PREMODERN EXPERIENCE OF THE NATURAL WORLD IN TRANSLATION

Edited by
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2 Scientific Tasting

Flavors in the Investigation of Plants and Medicines from Aristotle to Albert the Great

Marilena Panarelli

Among the most controversial terms that were translated in the context of medical pharmacology during the twelfth and thirteenth centuries are, without doubt, those related to the classification of flavors. This is especially true from the perspective of the history of knowledge transmission. Although initial attempts to categorize flavors were made during Antiquity by Aristotle and Galen, a thorough categorization was completed only during the Middle Ages, in the field of Arabic medicine.[1] This categorization was then translated into Latin and transmitted to the Latin West.[2]

The transmission of knowledge regarding sensory data—such as flavors—faces some particular linguistic and epistemic obstacles, since such data are closely linked to direct experience. In addition, a precise categorization of flavors required a systematic approach to the experience of natural elements such as plants. I investigate the development of the doctrine of flavors during the Middle Ages, in terms of two questions: What role did the doctrine of flavors play in the development of medical and philosophical knowledge in the period? And how did the translation of terms for flavor from Greek to Arabic to Latin and the classification of flavors facilitate the transmission of scientific teachings on flavor across linguistic borders?

The most important value that flavors carried for the premodern natural philosopher was not their phenomenology, but their expressive properties. For different scientists, the different flavors could express anything from the substantial qualities of plants, to the pharmacological properties of simple medicines (*simplicia*), to the states of maturation of food, to the operations of drugs. How could the same flavors, with the same phenomenological properties, be expressive of such a wide range of different scientific ideas?

To answer these complex questions, I will turn first to the disciplines within which the flavors were put to use in shaping scientific ideas. It is well known that flavors played a key role in the discipline of botany and in practical medicine, both dietetics and *materia medica*. These disciplines had different ends—knowledge for the sake of knowledge (botany) and knowledge for the sake of use (practical medicine); knowledge for the sake of use in food (dietetics) and knowledge for the sake of use in

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drugs (*materia medica*). This meant that the flavors were translated into disciplines that overlapped, but were not identical. In each, the flavors took on different epistemic values, even though in the experiences of their phenomenological properties, they remained the same.

These epistemic translations of the phenomenologies of the flavors between different disciplines are the focus of this chapter. Specifically, I ask how, against the background of Aristotle and Galen, three medieval scientists translated the phenomenology of the flavors into dietetics (Isaac Israeli), *materia medica* (Avicenna), and botany (Albert the Great). I look at the scientific translations in Latin only, even though Aristotle and Galen composed their works in Greek, Isaac Israeli and Avicenna in Arabic. This is because I aim to show, first, the scientific ideas with which Albert the Great, the main focus of my chapter, was acquainted and, second, that he decided to pursue his own scientific goals by integrating flavors into the science of botany.

Interlingual and Interscientific Aspects of Flavor

In ancient Greek, there was an implicit relationship between the doctrine of flavors and the doctrine of humors, though this was lost in the Latin translations. The ancient Greek term *chumós* refers to flavors and humors at the same time.[3] Thus, in ancient Greek, there is a kind of assimilation between flavor and the object to which it refers: the Greek term does not denote the perceptive state of the one who tastes, but the physical state of the object of taste, its liquidity.[4] However, in Arabic and subsequently in Latin, *chumós* was translated using two different terms, separating the notion of flavor from the object of perception and instead linking it to the subject by indicating the perceived sensation of the one who is tasting. In Arabic, the notion of *chumós* was split into the words *khilṭ* (pl. *akhlāṭ*), translated into Latin as *humor*, and *ṭaʿm* (pl. *ṭuʿūm*), translated into Latin as *sapor*.[5]

The Latin epistemic viewpoint arising from the Greek *chumós* classifies flavors by systematizing humoral theory: to acknowledge a certain kind of flavor, one must identify the dominant humors or, more specifically, the complexion, which is thought of as the dominant quality resulting from the humors present in a body. This relation between *sapor* and *complexio* requires investigation, as the notion of *complexio* indicates a kind of pharmacological identity of a natural living being. As such, identifying the complexion is the primary goal of sensorial analysis. A certain complexion is also associated with certain medicinal properties of a drug or plant, which can be deduced from perceptible features such as form, color, smell, and, especially, flavor.

