

# **'A Dignity That Insures Their Perpetuation' Obsolete Constellations and the Making of the Modern Night Sky**

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Joel Dorman Steele, a prolific American textbook author of the late nineteenth century, noted that the Western constellation figures bear little resemblance to the mythical heroes, exotic beasts, and apparatus of the arts and sciences they represent. "The likeness is purely fanciful," Steele wrote in 1899. "Not only are the figures uncouth, and the origin often frivolous, but the boundaries are not distinct. Stars occur under different names; while one constellation encroaches upon another." But Steele argued that deference to tradition and the passing of many centuries since their creation insulated the constellations from further alteration. "However the constellations are thus rude and imperfect," Steele argued, "there seems little hope of any change. Age gives them a dignity that insures their perpetuation."

A canon of 88 constellations, established by the world community of professional astronomers, composes the entire contents of every modern star map. This number is as arbitrary as the construction of constellations itself. The lore of the night sky, at least in the Western tradition, is taken as the received wisdom of the ages, and by rights it is. Some of the figures constituting this set may have been first identified by humans over 20,000 years ago, while the last few added to the collection made their debut in the mid-eighteenth century. The process by which some were kept while others were discarded did not take place in a vacuum, and it owes a great debt to the two millennia that preceded the selection.

The Western view of the night sky seen as seen in the northern hemisphere was largely complete by the second century AD when it was committed to history in the pages of a text that has come to be known as the *Almagest*. The treatise was written by Claudius Ptolemy, an ethnic Greek or Hellenized Egyptian living in Alexandria who may have held Roman citizenship. Among its thirteen 'books' on the apparent motions of the planets, an outline of Aristotelian cosmology, and eclipses of the Moon and Sun is found a catalogue

of 1,022 stars divided into 48 constellations. In addition to the 12 figures of the zodiac, 36 other constellations define the night sky as it was known to the Greeks, who never ventured further south than the Nubian frontier of southern Egypt near latitude  $24^\circ$  north. That left nearly one-third of the night sky unknown to them. (Figure 1)

