## "Constellations of the star sky"

In dark, moonless and cloudless night in the sky the set of stars is visible. It seems, difficultly to understand this majestic picture of the star sky about which our great compatriot M. V. Lomonosov (1711-1765) with inspiration wrote:

"The chasm of stars has opened is full,

To stars of number is not present, a chasm - a bottom ".

Even more difficultly the problem is represented to count all visible stars in the sky. But difficult at first sight, it becomes quite easy if to apply correct ways of its decision. These ways were created not at once, and decades and centuries, and the first of them leave the roots in an extreme antiquity. At the beginning of a human society when for the first time there was a primitive manufacture, already it was necessary for nomad tribes to be guided at transitions from a place of a pas a place to find a way to former places of parking. At higher step of development of a human society, at agriculture occurrence, there was a necessity to conduct, at least and rough, the account of time for regulation of agricultural works.

What exit saw from the created position the ancient people which did not have at the order even the bare rudiments modern us of sciences? It is unique that was always before them, and is more true, over them, is a star sky on which the ancient people began gradually to learn to be guided by districts and to keep count of time. Practical necessity of studying of the star sky has led to origin of the science which have received subsequently in the Ancient Greece the name of astronomy, an event from two Greek words: астрон- a star and номос - the law.

But the name at all does not serve as the proof of origin and development of this science only in the Ancient Greece. The astronomy has arisen and independently degree of its development, naturally developed literally at all people, but, was in direct dependence on a level of development of productive forces and culture of the people.

If someone made fascinating travel from Moscow to Yaroslavl on the Yaroslavl highway, that should pay attention of a pas rather a small number of turns on all its extent. The highway is almost rectilinear, and its turns are connected only with detour of ravines, marshy places or too abrupt hills. And after all the Yaroslavl highway is laid basically on the old road connecting Moscow with Yaroslavl.

Both cities - almost coevals. Moscow is mentioned in annals since 1147 though, judging by last archeological excavations in the Moscow Kremlin, it as settlement existed already in second half Х century Yaroslavl based in 1010 By the same time occurrence of the traveller of a path between two cities concerns also. What way possible to pave in those days surprisingly direct shortest way between two cities removed from each other? Yes only same to what not less direct road between Moscow and Vladimir - orientation on stars has been laid; other ways of orientation in those days was not.

But how it is possible to be guided on stars if them the great variety is visible to a pas the sky? It would Seem, easily to get confused in this abundance of stars. Here for this purpose also it was necessary to group, first of all, bright stars (which in the sky not so already much) in the figures well remembered by the contours. Such star figures - combinations of stars, or constellations - have been allocated, and later to them have carried also weaker stars located around constellations. It is quite natural that the various people created the imagination different constellations and if it is casual contours of constellations and coincided, they were called differently. As sources of names of constellations myths about gods, legends on legendary heroes and the events connected with them, various animals and, at last, the instruments of production used by the people in an everyday life, as a rule, served.

So, known group of seven bright stars, reminding a ladle outline, ancient Greeks named.

The Big Dipper. If to this group of stars to attach the weak stars located near to a ladle at sufficient imagination it is possible to spend borders of this constellation so that they will remind outlines of any big animal (fig.1)



Fig.1. Constellations of the Big and Small She-bear.

The Greek myth tells that nymph Kallisto has been transformed by jealous spouse Zevsa the Hero into a she-bear who was badgered on hunting by dogs by its own son Arkad (Volopas). Zevs has given Kallisto immortality, having placed it in the sky in the form of constellation of the Big Dipper. Near to the Big Dipper its persecutors - Volopas and Hounds Dogs (fig.2) are located also, but the constellation of Hounds of Dogs has appeared in the sky only in XVII century when the Ancient Greek myth has been added by companions of the hunter. In the Ancient Greece the constellation of the Big Dipper was called also as the Chariot what the Homere in "Odysseus" mentions.



Fig.2. Constellations of the Big Dipper, Volopasa and Hounds of Dogs.

In Ancient Russia the same constellation had different names - the Cart, the Chariot, the Pan, the Ladle; the people occupying territory of Ukraine, named its Cart; in Zavolzhe it was called the Big Ladle, and in Siberia - the Elk. And till now in some areas of our country these names have remained.

By analogy other group of seven, but weaker stars located near to the Big Dipper and also reminding outline of a ladle, ancient Greeks named constellation of the Small She-bear. The same group of stars has been named by Siberians the Small Ladle, and the people occupying coast Ledovitogo of ocean, saw in it a polar bear with the head lifted up upwards on which to a nose North star located at the very end of the handle of a ladle (fig.3 flaunted).



