Translators' Notes

The Renaissance had seen a deliberate return from the crabbed and inelegant style of medieval Latin to an imitation of the classical style of Cicero's time. Naturally some constructions occurred which were not used in correct Classical Latin, and some words which were used in senses different from those of the first century BC. Kepler writes on the whole sound Renaissance Latin in that tradition, though his phrases and sentences are inclined to be somewhat contorted in the effort to express difficult ideas. Among the words which he uses in a sense different from that of Cicero, but closer to the sense of the modern words derived from them, are, for example, *intono* meaning "intone" rather than "thunder," and *textus* meaning "text." However, the fidelity with which authors of Kepler's day imitated the classical models of seventeen centuries earlier is remarkable.

He was also typical of his time in using Greek words and quotations rather frequently, as well as quotations from classical Latin literature. We have marked words in our English text which are either transliterations or translations of words which Kepler wrote in Greek script by enclosing them in single inverted commas. However, we have not marked in that way Greek words which Kepler himself has transliterated into Roman letters.

Occasionally we have supplied in English words which are not represented in the Latin text, but have been left by Kepler to be understood by the reader; in such cases we have enclosed them in square brackets.

Kepler also has a liking for strikingly unusual words, in a rather self-consciously literary manner, which enhance the effect of some of his more impressive passages of prose. In a few places where he illustrates a point by some homely or personal touch he introduces the occasional colloquial word or phrase, but that is rare.

There is a particular difficulty with the translation of the terminology of proportions. As was usual in the early seventeenth century, Kepler writes of proportions being added or subtracted, where in modern English we speak of their being multiplied or divided, of their being doubled or tripled where we speak of their being squared or cubed, and of their being halved where we speak of taking their square root. It would be unacceptably confusing to the reader to translate Kepler's terminology literally in such instances. We have therefore followed the modern usage as far as possible, though we have preferred clarity to complete consistency. On the other hand, modern English, like Kepler, speaks of musical intervals and motions being added and subtracted. Naturally we have translated Kepler literally in such cases. That has caused some complications in passages where Kepler relates arithmetic proportions to musical intervals and the motions of planets, but we hope that we have made the meaning reasonably clear to the reader.

The following terms require a particular comment:

Acutus in reference to musical pitch has been translated as "high," and its opposite, *gravis*, as "low." We have not been able to find terms which represent the puns on the other senses of *acutus*, such as "sharp," and "acute" applied to angles, which Kepler makes at the beginning of chapter 4 of Book III of the *Harmonice Mundi*, or the corresponding senses of *gravis*. *Acutus* and *gravis* are also used to refer to acute and grave accents.

Cantus, which literally means "song," was used in Kepler's time to mean instrumental as well as vocal music, and has been translated generally as "music."

Cessiuncula has been translated as "stationary points" in the discussion of resonance between vibrating strings in chapter 1 of Book III on page (III.15). However, it does not mean what are called in modern physics the nodes on a vibrating string, which are permanently stationary points between standing waves. It appears to mean the positions of a vibrating section of a string where it has reached its maximum amplitude and is stationary for a moment before vibrating back again in the opposite direction.

Chorda in Latin means both a chord, in the musical sense, and a cord or string. It has not been possible to find a single word in English which conveys both meanings. Kepler also uses *chorda* sometimes to mean the note emitted by a particular string.

Concinnus, Kepler's term for musical notes which sound melodious when they are sounded in sequence but not harmonious when they are sounded simultaneously, has been translated "melodic." Its opposite, *inconcinnus*, has been correspondingly translated as "unmelodic."

Consonus, Kepler's term for notes which are in harmony when sounded simultaneously, has been translated as "consonant," and its opposite, *dissonus*, as "dissonant."

Demonstratio is sometimes used to mean "demonstration" or "proof," which is its normal meaning; but more often in the *Harmonice Mundi* it means the process of proving rigorously that a specified geometrical procedure for drawing a particular line or figure does in fact describe it in accordance with its strict definition. We have therefore translated the word in this sense as "construction." That in geometrical terminology is much closer to Kepler's meaning than "demonstration," which indeed is quite inappropriate in some passages. Similarly *demonstrabilis* has been rendered as "constructible."

Diapason, which means literally "over all the notes of the octave," has been translated by the same word in English rather than by "octave," for Kepler does not use the two as exact synonyms. Similarly the words "diatessaron," "diapente," "diahex," and so on, which were current in seventeenth-century music, have been used to translate the same words in Latin rather than "fourth," "fifth," which can be augmented or diminished, and "sixth," which can be major or minor, as these are not precisely equivalent.

Discursus in Kepler's usage means the process by which the mind reflects on and develops a simple idea which has come into from the outside world. It has been translated as "reflection."

Gravis referring to musical pitch has been translated as "low." See *acutus* above.

Instinctus, which means "impulse" in classical Latin, clearly means "instinct" in the *Harmonice Mundi*, though naturally not all the connotations of the term in modern psychology should be read into it here.

Meteora has been translated as "meteors," which is probably what Kepler meant; but the word was also by other authors used to mean the Aurora Borealis.

Mundus apparently includes everything within the sphere of the fixed stars and not necessarily the whole universe if there is any of it outside the heavenly spheres. It would therefore be misleading to translate it as "universe." The best English equivalent is "world," though of course it must be understood that that is not a synonym for "Earth" but means the whole solar system. "Mundanus" therefore means something which belongs to the whole solar system, and in such phrases as "worldly music" or "cosmic music" refers to the music of the heavenly spheres which according to Kepler is not heard by the ears but perceived by the soul.

Physicus is not equivalent to the modern "physicist" but means someone who studies nature and may be translated approximately as "natural philosopher."

Retiformis tunica refers to what is now called the retina, but to avoid anachronistic implications has been translated literally as "netlike covering."

Scientia in the *Harmonice Mundi* does not of course have the same meaning as the modern word "science." It means "knowledge" in Kepler's special sense of knowledge of a geometrical line or figure which can be rigorously constructed. Similarly "scientificus" has been translated as "knowable" or "knowledge-producing."

Sesquialtera proportio and cognate terms such as *sesquitertia*, *semidupla*, and *semitripla proportio* have been translated by the obsolete term "sesquialterate" and so on because to paraphrase them by such translations as "the proportion of one to one and a half" would be intolerably clumsy and would make it even harder for the reader to follow Kepler's argument.

Species in Kepler's writing often means *species immateriata*, that is an invisible and immaterial simulacrum of itself emitted by an object which is received by human sensory organs and causes the object to be perceived. The Epicureans explained sensation by such emanations but supposed them to be material. In the later Middle Ages the term was used by such authors as Robert Grosseteste and Roger Bacon, under the influence of Neoplatonic philosophy, to mean a power propagated by a body, of which light was only one example. (See A.C. Crombie, *Robert Grosseteste and the Origins of Experimental Science*, 2nd ed., Oxford, 1952 [1953], 104–116 and 144–147.) It has often been appropriate, therefore, to translate species as "emanation." Elsewhere, and often indeed in the same passage, it means "vision" (as occasionally in classical Latin), or "kind" or "species" as opposed to *genus*, that is the general class to which a species belongs.

Vox literally means "voice"; but frequently means "note" in music, not necessarily vocal. *Clavis* (literally "key," and sometimes used by Kepler in that sense), *chorda* (literally "string" in such a context), and *nota* (literally "note," and sometimes used by Kepler to mean the written symbol for a note on a musical stave) also frequently mean "note" in the sense of a musical sound.