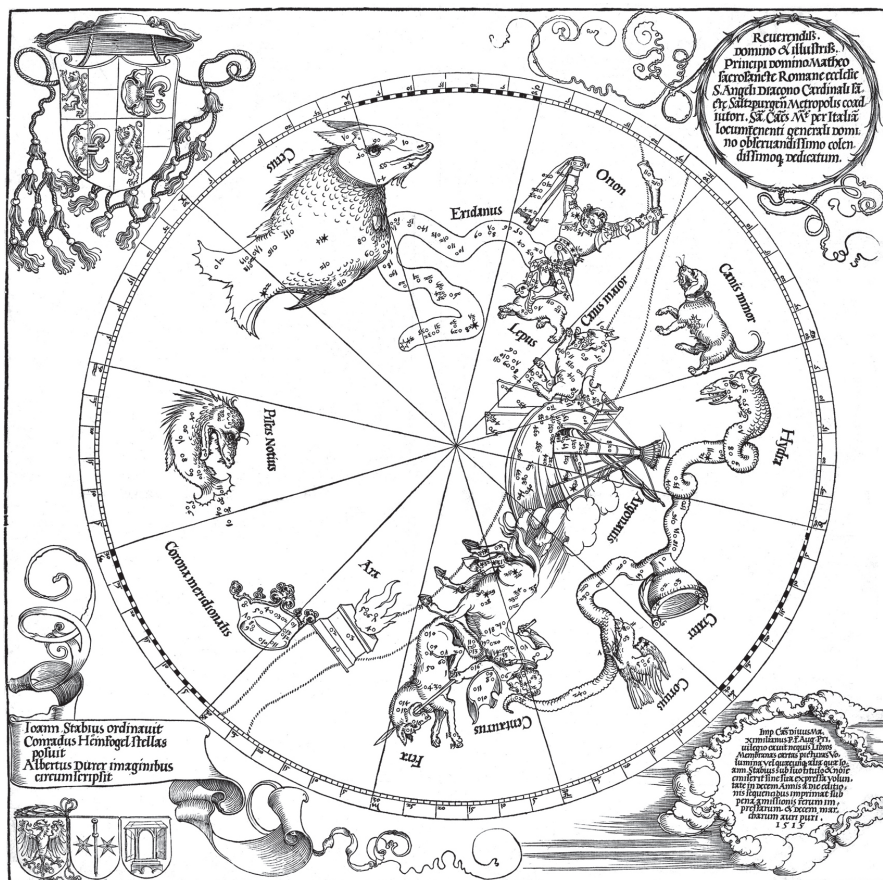


Figure 1. The southern night sky as shown in Albrecht Dürer's 1515 map *Imagines Coeli Meridionales*. The map, centred on the south celestial pole, shows only the constellations identified by Ptolemy in the second century AD. The conspicuous empty circular region at centre-left indicates the part of the night sky permanently below Ptolemy's southern horizon in his time; the gap between the centre of this circle and the pole on Dürer's map indicates precession of the equinoxes by about eighteen degrees during the intervening fourteen centuries. (Wikimedia Commons/Albrecht Dürer/*Imagines Coeli Meridionales*)

Ptolemy’s view prevailed at the end of classical antiquity and persisted in Western thought for more than a thousand years. However, Ptolemy merely cribbed from the second century BC Greek astronomer Hipparchus. The Greeks in turn learned the same constellations in their interactions with the civilizations of the ancient Near East. There is evidence that the core set of Ptolemaic figures was practically ‘baked in’ by the end of the twelfth century BC, its iconography firmly associated with native Greek myths.

Even the Christianization of Europe that began in late antiquity did not displace the pagan myths from their place in the cosmos; as late as the early seventeenth century, some ambitious celestial cartographers tried unsuccessfully to re-brand the Greek figures with themes of the Old and New Testaments. (Figure 2) Other mapmakers, respecting the Ptolemaic convention, noted astutely that Ptolemy himself referred to certain stars as *amorphotai*

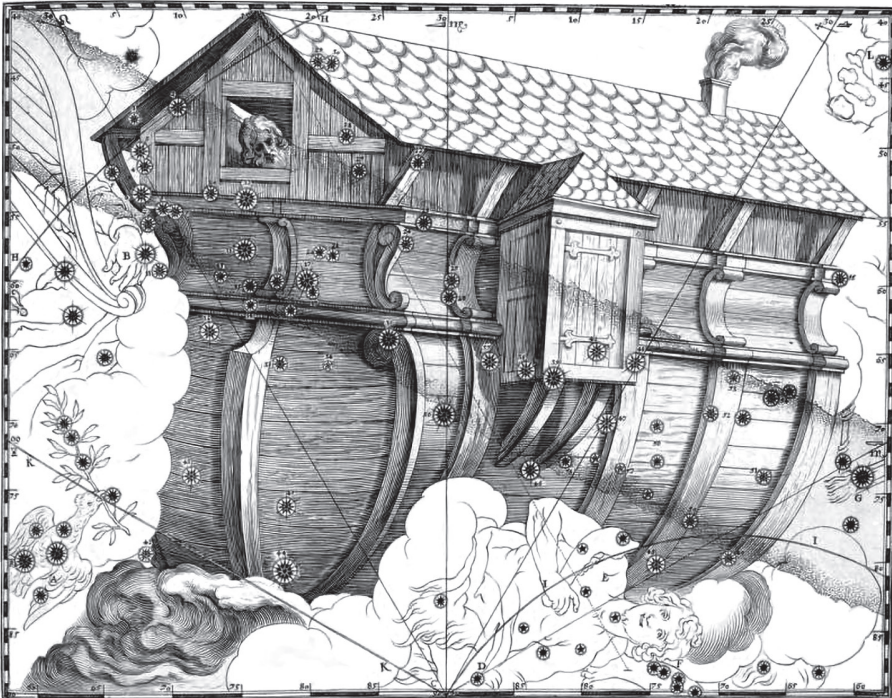


Figure 2. The now-obsolete Ptolemaic constellation Argos Navis became Noah’s Ark in the Christianized firmament of Julius Schiller’s *Coelum Stellatum Christianum* (1627). (Wikimedia Commons/Julius Schiller)

(meaning “unformed”) and not belonging to any of his figures. They sensed and seized upon an opportunity for fame and profit by claiming these stars for their own designs.

