans ventured out onto the seas and embarked on increasingly longer voyages, they also experienced the difficulties and hardships that remained almost inevitable for centuries on end, until definite solutions could be found. It goes without saying that the average expedition needed sturdy ships that could cope with various weather conditions and it is well-understood that the availability of a fair knowledge of astronomy, winds and ocean currents and many more aspects of seamanship could make a huge difference in the successful effectuation of a sea voyage. Still, what by no means could be overlooked was the health of the sailors and, therefore, the ships needed to be equipped with the necessary supplies. When examining

the history of long distance navigation and seafaring and making the actual life at sea our point of focus, the scholar is inevitably confronted with questions relating to the health conditions of those aboard ocean-going ships.

In this respect, it should be well-understood that piracy, infectious diseases and extreme climatic circumstances could seriously place the fate of an expedition in jeopardy or even ruin it. However, the danger could also come from the inside. Expeditions demanded long and meticulous preparations in terms of provisioning. Nevertheless, during the Middle Ages, one of the most disastrous problems for ships' crews was the vitamin C deficiency disease scurvy, which claimed countless victims over many centuries. Since the maritime traditions of many Asian peoples – not least the Chinese – go back a long way, an acute question emerges about how the seafarers of other maritime cultures coped with the specific obstacles, that appeared in their path while on the high seas. Research became all the more necessary when biochemists at Ghent University took a new approach towards the issue of provisions and scurvy paying special attention to the diversity of the peoples of the globe. The results of the thorough investigation carried out in recent years by Prof. Dr. Joris Delanghe and his team at the Department of Clinical Biochemistry at Ghent University, Belgium reveal that there is a genetic differentiation, which implies that Asian peoples are relatively more scurvy-prone than others. This freshly acquired knowledge sheds a whole new light on the issue. Subsequently, Prof. Delanghe took the initiative in contacting the Department of Languages and Cultures of South and East Asia at the same university, which triggered an interdisciplinary project that formed the basis of this doctoral dissertation. The tantalizing questions that were eventually to be answered may be formulated as follows: how did Asian or – more specific – Chinese sailors procure their food supplies? How did East and West differ in the application of preservation techniques for their food supplies? What knowledge did the Chinese have of scurvy? And, finally, can this differing proneness to scurvy be proven by means of our historical sources? In the light of the specific character of this topic, it goes without saying that a dynamic methodology should be developed, which integrates such generically remote fields as philology and biochemistry.

The complexity of the questions laid out above is mainly related to the specificity of the topic and the documentation that exists on it. Sailors' provisions is hardly the kind of subject to which an extensive collection of publications would be exclusively devoted. It is not a field of study *per se*, but occupies a position within broader fields such as maritime history or the history of food and food habits. It will surely come as no surprise that a topic like sailors' provisions will enjoy greater prominence in works that bring to attention the more personal stories behind the general historical reality, or that have come into being through an interdisciplinary approach. Although the food of sailors constitutes a crucial aspect of seafaring life, it remains a highly specific facet of it. Supplies are often left out of the primordial focus, as they have no factual impact on the general evolutionary paths and tendencies of economic history, that are so frequently studied. Nevertheless, the issue of scurvy and provisions has attracted attention, not least because there exists a relatively abundant collection of primary historical materials, which includes data on seafarers' supplies. Thus, the use of these documents enables us to obtain

a relatively clear picture of the dietary conditions at sea. Port documents, ships' logs and travel accounts, usually with few exceptions, make at a least brief mention of the provisions of the sailors. In the same writings, that is, where an extended sea voyage is concerned, one regularly encounters statements about scurvy and, on the whole, we are relatively fortunate to possess a considerably wide range of sources that are elucidative on the matter of the sailors' diet and scurvy. In this way, it becomes clear why the macabre story of scurvy has become a relatively well-known aspect of maritime history, although, to be well understood, the above mainly regards Western maritime history. When we contrastively embark on a quest for equivalent documents in Chinese history, the case suddenly becomes far more complicated than anticipated. While Chinese maritime history – like its Western counterpart – in the past century has been studied relatively thoroughly, it nevertheless appears that the actual living conditions aboard a seagoing junk have not yet been received serious attention.

The scientifically underscored connection between haptoglobin and vitamin C is not a terminal point but rather another step towards a better understanding of the function of micronutrients in the human body. Vitamin C is a somewhat mysterious substance that has not yet revealed all of its secrets. The more research that is being done, the more plentiful become the new findings. This is also the trend in the historiographical and philological component of this research. This dissertation is characterized by the fact that, all of a sudden, the issue of food supplies exceeds the boundaries of a *tiny little paragraph*, as stated above. An important task in this dissertation lies, firstly, in bringing Chinese sailors' food supplies into the limelight, by demonstrating that there is more to discover about this shadowy side of seafaring history. Once this has been accomplished, the final goal of this study will be to bring the results of both disciplines to a conclusion which may shed light on the topic concerned and serve as a platform for further study.