An epistemic analysis of *sapor* in its relationship to *complexio* is highly significant for the history of medicine, as it may help to reveal the nature of *simplicia*, medicines made of single ingredients taken from a plant. Among the different meanings assumed by the Latin term for flavor,

sapor, the first to consider is thus its meaning as an epistemic tool of *materia medica*, pharmacology. There, flavor is the quality that, through *experientia*, makes the complexion of a natural object and its humors epistemically accessible.

To investigate the term *sapor* from this perspective, we must also analyze it as an epistemic object of theories of sense perception, looking at systematic approaches to sensible knowledge that led to the idea of reiterated experiences, *experimenta*. In fact, *sapor* is a term of both sense perception and experience, as the recognition of different flavors is the first step in a cognitive process that leads to the identification of a drug as useful for a certain kind of disease. In other words, the recognition of the differences between flavors enabled scientists to acquire a fundamental part of medical knowledge, the attribution of particular operations to particular drugs. In other discourses as well, flavor became an instrument to investigate plants as natural beings per se and the differences between them. In these discourses, too, flavor was one of the most fundamental epistemic tools, since it could provide clues to the maturity of foodstuffs and the substances of plants.

Aside from its relationship to *complexio*, another aspect of the term *sapor* is key to its history. In Latin, the semantic root shared by humor and flavor in Greek was lost, and a new etymological similarity came into focus. *Sapor* was declared to be the etymological root of *sapientia*, as in the well-known Latin saying *sapientia a sapore dicitur* (wisdom is said [to come] from flavor).[6] This etymological association of *sapor* and *sapientia* was common, but it connects two semantic fields that are actually very distant: *sapor* belongs to the senses and corporeity, *sapientia* to the field of intellectual knowledge and spirituality. Still, in the early seventh century, Isidor of Seville, in his *Etymologiae*, already acknowledged the connection between the two terms: in the same way that the sense of taste discerns flavors, the wise man discerns the causes of things, having access to the truth.[7] The activity of the wise and the activity of taste both presuppose a kind of discernment. The link between flavor and wisdom prompts the assumption that—at least in Latin culture—knowing something means recognizing its specific flavor. Thus, the sense of taste is the sense that leads to a deep knowledge of its object, implying an assimilation of the object.

In Latin, *sapor* also bore an allegorical meaning derived from biblical sources. Biblically speaking, tasting the fruit of the tree of knowledge is the origin of sin itself: by experiencing this taste of knowledge, the first man sinned. In the eyes of medieval Christians, taste, more than any other sense, determined the destiny of humankind. What remedied this original sin, depicted as tasting the forbidden fruit, was the sacrament of the Eucharist, through which humans could regain grace.[8] For the thirteenth-century Dominican friar Albert the Great, the fruit of sin is thus contrasted with the sacramental bread. Both foods are charged with meaning, but they have opposite flavors. Among the five senses, then, taste is the one that may cause sin or grace.[9]

Similarly, *sapor/sapientia* included two opposites of the cognitive process: taste, as one of the five senses, is the beginning of the process of knowledge, whereas *sapientia* is the highest degree of knowledge. In a passage of his *Super Iob*, Albert assigns an allegorical value to the sense of taste, linked to exercising judgment.[10] Taste implicitly involves the capacity of judgment, which imitates *sapientia* as such.

The extent to which this new etymological approximation influenced Albert's botany and his use of flavor there will be discussed below. For now, I shall turn to his scientific and medical sources—first Aristotle and Galen, then Isaac Israeli and Avicenna—in order to investigate their scientific translations of flavor.

Aristotle (384–322 BCE)

During Antiquity, Aristotle was one of the first to attempt a categorization of initially seven and later eight flavors, mainly in his *De anima* and *De sensu et sensibilibus*. As part of an investigation of the sensitive soul, Aristotle provided a general treatise on each sense in the *De anima*, where he connects the sense of taste to the sense of touch.[11] Aristotle states that the object of taste is tangible because it does not need any medium to be perceived. The tangible substance that is the object of taste is a moist substance, and moisture is a necessary condition for taste to be perceived.[12]

In *De sensu et sensibilibus*, Aristotle gives a more extended definition of flavor. Having claimed that water is tasteless, he observes that flavors appear when nature transforms water by adding a dry substance through the action of heat. Flavor originates when the dry substance ages into a moist one,[13] and thus results from its own opposite. In the same passage of the *De sensu*, Aristotle explains that flavors are most evident in plants precisely because they have a dry temperament, so that the contrast between moisture and dryness is stronger in them.[14] Flavor can therefore be defined as the property resulting from the dry solid (*xēros)* acting on moisture (*ugrós*). As such, flavor occurs only in food, which is a mixture composed of solid and liquid substances.

