

Guidance of Orion watching

1. Background

Orion is a well known constellation because it consists of many bright stars and has a remarkable alignment of stars like 3 belt stars. At southern side of the 3 belt stars, you see another alignment of 3 stars with smaller scale. If you use a telescope, you see a nebula around the middle star of the 3 stars. The nebula is called Great Nebula of Orion. The nebula is one of the diffuse nebulae, which locates at the distance of about 1600 light-years away from the Earth. The nebula is a cloud that is mainly made with Hydrogen gas. The gas cloud extends into 33 light-years across.

Galileo observed the Great Nebula of Orion. In his sketch of the Orion nebula, you see many stars. However there is no gas cloud. Probably, he could not see the nebula gas clearly with his telescope.

In the Great Nebula of Orion, stars are forming. With telescope, you can see four stars in the brightest area of the nebula, which is called the trapezium. The stars are newly born stars. The nebula is shining because of starlight from the 4 stars.

2. Purpose

The aim of this activity is that children experience the feeling of wonder that Galileo had when he observed celestial bodies for the first time. When children observe the Great Nebula of Orion with the telescope which made by themselves, they will notice that there are many stars in the nebula. Teachers make children do sketch of the Orion nebula by themselves and lead them to find many stars.

3. Observation Tips

It is not so difficult to see the Great Nebula of Orion with low magnification telescope. As for the person who use telescope for the first time, it is advisable to have a practice session by using distant scenery in daytime.

4. Steps

(a) Observation and sketch of the whole of Orion constellation with the naked eyes

Use the first worksheet. At first, children observe the entire figure of the Orion with the naked eyes.

(b) Write any findings and/or questions

Write anything you found out and/or question from your observations in your sketch sheet under the sketch column.

The person with strong eyesight may be able to see a diffused image of the middle star of the small 3 stars, which is the place of the Great Nebula of Orion.

(c) Observation and sketch with the telescope

Use the second sheet for observation and sketch with telescope. Children sketch both of the 3 belt stars and the small 3 stars.

If the magnification of a telescope is too high to see the entire 3 stars image in the telescope's field of view, please put the middle star at the center of the telescope's field of view.

Magnifications of the telescopes are as follows:

For Hoshi-no-Techou Inc. telescope kit, the magnification is a 15 power

(Focal length of the telescope is 273mm and focal length of the eye piece is 18.2mm).

For ORBYS Inc. telescopes kit, it is a 35 power

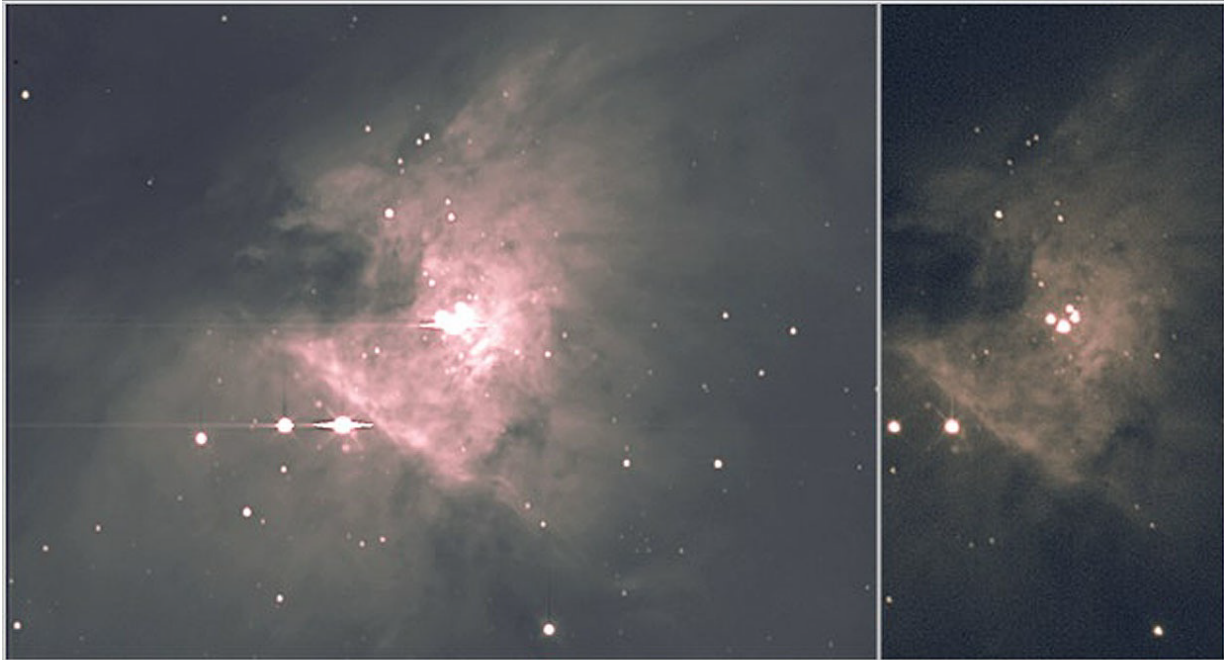
(Focal length of the telescope is 420mm and focal length of the eye piece is 12mm).

(d) Write any findings and/or questions

Write anything you found out and/or question from your observations in your sketch sheet under the sketch column.

オリオン大星雲（M42）中心部

Nov. 19, 1995 01h40m~01h52m(JST)



口径50cmカセグレン式反射望遠鏡（F12），液体窒素冷却CCDカメラ（Astromed 3200型）
露出時間：左60秒，右1秒，フィルタ：Rバンド，擬似カラー処理

星雲中心部に矩形に並んだ4個の星は，トラペジウムと呼ばれている。
これらの星の光により，星雲のガスを発光させている。

H. Fukushima

国立天文台 広報普及室

(e) Confirm the existence of the Orion nebula

Children compare their sketch with the photo or the Galileo's sketch of Orion nebula on the work sheet of the post observation study. If they see the nebula by their observation, they did a better observation than Galileo did, because Galileo could not see the nebula itself.

Summarize your knowledge of the Great Nebula of Orion, which you learned from observations with the telescope and through a textbook or the internet. Also, write down what you want to know more and what you can do further.

5. Notes

In this activity, children watch the nebula in the Orion constellation. Teachers teach the nebula is the place where stars are born in the Universe. Teachers also teach that nebulae are made by gas. In addition, it is better to explain the star formation mechanism and evolution, depends on children's levels of understanding.

If it is possible, teachers observe the Orion nebula with a larger telescope beforehand. You can see the nebula around the trapezium by a 10cm (or larger aperture) telescope with low magnification. If you use the high magnification telescope, you can see 4 stars in the trapezium. With larger telescopes, you will see the fifth star in the trapezium.

Scientists know that there are many newborn stars in the trapezium region from their observation done by larger than 1 meter in diameter telescopes.

Caution must be given to children that "Never watch the Sun through the telescope!"