Like the sky above, the Earth below began to open up to Europeans in the fifteenth and sixteenth centuries. The discovery of the lands of the western hemisphere around 1500 validated ideas about a large but navigable world whose continents were surrounded by contiguous oceans. An age of exploration saw the “new” world colonized by the old as Europeans ventured for the first time to the planet’s southernmost reaches. There they encountered an utterly unfamiliar sky full of stars that were unknown to the Greeks.

New southern constellations were first identified as a navigational aid that could be communicated to other explorers through maps. Some of the figures were literal representations of navigational instruments: Circinus (the Compass Circles), Horologium (the Pendulum Clock), Octans (the Octant). Others referred to strange new animals the Europeans encountered on their voyages: Tucana (the Toucan), Chamaeleon (the Chamaeleon), Apus (the Bird

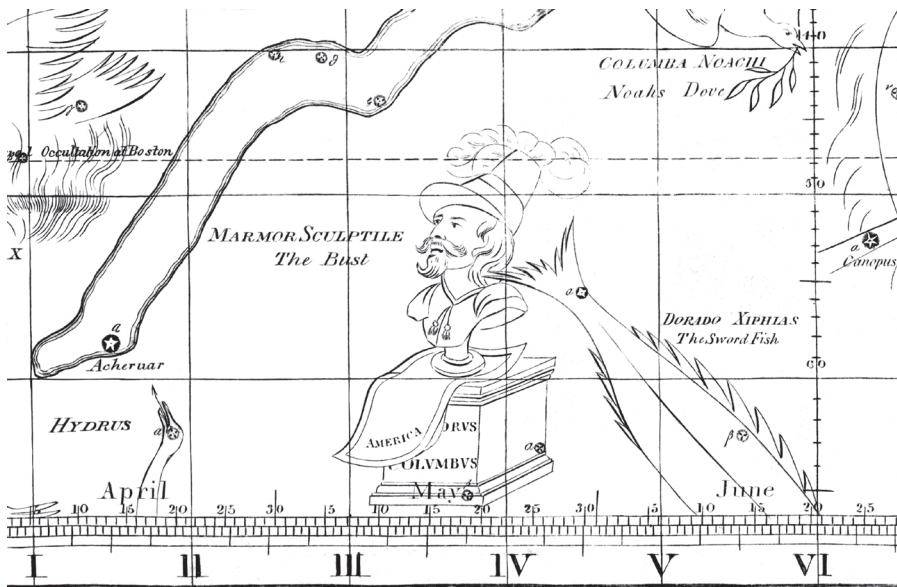


Figure 3. In 1810, William Croswell took stars largely comprising the modern constellation Reticulum (the Reticle) to form Marmor Sculptile, a marble bust depicting the Italian explorer Christopher Columbus. (U.S. Library of Congress/William Croswell)



of Paradise). While these figures are counted among the modern constellations, others were proposed and enjoyed brief popularity before falling into disuse such as Rhombus (the Bullroarer) and Polophylax (the Guardian of the Pole). The traditional ‘discoverer of the New World’ was even honoured with his own figure, Marmor Sculptile (the Bust of Christopher Columbus), by the American cartographer William Croswell on his 1810 *Mercator map of the starry heavens*.

As the initial phase of global exploration came to a close in the eighteenth century, the makers of star charts dealt with Ptolemy’s *amorphotoi* by daring to create their own constellations, inserted strategically between Ptolemaic figures. They staked their claims on the maps they drew, published and distributed in a kind of popularity contest: new constellations garnering the greatest public acclaim would make their way onto others’ charts and slowly assume a place in a growing *de facto* canon. Although it has ancient origins as an asterism, Coma Berenices (Berenice’s Hair) was the first new northern constellation introduced since antiquity that is still found on modern charts, appearing on a celestial globe in 1536. Other figures, including Monoceros (the Unicorn) and Camelopardalis (the Giraffe), appeared later in the sixteenth century. The only manifestly Judeo-Christian symbol still found on modern star maps was introduced in this era: Columba Noachi (later just “Columba”) representing the dove Noah released from the ark in order to learn whether the global flood was subsiding.