To support his thesis that the fundamental prerequisite for the perception (*aísthesis*) of flavor (*chumós*) is moisture, as the Greek term itself already expresses, Aristotle observes that the tongue is unable to perceive taste when it is completely dry, but also when it is too moist: the moisture present in the tasty substance has a solvent power on the tongue. This is why taste is a sense that perceives without a medium. By explaining the term in this way, Aristotle laid the foundation for a close connection between the doctrine of flavors and the doctrine of humors.

In *De sensu* 442a, Aristotle proposes that there are original flavors: just as all colors derive from black and white, all flavors derive from sweet and bitter.[15] These are the strongest flavors, as sweetness implies an excess of moisture, bitterness a lack of moisture. In both *De anima* and *De sensu et sensibilibus*, he lists the same kinds of flavors: sweet, bitter, oily,

salty, pungent, grating, sour, and sharp.[16] The main difference between the two works is that in *De sensu* he claims they are seven in number, defining oily as a species of sweet, whereas in *De anima* the number increases from seven to eight, as oily is considered a distinct flavor. *De anima* gives a full classification of flavors and establishes three categories: simple flavors, intermediate flavors, and derived flavors. A precise quality of the substance is assigned to each flavor and there is a precise causal relationship between them. Each state of the moist substance has its own corresponding flavor. This Aristotelian approach constitutes the starting point for the translation of the eight flavors into other discourses, Galen's medical discourse being the first I turn to here.

Galen (129–c. 216 CE)

Aristotle's classification of the flavors and their connection to the sensation of taste was loosely related to a specific object, foodstuffs, but Galen translates it into his medical corpus with a clear focus on one specific object carrying those flavors: simple drugs, whose virtues, he suggests, can be discerned by means of an elaborate experiential regime. In Book IV of his *On Simple Drugs* (*De simplicium medicamentorum temperamentis ac facultatibus*), Galen offers a very detailed discussion of flavors, which proved to be crucial for the medical traditions in Greek, Byzantine, Arabic, and Latin lands.

The Latin translation made from the Arabic translation of *On Simple Drugs* is attributed to Gerard of Cremona (though this attribution remains controversial).[17] After describing the properties and effects of plants in the first books of the work, Galen dedicates the fourth book to the study of flavors, on the assumption that flavors are expressions of those properties and effects. In other words, the analysis of flavors in general is translated here into an analysis of the flavors of drugs. The pharmacological properties of the simple drugs become possible to grasp through a sensorial analysis of what is tasted. I will now explore how Galen manages this work of translation.

Galen devotes the first chapter of Book IV to the organ of taste, the tongue.[18] In contrast to the other sense organs, Galen defines the tongue as the "purity of sense" (*puritas sensus*); it is able to transform itself into that with which it comes into contact, as the saliva collects the juice of what is being tasted. He then compares the exercise of the senses to that of reason: just as dialectic leads human reason to recognize the truth, avoiding *sophismata*, so the correct exercise of the senses leads the physician to recognize the nature of the drug. The careful investigation of the flavors of drugs thus leads to a deep knowledge of them—making such investigation indispensable for the student physician.

The student of medicine, Galen argues, must memorize the precise phenomenology of the flavors of specifically expressive plants and drugs, so that each flavor may be easily recognized during the practice of medicine

and not mistaken for another. For instance, in order to recognize the phenomenology of a pungent flavor, Galen insists on student physicians practicing their sense of taste by repeatedly consuming garlic, chewing it and holding it in the mouth for a long time. Learning to recognize the phenomenology of an astringent flavor, the student should consume new wine, and for the phenomenology of bitterness, the ideal substances are borax, nitrate, and myrrh.[19]

In this Galenic exercise, Aristotle's eight flavors provide the conceptual basis for the sense experience: they enable the student physician to recognize the particular phenomenologies of flavors in the foodstuff or drug. Once the student's senses have been sufficiently trained and stabilized in their exact recognition, he can move on to the second step, associating the stabilized sensorial qualities with particular virtues of drugs. This step involves a translation of phenomenologies of flavors into the operative properties of plants and, in medical practice, back from the operative properties into the phenomenologies.

For Galen, then, the discernment of flavors is already a kind of technical knowledge, attainable through a precise methodology. Training the senses under the guidance of a conceptual apparatus that distinguishes between eight different phenomenologies of flavors—inherited from Aristotle—helped Galen to scientifically translate flavors into useful knowledge for the accurate discernment of virtues in plants and drugs.