Introduction: hypothesis, methodology, survey

It will be agreed that the above argumentation makes us aware of an acute difficulty. As soon as I started to explore secondary literature dealing with maritime history, the lack of sources became apparent. Obviously, this was the first major obstacle that needed to be dealt with in order to carry out this research properly. Therefore, I had to find out whether there really was an absence of primary material (which, as I then feared, could seriously put the consecutive stages of the work in jeopardy and make any conclusions relating to the topic concerned rather speculative) or whether this so-called "absence" was due to the unexplored nature of the matter, whereby the readily available materials had, so far, remained untouched. In other words, the key questions were: were sailors' provisions and scurvy simply undocumented issues that had escaped the attention of the pre-modern Chinese scribes, or did these topics form part of an unexplored, neglected peripheral area of Chinese studies?

In tackling the problematic issue that presented itself, I determined that the first step would be a delineation of those areas of study that could provide perspectives for yielding basic and workable material. The, admittedly experimental, philosophy underlying this approach, was that the possible Oriental counterparts of the kinds of sources that pro-

vided data concerning sailors' provisions and scurvy in the West were highly likely to contain similar information. I assumed that an account of a fifteenth century Portuguese sea voyage that reported on cases of scurvy might enjoy a close relationship with a "distant relative" from the Ming dynasty, or that an eighteenth century British ship's document might shed light on the diet of sailors in the same way as would – initially, of course – an imaginary Qing manuscript about a trading junk. This tentative exercise in extrapolation paved the way for the visualization of the specific geography with which I would need to become acquainted, in order to find the keys to so far unopened doors. It goes without saying that what lay before me was not a strictly delimited zone, but rather a landscape, where I needed to keep constantly alert to whatever might appear on the horizon. The first field of operations that naturally comes to mind is the maritime history of China or – broadly speaking – East Asia. This search commenced with accounts that could contribute to the picture of the – often – nameless sailors' lives aboard a junk, whether written by a Chinese hand or by foreigners witnessing the marvels of Chinese seafaring. Furthermore, it had to be established whether there existed ship logs, port documents or other records, in short, those manuscripts that were produced in the sphere of seafaring activities and whether these in any sense referred to such a specific topic. What I had in mind were not only Zheng He's seven major sea voyages of the early Ming dynasty – which, of course, will be discussed in detail later – but also the regular, rather anonymous sea trading exploits on Chinese and other Eastern seas that have been going on for ages. Regardless of the length of the voyage, food remained one of the primary concerns. Similar considerations came into play in connection with the supplying of the armies of pre-modern China. In view of the occurrence of several cases of scurvy during military conflicts in Western history, this was also a matter that required a good deal of attention, and, given the fact that, in this context, newly acquired knowledge about the disease could have been noted down or put into practice, I wondered whether the rich medical traditions of China carried a trace of this, or was it the "neighbouring" field of dietetics that could at least provide some theoretical essentialities about the diet of "transients"? As the particular way of travelling which leads to a permanent change in settlement, migration is certainly something that characterized all times and all peoples. The Chinese, in particular and among many others, have written a lengthy chapter in the history of migration and emigration to the four corners of the world. Since the tracks which these people followed mainly led across seas and oceans, it is surely worthwhile to scrutinise this remarkable history more closely.

Having established the research area and the topics to be explored, the remaining difficulty was that the documents of which much was expected, still needed to be found, if indeed they had existed and remained in the vaults of the libraries of East and West. To this end, I, myself, was compelled to "emigrate" temporarily, travel around and do the necessary digging. As it seemed at the beginning, the chances of finding the relevant data depended on exactly what I wanted to find. As described above, food is a common daily phenomenon and, therefore, I surmised that the probability that notions of the dietary situation aboard a junk had somehow found their way into a textual document was high. Nevertheless, scurvy is a whole different issue in the sense that it is a highly "volatile"