The collection of constellations defining the northern night sky as we know it today was essentially complete at the end of the seventeenth century. The latest entrants were submitted by the Polish astronomer Jan Heweliusz, publishing under the Latinized ‘Johannes Hevelius’, in *Firmamentum Sobiescianum* (1690); these finishing touches included Lynx (the Lynx), Lacerta (the Lizard), and Canes Venatici (the Hunting Dogs). Although these stars remained in dispute through the end of the eighteenth century (Figure 4), no constellation suggested after Heweliusz survived the twentieth-century cut that defined the modern canon.

The photographic process revolutionized astronomy when it was introduced in the latter half of the nineteenth century, beginning a process by which visual observing would be rendered all but obsolete in terms of value to the scientific method. Among its other benefits, photography enabled the precise measurements of the positions of stars, obviating the need for the aesthetically pleasing, hand-drawn sky charts of the past. Around the same time, the

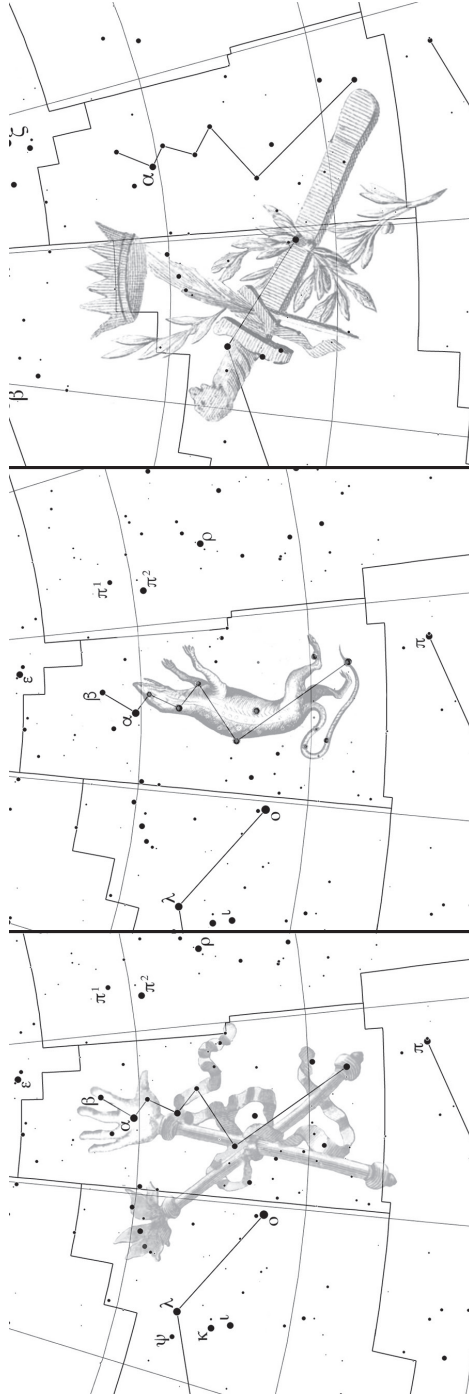


Figure 4. Three attempts in historic star charts to map faint 'unformed' stars between Pegasus, Andromeda, and Cepheus. In 1679, Augustin Royer created *Sceptrum et Manus Iustitiae* (left), depicting the royal regalia of France. Eight years later Jan Heweliusz formed the modern constellation Lacerta, the Lizard, in *Firmamentum Sobiescianum* (1690, centre) using many of the same stars. Almost a century after its publication, Johann Elert Bode appropriated some stars from both Lacerta and neighbouring Andromeda to form Honores Frederici, a constellation honouring the achievements of the recently deceased Frederick II of Prussia. In each panel, modern constellation boundaries are indicated along with some lines of constant right ascension and declination. (Left: author photo/Corbinianus Thomas; centre: Wikimedia Commons/Johannes Hevelius; right: Wikimedia Commons/Johann Elert Bode)

burgeoning field of variable star studies -- still largely carried out through the diligent efforts of visual observers -- brought about a set of conditions that demanded a more precise definition of where one constellation formally ended and another began. The need to clearly delineate such boundaries resulted in the declaration of the particular set of constellations, and their limits, found on every modern star chart.