As these remarks on Galen's experiential method show, the phenomenology of flavors is here already connected with the study of botany. If one wants to determine the properties of vegetables and fruits, one must investigate their flavors, as these give some indication as to ripening, for instance.[20] Moreover, when he discusses the flavors of plants, Galen also attends to notions of botany. Flavor being the most reliable expression of the nature of a plant, it is necessary to recognize flavors so as to prepare a drug correctly, but also to be familiar with plants and fruits in other respects.[21] The Aristotelian doctrine of flavors is thus both a fundamental epistemic instrument for the Galenic physician and useful with regard to the knowledge of plants and fruits that is needed for understanding botany as such.[22] This theoretical framework, set out by Aristotle and Galen, formed the core of medieval reiterations of the topic, although the medieval thinkers I shall discuss systematized it more thoroughly.

Isaac Israeli (c. 832–c. 932 CE)

As in so many aspects of the transmission of knowledge, Arabic writers played a special part here. They not only reconsidered the number of existing flavors, but also translated the epistemic role of flavors into new classifications of foodstuffs. Most importantly, although the semantic connection between humor and flavor implied in ancient Greek was lost in Arabic, the dependence of flavors on the different kinds of humors was systematized in detail in some Arabic medical sources. One of the works

where we find this translation into a full-blown theory is Isaac Israeli's *De diaetis universalibus*. Translated into Latin by Constantinus Africanus, this was one of the most important sources of Constantine's *De gradibus*, a fundamental text of the Salernitan Medical School.[23] The section on flavors in Isaac's *De diaetis* is a long and well-structured piece of theorization. It begins with a statement that identifies the cause of the diversity of flavors as the different *complexiones* of food: the preeminence of one of the active qualities (heat or cold) over one of the passive qualities (moisture and dryness) generates different kinds of flavors.[24]

According to Isaac, there are two causes for the diversity of flavors: differences in the *complexiones* of foodstuffs, and differences in the actions of the active qualities on the passive ones. Isaac offers a kind of genealogy of flavors, stating that the beginning (*initium saporis*) is twofold—a flavor needs both the dry and the moist substance to be perceived, which is in line with Aristotle's explanation.[25] This means that the mutation of flavors corresponds to a change in the balance of dried and moist components. Here, Isaac clearly relies on the idea, already present in Galen, that a different flavor can be associated with each step of a fruit's maturation. This idea would become central some centuries later: in Albert's *De vegetabilibus*, for instance, we find the notion that the growth of fruits and plants can be considered a kind of cooking.

For Isaac, the different degrees of flavors represent the different degrees of the process of the perfection of the fruit, as the maturation of a fruit is always a passage from tartness (*ponticitas*) to sweetness (*dulcedo*). This example helps him to explain how one flavor changes into another. The passage from one flavor to another can be gradual or immediate: grapes, for instance, become *dulces* only after before having been *acetosae* (sour) and *stipticae* (astringent), while dates do not pass through such intermediate stages, their taste changing immediately from tart to sweet. However, a nongradual transformation from tartness (*ponticitas*) into sweetness (*dulcedo*) may happen in two ways, depending on the modification of the tangible qualities of the substance itself: it may be due to the substance of the fruit being hard from the beginning or becoming hard while becoming sweet.[26] Once again, the cause of different processes of fruit mutation is sought in the composition of the nourishment.

Unlike Aristotle and Galen, Isaac thus considers the phenomenology of flavors to reflect the state of the substance, namely the kinds of moistures present especially in vegetal foods. Isaac translates the phenomenology of flavors into a context that is directed not only at the exercise of the sense of taste as such, but at an interpretation of the general state of the substance—at the ability to recognize the kinds of moisture present in the substance and, consequently, their specific actions.

A key piece of theory underpinning Isaac's phenomenology of flavors is that the balance between heat and moisture generates different kinds of *sapores*. This interpretive scheme translates every type of moisture into a certain type of flavor, which may be further distinguished. For instance,

the flavor-type tartness (*ponticitas*) may be modified into two different kinds of flavors, astringency (*stipticus*) and sourness (*acetosus*). But the description of the transition from one flavor to another also implies that there is a causal relationship between them, one that testifies to different states of transformation of the same substance. This transformation is regarded as the perfection of a fruit, leading to its maturation. Sweetness is the flavor that indicates the highest edibility, as Galen also noted several times, because it corresponds to the last step of maturation.