phenomenon. Food is supposed to be present aboard a ship; scurvy is not. It is an incidental, accidental condition which only appears in extreme circumstances. In my opinion, this minimized the chances of the appearance of the disease in the textual sources, unless the problem had become of such monstrous proportions that it was inevitably reported. This surely did not seem to be the case. My estimations provided room for several options. If it appeared, in the course of time, that the accounts of scurvy in China were rather plentiful, then this would simply confirm the biochemical findings relating to haptoglobin polymorphism and vitamin C. Yet, the possibility could not be totally ruled out that the much coveted, though initially virtual, accounts would appear to be very few or even virtually non-existent. "Absence" would, as mentioned earlier, render the drawing of conclusions more difficult, but would in any case have an undeniable significance. The absence of accounts of cases of scurvy could mean that they had simply never been recorded or that scurvy had never occurred, because the kind of food aboard the junks or with the armies was "up to standard"; that is, it contained the necessary nutrients in sufficient amounts. Yet, a third possibility remained: perhaps the Chinese had never ventured very far out onto the ocean and had instead limited themselves to coastal shipping, so that the question of scurvy would be irrelevant. Whatever the outcome, it would lie in the vicinity of these assumptions and its referents. The views and insights that my colleagues cordially shared with me admittedly did not appear very promising at the beginning, and rather confirmed the absence of materials as mentioned in the first paragraph of this section. Nevertheless, having read a substantial amount of work, a different picture began to emerge. The collection of material from such a wide variety of places as the Needham Research Institute in Cambridge (UK), the Kyōto University Library in Japan and many other libraries in Taiwan and China (cf. 'Acknowledgements') ultimately resulted in the production of a fairly diverse list of workable sources that contain interesting data.

When we are dealing with a topic with numerous aspects, it may be useful to show how the pieces of the puzzle fit into the larger whole. It will be my goal steadily and carefully to build up the mountain with all its related foothills and embranchments that need to be connected. Given the fact that the deficiency disease scurvy is generally acknowledged to be a gloomy pathological shadow from the past, and since for over a century it has no longer troubled the minds of ships' surgeons and other physicians, the first chapter, naturally, will be devoted to presenting the historical background of the disease. The purpose of this introduction is not to provide an exhaustive and detailed list of the known cases of scurvy throughout history. This has been accomplished before to great success, in a thorough and surveyable way, and does not require revision. It will be more appropriate to sketch an overview supported by exemplary circumstances from history of instances when scurvy showed its face. In this way, it is hoped that a clear insight will be acquired, not only into the characteristics of the deficiency disease that plays a central role in this doctoral study, but also into the status of the historical research that has been done regarding this subject. In the first chapter of this dissertation it will not go unnoticed that extensive use has been made of Kenneth Carpenter's work, *The History of Scurvy & Vitamin C*. This is almost inevitable and rests on the fact that this author has

taken painstaking efforts to collect and process all possible knowledge on scurvy and has resulted in the most authoritative and encompassing monograph on the subject so far. I cite regularly from his manuscript and this also pertains to the excerpts from the original sources that Carpenter has so eminently woven together. As far as the availability of the original accounts allow, I tried to cite the original passages where this was deemed necessary. For the less accessible ones, I have relied on the excerpts cited by Carpenter. Yet, I have not engaged myself in a complete, reiterated study of all of this primary material, since this would have been impossible because of the difficulty of obtaining certain rare sources, that may have then proved either superfluous or irrelevant and would have pushed me far beyond my original goals. First and foremost, it was my intention to concentrate the bulk of my efforts on collecting what could be found in the Chinese sources and subsequently juxtaposing this onto Carpenter's trail-blazing work. It will, indeed, be a great honour to make a few modest comments about Carpenter's work and, more importantly, to complement it with new data from both Western and non-Western sources.

It will be noted that a distinction is made between *maritime* and *land scurvy*, although not the slightest difference can be perceived when purposely comparing the appearance of the disease on land and at sea. Irrespective of the location in which the disease occurred, we are dealing with one and the same ailment. Therefore, this classification into a maritime and a continental "version" of the disease appears, at first sight, somewhat artificial and superfluous, yet there is a good historical reason for applying these paradoxical terms. As far back as the Middle Ages, scurvy was considered to be exclusively a sailors' disease, because it predominantly cropped up during long sea voyages and its occurrence was, for a considerable length of time, attributed to the moist environment in which the sailors had to perform their duties. A connection with appearances of scurvy on land was only made with the advent of the first medical studies about the disease. Following the example of the most authoritative study on scurvy, I adhere to this distinction between land scurvy and sea scurvy, and this will also presage the character of the framework which will be employed in the following chapters when I attempt to remove the veil from the Chinese perspective of the matter. Chapter I concludes with an elucidation of the biochemical findings that have provoked the need for further research into the historical aspect of this topic.