As photography made the process of collecting astronomical data more objective and quantitative, the observation of variable stars was coming into vogue. Since by tradition variables are labelled according to the constellation in which they appear, clear boundaries between constellations became an issue of serious concern such that astronomers properly communicated among themselves to which star one observation or another pertained. But because boundaries varied from chart to chart based on the preferences of the cartographers who drew them, confusion reigned. Furthermore, the precession of equinoxes, resulting from the slow wandering of the Earth's rotational axis in space, could cause a particular variable star to apparently cross anyone's arbitrary dividing line over time. The problem remained unsolved until the decade following the First World War, when the professional astronomical community imposed a sense of order on the night sky meant to be final.

The newly established International Astronomical Union (IAU) met for the first time at Rome, Italy, in 1922. Among the topics the congress addressed was the architecture of the night sky itself. At its first General Assembly, IAU members settled on a list of 88 'modern' constellations. In the process, they discarded roughly 25 figures that appeared on multiple charts between the seventeenth and twentieth centuries. We do not know many of the details of the process by which the decisions were made. All 48 of the Ptolemaic constellations were kept, plus contributions from mapmakers and astronomers to the end of the seventeenth century. Clear boundaries were established, following lines of constant right ascension and declination tied to the epoch 1875.0, which could be adjusted in the future so as to prevent precession from changing the identification of stars with particular constellations. By 1930, when the final set of charts was printed, the case for further changes was essentially closed. From then on, constellations were defined regions of the night sky, contiguous with one another in every instance, and whose demarcation was tied to the system of equatorial coordinates that remains widely used.

The nearly three dozen constellations cut from lists of prospective inclusions in 1922 constitute a collection of figures as diverse as the 88 constellations that the IAU dubbed official. Just like the assortment of suggested additions adopted during the time between Ptolemy and Rome, the discarded figures were born of many of the same motivations: flattering patrons, commemorating nationalist symbols, honouring significant individuals, and recognizing the contributions of science and technology. The cultural attitudes of post-WWI Europe, for example, may have influenced dropping constellations honouring technological advances attributed to ethnically German people, such as the Electric Generator (*Machina Electrica*) and the Printing Press (*Officina Typographica*). The IAU similarly turned down two constellations introduced in the late eighteenth century to recognize the discoveries of the Anglo-German astronomer William Herschel (*Telescopium Herschelii* Major and Minor). But it also declined to canonize *Custos Messium* (the Harvest Keeper), a somewhat less pointed reference to the eighteenth century French comet hunter Charles Messier.

Some formerly independent constellations lost their status and were relegated to asterisms, or small figures consisting of prominent stars but which are not recognized as constellations in their own right. These range from *Caput Medusae* (the Head of Medusa; Figure 5), carried in the right hand of Perseus, to *Lochium Funis* (the Log and Line), a figure that once ranked independently alongside other pieces of the Ptolemaic figure *Argo Navis*, the Argonauts' ship from classical mythology. The latter is an example of a cartographer, in this case the French Abbé Nicolas Louis de La Caille, who in 1752 dispensed with the large and unwieldy *Argo* by breaking it into pieces and giving the components identities as their own constellations: *Carina* (the Keel), *Puppis* (the Poop Deck) and *Vela* (the Sails). These remain canonical, but *Lochium Funis* was fully absorbed into the stars of the neighbouring *Pyxis* (the Mariner's Compass) by the end of the nineteenth century.

In an era during which there was no consensus among astronomers about the exact composition of the constellation canon, some enterprising astronomers formed new figures in order to flatter their benefactors. At least nine such figures once appeared on European star charts, including *Gladii Electorales Saxonici* (the Crossed Swords of the Saxony Electorate, honouring Johann Georg III, the Holy Roman Elector of Saxony); *Honores Frederici* (Frederick's Glory, honouring Frederick II of Prussia, seen here in Figure 4); *Sceptrum* et