It is not by chance that Isaac considered the *complexio* of sweetness to be the one closest to that of human beings; this explains why sweet foods are the most nourishing and most easily digested. At the same time, the translation of flavors into a theory about *complexiones* carries significant implications: the epistemic value of flavors, conceived of as phenomenological information derived from sense perception, is no longer universally valid, but always valid only relatively to the tasting subject. A certain kind of flavor may indicate that a substance is good for humans, but that might not hold true for every other animal as well. Isaac's categorization served as a way of determining what kind of foodstuff was most suitable for the different human temperaments, in a text that became one of the most authoritative sources on this doctrine not only for dietetics, but also for pharmacology and botany.

Avicenna (Ibn Sīnā, c. 980–1037 CE)

Whereas Isaac translated the phenomenology of flavors into a theoretical categorization concerning food and dietetics, Avicenna went a step further by establishing a clear connection between flavors and the virtues of drugs. This type of scientific translation from the perceivable properties of plants to their unperceivable virtues was complex, and Avicenna reflected carefully on the investigation of the effects and operations of drugs.[27] He suggested that in general such an investigation may proceed in two ways, through experiments (*semita experimenti*) and through rational analysis (*semita rationationis*);[28] the particular study of flavors was part of the second method, rational analysis. Avicenna understood this to imply a kind of reasoning that moved from recognizing the sensory features of the substance to understanding its medical uses. Accordingly, he translated the thinking of Aristotle, Galen, and Isaac into a profound system of *materia medica*, clearly indicating how specific qualities of the substance of each drug may be deduced from its sensorial qualities, such as color, smell and, most importantly, flavor. For instance, bitterness indicates that a thick, earthy substance is warm (*substantia spissa ac terrea calida*), tartness (*ponticitas*) that it is cold.

Especially interesting in this account is Avicenna's assumption that a specific operation of a drug corresponds to a particular kind of flavor. The operations are understood as the direct effects of the substance of the drug, to be expected on the basis of an analysis of the drug's physical

qualities. Recognizing the flavor is therefore one way to deduce the drug's utility. Indeed, each flavor corresponds to a certain *operatio* of the drug, so that a proper understanding of the sensorial data enables the validation of the practical aspect of medical science. The ultimate goal of this investigation is to heal, but a prerequisite for that is profound knowledge of the individual drug, which implies being well acquainted with the plant. The categorization at the base of the Avicennian doctrine may be summarized as follows:

Sapor	*Operatio*
Sweetness (*Dulcedo*)	Smoothing and increasing nourishment (*Lenificatio et multiplicatio nutrimenti*)
Bitterness (*Amaritudo*)	Wiping (*Abstersio*)
Tartness (*Ponticitas*)	Contracting when it is weak, squeezing when it is strong (*Contractio si est debilis, expressio si est fortis*)
Sharpness (*Acuitas*)	Contracting, hardening, holding back (*Contractio et induratio et retentio*)
Saltness (*Salsedo*)	Wiping and drying up (*Abstersio et exsiccatio*)
Astringency (*Stipticitas*)	Contracting and thickening (*Contractio et inspissatio*)
Oiliness (*Unctuositas*)	Lubricating and low burning (*Lubrificatio et coctio parva*)
Sourness (*Acetosus*)	Putrefaction (*Putrefactio*)

Each operation pursues a particular medical goal, being useful to heal a certain disease. Avicenna divides them into three groups. The first group includes universal and the second group particular operations; the third group comprises those operations that are similar to the universal. Avicenna's categorization of the operations is so elaborate that he eventually lists forty-nine different types of operations.[29]

It is impossible to analyze this aspect of Avicenna's medical account here, but it should be mentioned that each operation may be deduced from certain sensory qualities of the drug, following a sensory analysis that is even more precise and complex. This is especially true for drugs composed of more than one flavor. For those cases, Avicenna provides an interpretive schema encompassing the various possible combinations of two or more simple flavors.[30] Bitterness and astringency (*amaritudo et stipticitas*), for instance, produce a flavor called *horribilitas*, while the combination of bitterness and saltiness yields a flavor called *turpido*. If two different flavors are present in the same substance, a wider range of operations is ascribable to it, which may enhance each other, acting

synergistically. Thus, in a composed flavor, the recognition of the simple flavor component is a step of the *semita ratiocinationis* designed to delineate the virtues and the operations of the medicine. The correct sensorial analysis, which presupposes a proper training of the sense of taste much like that I have described for the case of Galen, also has a specific goal: to discern the drug's *complexio*.