The freshly acquired knowledge presented in Chapter I will make it possible to view the contents of Chapter II in a strong, comparative light. For, after an odyssey through Western history, I have chosen immediately to touch upon knowledge about scurvy in China, in the form of a medical text that has never hitherto been subjected to serious scrutiny. The *Yizong jinjian* 醫宗金鑒 constitutes the most elaborate, non-Western source on scurvy (or *qingtui yagan* 青腿牙疳 or 'green leg-gan of the teeth') which has been found so far. In Chapter II, this precious document will be extensively situated in its historical and medical context, translated, annotated and illustrated. Any consequences and implications that arise during this process will be forthwith evaluated. In adopting this approach to this medical text, it has been my intention to examine the document from both a Chinese and Western perspective. On the one hand, naturally, the contents should be analyzed within their cultural and terminological context, sprung as they have from

the age-old traditions of Chinese medicine. On the other hand, since vitamin C deficiency has functioned as a powerful stimulus to the conception of this research, it was almost inevitable and, at the same time, quite exciting to interpret the treatment methods that were proposed by mid-eighteenth century Chinese physicians, together with a close consideration of vitamin C. My initial reluctance, however, simply to judge the Chinese treatment methods by their efficiency, based upon the presence or absence of ascorbic acid in the products that were being applied, finally faded away and made room for a descriptive and comparative approach wherein both traditions were carefully juxtaposed. Whether this attitude proved fruitful will become apparent later, but, in any case, there was some comfort in creating a harmonious whole, from which surfaced the striking similarities, interesting dissimilarities and unique characteristics of both medical traditions. Furthermore, the contents of the text necessitated the clarification of the closely related issue of the provisioning of the Chinese army in pre-modern times. As Western history shows, scurvy, as a typical pathological phenomenon of extreme conditions, was likely to be pervasive during large-scale military operations. Apparently, such a situation was not alien to China, a country whose history has, since remote antiquity, been characterized by extensive military activity. From the diet of the soldiers, we may learn more about the systematically organized provisioning and survival in desolate areas.

Although considerable data is adduced in Chapters I and II, this may prove dissatisfactory, since an exact counterpart to the Western cases of scurvy has not yet been found. The sea was the specific area in which the disease caused particular havoc and deaths, so it is to the sea that I return in Chapter III, yet this time moving the focus towards China and the adjacent regions. First of all, I considered it necessary to shed light on the obstacles that hindered the unravelling of the issue of provisions in an Eastern seafaring context. The problems to be tackled were diverse, but appeared interconnected. A considerable 'disadvantage' which presented itself was the obvious discrepancy between Chinese and Western seafaring history in terms of the length of the ocean-going operations. Secondly, resulting from this dissimilarity, a lack of relevant sources appeared to impede the progress of my research. The ultimate challenge lay in the opening of the door to a virtually undocumented aspect of everyday seafaring life in Eastern waters. In the run-up to the textual source material, attention will be paid primarily to the geographical setting in which Chinese seafaring grew to its full stature. Subsequently, I will go into the heart of this dissertation and attempt an analysis of the contents of the pre-modern Chinese sailor's diet. The succession of subdivisions in this chapter progresses in a chronological manner, but is not restricted to separate dynasties. As material culture is unlikely to be grafted or pinned down strictly by such ephemeral political episodes as dynastic rules, I have chosen to allow thematic topics to govern the structure of this part. Notions about the ancient stages in Chinese maritime history are followed by the first long-distance sea travels, mainly but not exclusively in a Buddhist context, whereafter an impressive technique of providing an almost instant food supply to junk crews, archaeological contributions and the large-scale maritime wanderings of the originally nomadic Mongols will be reviewed. This episode sets the scene for the apogee of Chinese seafaring activities during the early Ming dynasty. Zheng He's seven expeditions, eventually arriving at the very

western extremities of the Indian Ocean, stand out in history, due to their scale. Afterwards, such huge fleets were never again dispatched on the high seas by the Chinese authorities. The size of the crew that set sail is unmatched in the pre-modern maritime history of the world and this very circumstance provokes a whole series of questions relating to provisioning and health care. Thirty years after the first expedition, the naval supremacy of the Ming was brought to a definitive halt with the total disbandment of the expeditions, yet despite the ban on ocean-going operations, Chinese junks never ceased plying the waves in the decades and centuries to come. In this respect, the Qing sources provide a wide variety of references to the supplying of sea vessels. These materials are enriched and underscored by journals and reports by Westerners, whose presence in China and Southeast Asia became more widespread during this period.