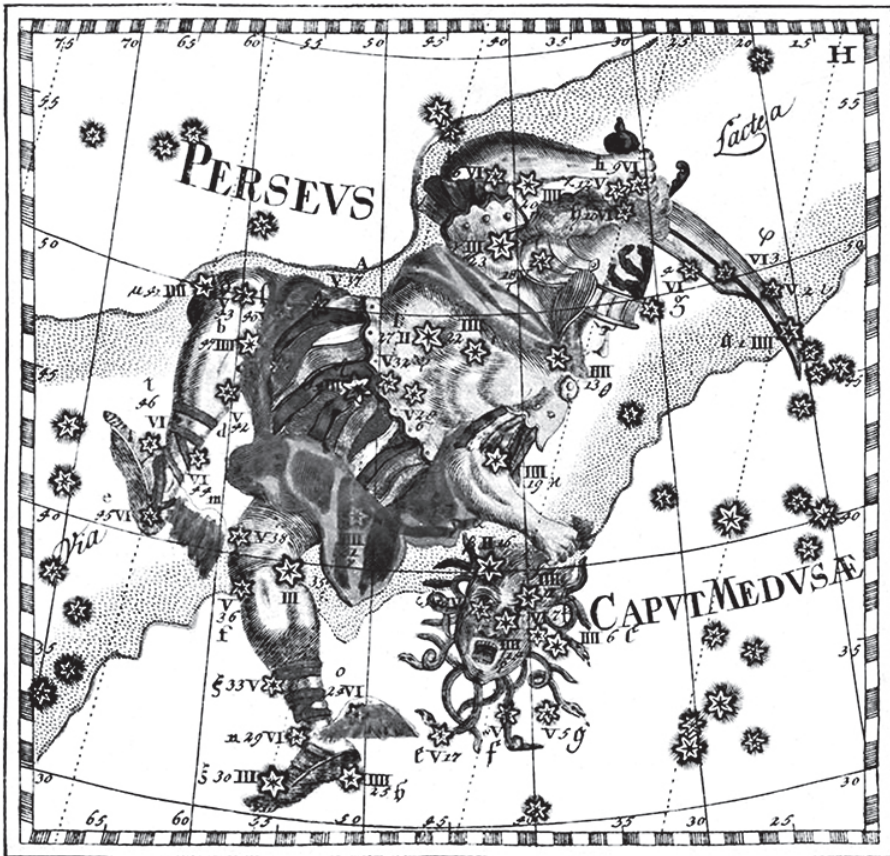


Figure 5. Some figures now considered asterisms had former lives as constellations unto themselves, such as Caput Medusae (the Head of Medusa), shown here in Corbinianus Thomas' *Mercurii philosophici firmamentum firmianum* (1730). (Author photo/Corbinianus Thomas)

Manus Iustitiae (the Scepter and Hand of Justice, honouring Louis XIV of France, also in Figure 4); and Taurus Poniatovii (Poniatowski's Bull, honouring Stanisław II Poniatowski of Poland).

A more brazen approach involved repurposing ancient figures for decidedly contemporary reasons. Corbinianus Thomas, a Benedictine monk who lived in and around Salzburg, Austria, in the eighteenth century, tried unsuccessfully to transform the Ptolemaic figure Corona Borealis (the Northern Crown) into Corona Firmiana, commemorating the presumed achievements of Leopold

Anton von Firmian, Prince-Archbishop of Salzburg. But it was Jan Heweliusz who gave our star charts the only instance in which a beneficiary successfully acknowledged his patron's largesse: Scutum, originally called 'Scutum Sobiescianum' (Sobieski's Shield), which recognized the material support of John III Sobieski, King of Poland and Grand Duke of Lithuania.

The 'lost constellations' became so for a variety of reasons. Chief among these is that they were formed from relatively faint and inconspicuous stars that did not lend themselves well to readily recognizable patterns. Those that were not easily sighted tended to disappear from star charts first for lack of