By translating the phenomenology of the flavors into a precise pharmacological interpretation intended to determine the compatibility between the *complexio* of those who ingest the drug and the *complexio* of the drug itself, Avicenna corroborates and systematizes the idea that the *complexio* of the drug corrects the faulty *complexio* of the sick person. Based upon an analysis of the phenomenology of flavors, the aim of studying drugs is thus to discern their different complexions in order to establish how to heal the varying degrees of a disease. In this way, Avicenna builds upon the phenomenology of flavor to contribute to medical pharmacology.

Albert the Great (c. 1200–1280 CE)

Albert the Great's treatment of flavor in his *De vegetabilibus* is unique among the ancient and medieval thinkers discussed here. Although it is not a medical work, the main aspects of the medical tradition just outlined appear in it: Galen's experiential method, Isaac Israeli's dietetics, and Avicenna's *materia medica*. Albert's work thus translates the phenomenology of flavors into the philosophical investigation of the vegetal world, detaching it partially from medical usefulness. In Albert's account, flavor is no longer the means of knowing the drug, but of knowing the plant as such, the object under investigation in natural science. With regard to plants, Albert mainly revisits elements I described for Galen's *On Simple Drugs*, connecting the term *sapor* to the term *experimentum*. In this context, too, Albert translates *experimentum* from the purely operative science of medicine into an inquiry into substances, as prevalent in the *scientia de plantis*.

More specifically, in the sixth book of *De vegetabilibus*, Albert declares a change in course: from now on, the philosophical consideration of the universals of plants is replaced by an investigation of the particular.[31] The whole sixth book is dedicated to a kind of argumentation assuming that the particular can be known. Yet if the universal truth is known due to the employment of logic, specifically syllogisms, how can the truth of the particular be known? Albert answers this question at the beginning of the book: "For it is experiment [*experimentum*] alone that certifies with regard to such things [i.e., particulars], since syllogisms cannot be made use of with regard to the natures of such particular particulars."[32]

Here, the definition of the word *experimentum* matters. Chiara Crisciani and Joel Agrimi show that the medieval *experimentum* is a *collatio* of regular and stored sensible impressions and memories.[33] This

terminology of *experimentum* developed mostly at the faculties of arts and medicine during the thirteenth century, where Albert also played a major role. Thus, Albert's statement that in order to know a plant, or rather in order to know its virtue, one must experience it through its flavors—which accords with the Galenic-Avicennian tradition—is highly relevant: "Flavor is what gives the most certain experience of the virtues of plants."[34]

In this Albert partially contradicts Avicenna, who considered the analysis of flavors to pertain to the path of reason (*semita ratiocinationis*) rather than to experience. The term *experimentum*, which Albert translates from the medical tradition into his philosophical investigation, thus acquires a slightly different meaning. In a philosophical treatise like *De vegetabilibus*, the *via experimenti* coincides with the analysis of sense perceptions, and flavor is the most phenomenologically explicative of a plant's experienceable qualities.

Following his predecessors, especially Avicenna, Albert lists eight plus one different types of *sapores*, adding *insipidus* (the tasteless) to the classical eight. Because he considers flavor the most reliable epistemic instrument to study the vegetal world, Albert says that those who want to gain knowledge of plants should very carefully (*intentissime*) get to know their flavors.[35] Albert defines flavor as the *proxima sequela complexionis*,[36] the most immediate effect of the *complexio*. Identifying the *complexio* is the aim of this investigation, exactly as it was for Avicenna. However, the operation of a drug is not absolute, but related to the *complexio* of the drug itself and to that of the sick person—the action of a plant changes depending on the body on which it acts. If the two *complexiones* are similar, the action of its virtue will be feeble; if they are dissimilar, the action will be *vehementior* (more vigorous).

On the basis of this theoretical framework, it can be explained why certain plants are edible for certain animals but not for humans. As an example, Albert cites henbane, *jusquiamus*, a herb toxic for humans but much loved by sparrows. The explanation lies in the "similarity and difference of complexion" (*similitudo et dissimilitudo complexionis*): it is toxic for humans because of the powerful action of its heat, which is too strong for and quite unlike the human *complexio*. Another aspect is of note here: Albert no longer limits the meaning of the term *complexio* to the field of medicine and the operations of drugs, but translates it into the much wider semantic field of botany.