Fig.3. Constellation of the Small She-bear in the form of a polar bear.

The name of these two constellations at the people occupying territory of the present Kazakh Soviet Socialist Republic is rather original. Observing the star sky, they, as well as other people, have paid attention to an immovability of North star which invariably occupies at any time the same position over horizon. It is quite natural that these people, the basic which source of existence were herds of horses, named North star "an iron nail" ("Temir-Kazyk") hammered into the sky, and in other stars of the Small She-bear saw adhered to this nail "the lasso which has been put on a neck of the Horse (constellation of the Big Dipper). Within days the Horse ran all over the way around"nail" (fig.4). Thus, ancient Kazakhs united constellations of the Big and Small She-bear in one.



Fig.4. The constellations of the Big and Small She-bear united in constellation of the Horse.

If an average star of a tail of the Big Dipper mentally to connect a straight line to North star and to prolong this line further we will see constellation of Kassiopei which outline reminds the turned and a little stretched letter "M" (or Latin "W"). This constellation ancient Greeks has been named in honour of mythical tsarina Kassiopei: in outlines of this constellation they saw a throne with the tsarina sitting on it (fig.5). The Belarus people saw in this constellation of two people mowing a grass (fig.6).



Fig.5. Constellation of Kassionei in representation of ancient Greeks.



Fig.6. Constellation of Kassiopei in representation of Byelorussians.

Winter evenings over a horizon South side pack up the most effective constellation of the sky - constellation of Orion, desert by the seven bright stars from which the arrangement of four reminds the huge letter X, and three other, extended abreast, cross out this letter in the middle. To the right of the top bright stars, and also more to the left and above them two arches from the weak stars, turned by concavity to bright stars are visible. Ancient Greeks named this constellation a name of a mythical giant, the hunter of Orion (fig.7), and represented its covered board from a lion's skin, (the right arch of weak stars) and raising a cudgel (the left top arch of weak stars), on the Bull (Taurus) running to it on the right. Three average bright stars represented the hunting belt to which the sword - a number of the weak stars located from top to bottom from a belt is hung up. The modern astronomy too often uses these terms - a belt and a sword of Orion.



Fig.7. Constellations of Orion and a Taurus in representation of ancient Greeks.

In III century to pashas of an era the Greek (Alexandria) astronomers have reduced names of constellations in uniform system which was borrowed subsequently by the European science and has kept it up to now, in particular names of constellations of northern hemisphere of the sky. In the southern hemisphere which studying by Europeans has begun, in essence, only in XVIII and XIX centuries, constellation have received more modern names: the Telescope, Hours, the Pump and others.

Now by constellations mean not allocated groups of stars, and sites of the star sky so all stars (both bright, and weak) are ranked as constellations. Modern borders and names of constellations are confirmed in 1922 at I congress of the International astronomical union (MAC). All sky is divided into 88 constellations from which 31 is in northern heavenly hemisphere, and 48 - in southern. The others 9 constellations (Fishes, the Whale, Orion, the Unicorn, the Sextant, the Maiden, the Snake, Zmeenosets and the Eagle) are located in both heavenly hemispheres, on either side of from the big circle imagined in the sky named heavenly equator that in Latin language means "equalizer" as it divides all sky into two equal on-lusharija.

How to find the approached position of heavenly equator, we will show slightly more low, and now we will notice that in territory of Soviet Union all constellations of northern hemisphere of the sky and some constellations of southern hemisphere, depending on geographical width of a place of supervision are visible: the it is located to the south, the it is more than southern hemisphere constellations is accessible to supervision. So, in Leningrad the part of stars of southern constellation of the Scorpion is visible only and that is very low over horizon, and the Centaur constellation is completely not visible. In Armenia, Georgia and Uzbekistan already many stars of constellation of a Centaur and all constellation of the Scorpion are visible.

Not all constellations can be found at once in the sky as many of them consist of weak stars, and only about 30 constellations are accurately allocated with the contours and bright stars. Constellations of the Big Dipper, Pegasa, Kassiopei, Voznichego, the Lion concern them and others. The areas occupied with constellations in the sky, and number of stars in them far are not identical. By the way, we will notice that distances between visible positions of stars in the sky are measured in degrees, minutes and seconds of an arch, and the areas occupied with constellations in the sky, - in square degrees. From bright constellations the greatest on the area is the constellation of the Big Dipper occupying the space in 1280 square degrees and numbering, besides seven bright stars of a ladle, 118 more stars, visible with the naked eye. The most small constellation is in southern hemisphere of the sky and it is not visible in territory of Russia is a beautiful bright constellation of the Southern Cross, the area in 68 square degrees, consisting of five bright and weaker 25 stars. The smallest constellation of northern sky usually do not know, as it consists only of 10 weak stars visible with the naked eye; it is called as constellation of the Small Horse, has the area in 72 square degrees and adjoins southwest border of constellation of Pegasa.