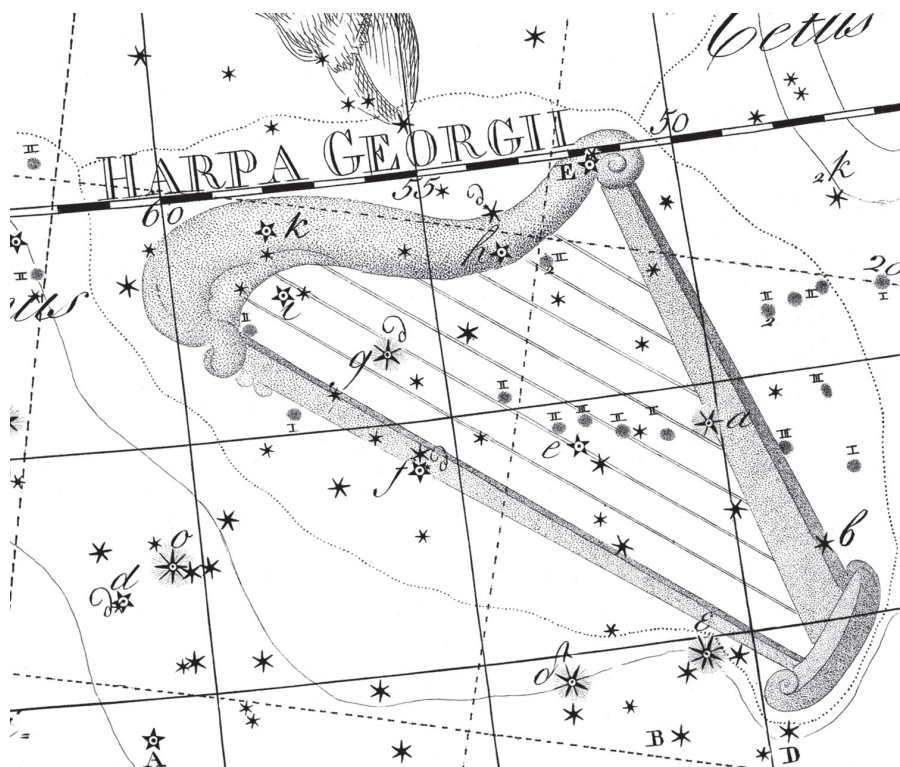


Figure 6. The inconspicuous figure of Psalterium Georgianum, shown labelled as "Harpa Georgii" on Plate XII of Johann Elert Bode's *Uranographia* (1801). The example also illustrates the arbitrary nature of constellation boundaries before the International Astronomical Union's uniform definitions were published in 1930: note that Bode carefully drew the dotted line separating this constellation from neighbouring Eridanus in order to exclude from the former the bright star  $\epsilon$  Eridani (lower right). (Wikimedia Commons/Johann Bode)

prominence. An example is shown in Figure 6: a collection of stars west of Orion and south of Taurus once called *Psalterium Georgianum*, the figure of a harp whose formation in 1789 was intended to honour King George III of the United Kingdom. That its brightest star was the fourth-magnitude  $\alpha$  Tauri did not endear this tribute to astronomers, and it vanished from contemporary charts before the end of the nineteenth century.

In several cases, the increasingly contrived figures were identified with subjects and symbols too wrapped up in the history and culture of one particular (European) nation to enjoy broad appeal across borders. More fundamentally, it seems that a sense developed in the about the nineteenth century that humanity simply did not need figures to represent every single group of stars visible to the naked eye.

The story of the obsolete constellations may otherwise be considered a curiosity of the astronomy history collector's cabinet, but they have significance even in the modern world. Their story may be a historical relic, but they did not actually disappear from the night sky when they vanished from star charts. In the same way that nations of old are still readily identifiable among the demographic distributions of people on Earth even as the distinctly human creations of political maps and artificial borders willed them away, the 'lost' constellations may yet be found in tonight's sky if one simply knows where to look.

Their proliferation corresponds to an 'age of discovery' when European explorers vastly expanded the boundaries of the world known to Western civilization and science and technology grew by leaps and bounds. They document a time near the end of the continuum between antiquity and the modern world, which saw the emergence of astronomy (and later, astrophysics) as a fully empirical science. This may have diminished the importance of constellations generally, but they remain signposts for people just discovering astronomy, many of them amateurs for whom the constellations are their guides around the night sky. And, lastly, the obsolete constellations beg the question of what the figures we place in the night sky will mean to people of the future: of today's 'official' constellations, which will future humans choose to keep and which will they discard?