For Albert, just as for Aristotle, the sense of taste can connect to its object without an external medium. The contact between taste and its object is direct, because the only medium taste needs to perceive flavor is the *medium humidum salivale*, which coincides with the investigated object itself—in plants, the sap or *succus*. This closeness between the perceiving subject and the perceived object enables knowledge of the "intimate and first virtues" (*virtutes intimae et primae*).[37] The close connection between flavors, saliva, and plant juices is strongly emphasized here. Albert was

also aware that the two terms *sapor* and *humor* were expressed by the same ancient Greek word,[38] which is why he adds that the connection is not explicitly expressed in the Latin.

Of all the senses, taste is the most reliable one, being closest to the substance of the plant. Albert warns against the error of other senses. Color can often be misleading (white, for instance, is a sign of a warm substance if it is earthy, but a sign of a cold substance if it is watery), and even taste must be analyzed carefully, as the perceived flavor is always a composition of different flavors, only one of which is dominant. In fact, the epistemic goal of "knowledge of flavors" (*scientia de saporibus*) is probability (*probabilitas*) and not necessity (*necessitas*). Taste has to be interpreted in its phenomenology and as such is prone to error. Taste does identify a certain quality of the substance, but among the qualities there are some—for example, the cold qualities (*qualitates frigidae*)—that might be confused with others. In this case, Albert again translates the information from Avicenna's *Canon* faithfully. Knowing a plant means tasting it, subjecting it to a careful sensory analysis that prevents one from being deceived by fallacious sensitive appearances.

In Albert's *De vegetabilibus*, the nine flavors are listed hierarchically, from the *sapor insipidus* at the top to *amarus*, *acutus*, *salsus*, *acetosus*, *ponticus*, *stypticus*, and *pinguis sive unctuosus* and *dulcis*. The substance that bears flavor (*substantia ferens saporem*) can be of three kinds—*grossa*, *intermedia*, and *subtilis*—and its quality can be of three kinds as well, namely *calida*, *intermedia*, and *frigida*. Each substance and quality corresponds to a certain kind of flavor:

Substantia	1. *grossa*	2. *intermedia*	3. *subtilis*
a. *calida*	amara	salsa	acuta
b. *intermedia*	dulcis	insipida	pinguis
c. *frigida*	pontica	styptica	acetosa

The flavor *acutus*, for instance, is indicative of a substance that is both warm and subtle, whereas the flavor *amarus* indicates one that is thick and warm (*grossa et calida*). The precise sensorial analysis of a plant in this scheme permits the natural philosopher to determine an exact correspondence between qualities and flavors. Looking at this method of analysis, we see that Albert employs several terms drawn from the field of medicine, such as *experimentum* and *complexio*. Rather than translating texts from one language into another, Albert—like his medieval Arabic predecessors—ventures into the epistemic translation of material from one field of knowledge into another.

The theoretical apparatus of his predecessors aided Albert in that enterprise, as he could translate much of their theorization into his botany. But Albert promotes the intersection between philosophy and medicine in a very significantly new way. Although the precise doctrine

of flavors emerged in the context of medicine, Albert clearly recognizes its epistemic value for *scientia* as well. Through the analysis of flavors, he aspires not only to know the pharmacological operations of plants, but to know their substance as such, which is knowable through its effects. In Albert's view, the philosopher should know the operations of a plant not in order to heal, but in order to recognize them as effects of a certain substance and thus to become able to describe their qualities. In this way, Albert successfully translated the phenomenology of flavors into his very own system of natural philosophy.

Conclusion

It is time now to narrow down the broad meaning of the couplet *sapor/sapientia* discussed at the outset of my chapter, specifying it for the context of Albert's botany.

Since *sapor* was not just blind sense perception but followed a distinctive experiential method, it was conceived of as something that creates knowledge—that, if interpreted correctly, reveals deeper knowledge about the substance of plants. The history of Albert's knowledge of flavors as revealing the substance of plants is rather complex, undergoing several stages of epistemic translation. Aristotle translated the sense perception of flavor into a phenomenology of eight distinctive flavors. Galen translated these into the medical corpus, by addressing the training of the student physician's senses that was required in order to master the transition from sense perception of flavors to a clear phenomenology of flavors. The medieval physician Isaac Israeli took advantage of this insight of Galen's and translated it into dietetics, where the phenomenology of flavor reveals the different states of maturation of plants. Avicenna then used both developments to translate the phenomenology of flavor into his *materia medica*. There, it constituted the accessible epistemic grounds to reveal, by means of experience, the inaccessible operational virtues of simple and complex medicines. In Albert's work, finally, the phenomenology of flavor was granted an even greater epistemic power. Translated into the science of botany, flavor could now indicate the substance of a plant as such.