For Asian junks, the adjacent Pacific Ocean appears to have remained a peripheral region until relatively recent times, although the textual evidence compels me to pay attention to a particular case of seafaring. In general, the achievements of Japanese maritime history do not particularly qualify as a fruitful area for scrutinizing the probable incidences of diseases such as scurvy aboard seagoing junks, yet, in view of a peculiar phenomenon related to maritime activities in local Japanese waters, namely the drifting of Japanese watercraft in the Pacific Ocean, opening a window on the Japanese scene appears justified. Before introducing the stories of drifting Japanese trade junks, a general and brief history of Japanese seafaring history will serve as the necessary background for understanding the circumstances in which these involuntary adventures occurred. From there, we progress to a less reluctant form of sailing east, as occurred in the nineteenth century, when the Pacific water barrier which, since time immemorial, had separated East Asians from the North and South American continents, was finally breached. We will see how the discovery of gold in California attracted a massive current of Chinese migrant workers, who embarked on Western sailing craft and, later, steam ships that set sail from the southern ports. Most of them lived on the edges of society and regarded the 'Gold Mountain' as the beginning of a new, bright future. Before they reached their destination, a hazardous voyage across the Pacific Ocean could still present a dangerous challenge. The living conditions of the Asian passengers aboard these Western ships appeared to be quite miserable, and the occurrence of scurvy led me to include this hideous episode in the mainframe of this research. In the last section of this chapter, we will return to consider the far shorter sea voyages undertaken by the seasonal workers of Fujian 福建. To this, I will add the results of fieldwork I personally carried out in the region, together with a historical survey of pickled vegetables, a crucial component of the pre-modern Chinese sailors' diet.

In the previous chapters, the extreme importance of adequate and qualitative food supplies for sailors is abundantly demonstrated, although, so far, little mention has been made of water, that other crucial component of a stable diet, which is certainly of high value when sea voyages pass through the tropical regions of the globe. Depending on the occasional rainfall was too risky a practice and, therefore, proper care and attention was paid to a sufficient sweet water supply which, in addition, could be preserved or replenished during the voyage. In Chapter IV, the issue of the water supply will become the

focus. The aim is not to deal with this topic as elaborately as that of the food supply but to outline the most common difficulties that sailors encountered in securing the purity of their water reserves. The introduction of the knowledge of the Eastern and Western traditions will show how seriously this matter was regarded. Although not directly related to the problem of scurvy, this consideration of the water supply is intended to function as a preamble to the particular use of water in the production of tea, that typical Chinese beverage which had unexpected consequences in the light of the nutrition available aboard Chinese vessels.

During the later dynastic periods, contact between China and the West intensified rapidly. In the wake of the merchants, Christian missionaries covered the huge distance to the east, hoping to spread their beliefs in China. Their baggage not only consisted of a religious faith, but also of a battery of knowledge pertaining to various intellectual disciplines. The result was the gradual transmission and exchange of knowledge, and, in later ages, a variety of works on diverse themes found their way to China. One of the numerous examples regards a manuscript on health care in the navy from the late nineteenth century. It is, in fact, a translation of a French work which, among others, deals in detail with the main diseases found among the marines of the French navy. Strikingly, the text pays a good deal of attention to scurvy and is especially notable for its terminology. *Qingtui yagan* was the name by which the eighteenth century physician in the northern army identified scurvy, but this term was unknown to the translators in the nineteenth century, as they use a Chinese equivalent for 'scurvy' that was based on the description in the original. Chapter V attempts to clarify this issue. The contextualization of this unique manuscript is followed by an analysis of a more practical case study relating to vitamin C deficiency. The extensive flooding in Shandong province in 1935 necessitated the creation of refugee camps where poor diets provoked the occurrence of scurvy. The medical article which was written on the subject of this incident will be brought forward and studied. After the completion of Chapter V, it is time to summarise the data employed in this book and, consequently, an attempt is made to quantify it. This entails the positing of a virtual Chinese sailor's diet in pre-modern times, with specific attention to its nutritional value.

Before embarking on the tale of scurvy and provisions, I wish to provide some further clarification of the use of the geographical terms 'East' and 'West' in this dissertation. Although no more explication should be given than is necessary, it is appropriate to say at least a few words on this subject. By applying these concepts, I do not intend to refer to sharply carved out geographical areas. These terms are also completely devoid of any Eurocentric connotation. It should have become clear by now that, in this dissertation, there is no place for opposition, rather a fruitful comparison is my goal. It can be easily understood that the terms 'East' and 'West' are rather basic and plain designations, used for reasons of convenience, to refer to well-known areas of the world, each with its own traditions and developments, that are, at times, connected, to a greater or lesser degree, and, at others, completely independent, although very similar.