Most of all bright stars, namely 12, contains constellation of the Scorpion, but, perhaps, the most beautiful constellation of all sky is already mentioned constellation of Orion numbering 120 stars, visible with the naked eye among which seven are allocated with the shine.

In each constellation the basic stars have those or other designations. In the ancient time own names, many of which, mainly Greek and Arabian were given to the brightest stars of each constellation, have reached up to now. So, seven bright stars of a ladle of the Big Dipper have received names: Dubhe, Merak, Fekda, Megrets, Aliot, Mitsar and Benetnash.

In process of increase in number of studied stars it became impossible to remember their names, and since 1603 rather bright stars in constellations began to designate letters of the Greek alphabet, as a rule, in decreasing order of shine of stars.

Much later for designations of stars have entered digital numbering on the constellations, nowadays, as a rule, applied only for weak stars which in a number of constellations are designated also by letters of the Latin alphabet. Designations of stars are put down on modern star charts and in special lists of the stars called by star catalogues. By this time astronomers have registered in star catalogues all stars, visible with the naked eye, and also many stars accessible to supervision only in telescopes. Census of stars shows that to a naked eye are accessible to supervision in all sky about five and a half thousand stars, and in territory of Russia it is visible only about three thousand. Other set of stars because of their weak shine is inaccessible to a naked eye.

Gradual detailed elaboration in studying of stars has led to necessity to enter their quantitative estimation to "visible brightness" or as now it is accepted to name more to pravil th, their shine. That stars have various shine, it is visible already at the first, even the fluent review of the star sky: one of them are very bright and at once draw attention of the observer, others are less bright, and not so are evident, the third are so weak that are not visible with open years and for their supervision optical tools are required. Precisely to define shine of stars, it is necessary to enter a certain numerical scale. It would be possible to measure quantity of light which reaches from a star the observer (to the Earth), in the usual units of light energy applied in the physicist. However the similar system of an estimation of shine of stars would be almost inconvenient for two reasons:

First, the quantity of light reaching from stars us so it is insignificant is not enough that measurement by its standard physical units would be like measurement of the sizes of details of the mechanism of a watch in kilometres;

Secondly, the gradation of shine of stars accepted in this case would be so is great that the shine scale would appear extraordinary bulky and it would be impossible to remember values of shine even the brightest stars.

Therefore shine of stars is expressed not in absolute physical (or lighting) units, and in the special conditional scale entered still in II century B. C. by Ancient Greek astronomer Gipparhom (180 110 BC) when was not and in помине physical units of measurements of light energy. This scale is called as a scale of star sizes. The name of a scale, maybe, and not absolutely successfully as the scale does not estimate the linear sizes of stars but only shine of stars allows to compare with each other. Presently the scale of star sizes considerably is improved and for definition of shine of stars the exact optical equipment is used.

If the beginning fan of astronomy asks, as it is possible to estimate shine of stars in a conditional scale, let he will recollect temperature measurement. After all the temperature is the certain physical characteristic, and it is measured in the conditional scale named a scale of degrees.

In astronomy there is a number of scales of star sizes which are applied depending on research objectives. So, for last 30 years photo-electric methods of studying of shine of stars by means of photo cells which under the influence of light generate an electric current (photocurrent) - the phenomenon opened still in 1888-1890 by the Russian physicist And have widely taken root. G. Stoletovym (1839-1896). Modern sensitive photo cells give a weak electric current under influence is insignificant small illumination, but special devices strengthen a current to the size accessible to measurement with the big accuracy.

Research of radiation of stars in different beams allows to receive a number of the important physical characteristics of stars. For this purpose also define shine of stars in different beams for what before photo cells put optical filters of different colour.

Now, when we have got acquainted with measurement of shine of stars, it is curious to notice that not too it is a lot of very bright stars of zero and first star size, only 24 in all sky, but weak - billions! This results from the fact that shine of stars depends not only on their valid luminosity, but also from distances: the further from us there are stars, the more poorly they look. Colour of stars depends on their superficial temperature.

In total in sky northern hemisphere is about 2900 stars, visible with the naked eye, i. e. To 6.