Except for the case of Aristotle, the phenomenology of flavors was an epistemic tool that was able to produce different types of knowledge by experience. Behind the simple recognition of flavors, there stood a broad implicit theoretical apparatus, which made certain medical or scientific judgments possible. The phenomenology of flavors, as I have shown, promoted a kind of knowledge that can be defined as experiential, since it always implied a certain comparison and correlation of phenomena, mastery, and the application of a type of sensory methodology. This opens up a previously almost unexplored perspective that will enable us to reconstruct scientific method in the premodern era.

Notes

1 Jacquart, *L'épopée*.
2 Burnett, "Sapores sunt octo."
3 Dilg and Keil, "Humoralpathologie"; Schöner, "Das Viererschema."
4 Stabile, "Sapor-Sapientia," 310.
5 I would like to thank Tommaso Alpina for helping me with the analysis of the Arabic. However, a detailed analysis of the terminology is beyond the scope of this chapter. See Ullmann, "Wörterbuch."
6 See Stabile, "Sapor-Sapientia."
7 Isidorus Hispalensis, *Etymologiae*, X, ed. Lindsay, n. 240.
8 See Albert, *De mysterio missae*, III. 4, ed. Borgnet, 86b.
9 See Albert, *De corpore domini*, I. 2, ed. Borgnet, 195a.
10 Albert, *Super Iob*, XXXIV. 3, ed. Weiß, 394.
11 See Aristotle, *De anima* II. 10, 422a8, trans. Miller, 237.
12 Ibid., 422a11, trans. Miller, 237–38.
13 Aristotle, *De sensu et sensato* IV, 441b21–24, trans. Ross, 67.
14 Ibid., 441b25–442a3, 67–69.
15 Ibid., 442a13–15, 67–69.
16 Aristotle, *De anima* II. 10, 422b5–15, trans. Miller, 237–38.
17 Most of the translations attributed to Gerard of Cremona are a matter of debate. The case of *On Simple Drugs* is particularly complex, because almost the entire manuscript tradition is incomplete, ending with Book V. However, an Arabic–Latin translation of Book VI also exists, despite being transmitted by only few manuscripts. Three possibilities are mooted: attributing the entire translation to Gerard, only Books I–V, or neither. The well-known Pincius edition, printed in Venice in 1490, transmits the translation attributed to Gerard up to Book VI, the remaining five books being transmitted in the translation of Niccolò da Reggio. See Ventura, "Simple Drugs"; Jacquart, "Les traductions"; Petit, "La tradition latine," 1069.
18 Galen, *De simplicium medicamentorum temperamentis ac facultatibus*, IV. 1, ed. Pincius, 57b; ed. Kühn, 619–20.
19 Ibid., IV. 2. 2, ed. Pincius, 58b–59ra; IV. 4, ed. Kühn, 632.
20 Ibid., IV. 8, ed. Kühn, 648.
21 See Galen, *On the Properties of Foodstuffs*, II. 59. 648, trans. Powell, 109.
22 See Stabile, "Sapor-sapientia," 319.
23 See Ventura, "Lo sviluppo," 643.
24 Isaac Israeli, *De diaetis universalibus*, XIV, ed. Lyon 1515, 34b–35ra.
25 Ibid.
26 Ibid., 36ra.
27 Avicenna, *Canon*, II. 1. 4, Venice 1507, 82va.
28 See Chandelier, "L'expérience."
29 Avicenna, *Canon*, II. 1. 4, Venice 1507, 82va.
30 Ibid., 67r.
31 Albert, *De vegetabilibus*, VI. 1. 1. n. 1, ed. Meyer and Jessen, 341. See Wöllmer, "Albert the Great."
32 Albert, *De vegetabilibus*, VI. 1. 1. n. 1, ed. Meyer and Jessen, 341.
33 See Agrimi and Crisciani, "Per una ricerca"; Draelants, "Expérience et autorités"; Friedman, "Albert the Great's Topoi."
34 Albert, *De vegetabilibus*, III. 2. 1. n. 68–69, ed. Meyer and Jessen, 191.

35 Ibid., n. 69, 191.
36 Ibid., n. 66, 190.
37 Ibid., n. 69, 191.
38 Albert, *De anima*, II. 1. 10, ed. Stroick, 79.31–33.

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