

The Constellations

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Astronomy folder

Before the times of telescopes astronomers used to designate stars by stating upon what parts of the conventional figures of men and animals drawn on globes they ~~were~~^{might} be found. Thus, Sirius was the star in the mouth of the dog, Canopus the star in the saddle of the ship Argo, Arcturus the star between the legs of the herdsman, Capella the star on the left shoulder of the charioteer, etc. In fact, the constellations, or groupings of stars named after these figures, remain in use to this day. They now number 85, but about half of these are modern and uninteresting. The rest are of great antiquity, and stimulate our curiosity by many a mysterious circumstance.

The stars have been catalogued many times. The oldest such list that has come down to us is that contained in Ptolemy's Almagest, a celebrated astronomical treatise by an Egyptian Greek living about A.D. 140.

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Here is described the exact situation of each star on one of 48 constellations: figures, while its latitude and longitude are also given. From these data, the figures can be reproduced. Nearly the same shapes are found sculptured upon a certain marble globe borne upon the shoulders of an Atlas; a statue of about the time of Ptolemy. Figures apparently corresponding to many of these, together with many others, are shown in a late Egyptian sculpture called the circular zodiac of Denderah, now in the Paris library. But the most important evidence concerning the origin of the constellations is found in the "appearances" of the Greek poet Aratus, written in Macedonia about B.C. 270. This describes with slight variations the same constellation-figures as those of Ptolemy, with a certain degree of immutability, incidentally mentioning the position of the pole and two stars that are just on the horizon in their correct position. It then proceeds to describe the course of the tropic of Cancer, the celestial equator, and the tropic of Capricorn among the

constellations. Finally it gives a long account of what stars and groups are and set together. It also mentions the most southerly stars that can be seen all round the polar circle of perpetual occultation.

Aratus does not profess to have any information regarding the origin of the constellations. Like other ancient poets, he generally writes as if they were due of divine decree. Thus, in the prologue he says that "Zeus himself hath fixed in heaven these signs, which separate the stars." Yet in another place, in a more naturalistic spirit he suggests that

"Some man of old,
A nomenclature thought out and devised,
And shapes sufficient found."

Probably no astronomer has ever believed that Aratus observed the stars, since what he describes is too utterly at variance with all he could have seen in the heavens. He may well accept, at least in part, the story of

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Cicero that the poem was composed at the instance of
the King of Macedonia in order to describe a
beautiful celestial globe ^{once the property of} ~~that had belonged~~ to the astronomer
Eudoxus who flourished a century earlier. Only, it
cannot be that Eudoxus ~~was~~ ever examined the globe.
Of this we can be sure in the following way.

We know that the procession of the equinoxes
is due to a slow conical motion of the earth's axis,
making the pole of the heavens describe a pretty
large circle among the stars in 26000 years, carrying
with it, of course, the celestial equator and tropical circles.
Consequently, after a few centuries these circles become
much displaced. At the time of Strabo this fact was
absolutely unknown: he says, in so many words, that
the stars do not move at all. Nevertheless, the
position of the circles fixed by his lucid and detailed
description is nothing like their real position at
his time, but corresponds well with that they occupied
near two thousand years earlier, or say B.C. 2200. More-

over, Aratus mentions a number of stars which in no age were visible in Macedonia, nor even in Britain, where Eudoxus lived; and his whole account of the risings and settings will only suit a latitude of 32° or 33° , which is that of Babylon!

Thus, we have in Aratus a witness who proves a fact that he did not know himself, - namely, that the old constellations were known in Babylon two thousand years before his day; and his testimony is rendered ~~infinitely~~ ^{all the} more trustworthy by his ignorance of astronomy, and by his carelessness in never comparing his globe with the ~~learned~~ celestial vault.

Surely, the globe of Aratus was never in the hands of Eudoxus, - a mathematician, an astronomical observer, and a philosopher of penetration; for with it he could not have failed to discover the procession of the equinoxes. Since that great fact was left for Hipparchus to make, a century later than Aratus, we may be sure Eudoxus never ~~saw~~ ~~or at least~~ examined this globe.

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During the time of the invention of the telescope, astronomers used to designate stars by drawing certain conventional figures of men and animals on their globes, and then describing the parts of these figures upon which the different stars fell. Thus, Sirius was the star in the mouth of the dog, Canopus the star in the middle of the ship, Arcturus the star between the legs of the herdsman, Capella the star on the left shoulder of the charioteer, etc. In fact, the groups of stars named after these figures are in use to this day under the name of constellations and to the number of 85.

The oldest catalogue of stars that has come

... is that of Ptolemy, made in Egypt
about A.D. 140. It contains 1025 stars ^{out of the} ~~Galaxy~~
visible to the naked eye in the entire
heavens. These are arranged in constellations
with the description of their ^{positions} ~~places~~ on the figure,
their measured places referred to the ecliptic, and
their "magnitudes," or number of on a scale of
brightness. The number of ^{Ptolemy's} constellations is
forty-eight.

~~All~~ ^{figures} of these ~~constellations~~ are also shown
upon a marble globe ^(called the Terrene globe) borne ^{on the shoulders of} a statue
of Atlas of about the age of Ptolemy. The only
exceptions are those ^{to} ~~three~~ ^{figures appear} ~~broken off~~ ^{the three beams of} ~~the~~ ^{the Southern Cross} ~~the~~ ^{the Little dog.}
~~three~~ ^{three} Sagitta, Enlens, ~~et~~ ^{et} ~~angulum~~
very small ones are omitted. There is also
~~one~~ ^{one} figure otherwise quite unknown in the place of
our modern Lynx.