

A Walk through the Southern Sky

A Guide to Stars and Constellations and their Legends

2nd edition

What star is that? Where is the Southern Cross? Who was Orion? *A Walk through the Southern Sky* is a beautiful guide to pathways in the night sky which answers these questions and many more. Its unique simplified maps make it easy to find by eye the constellations and the stars within them. Clear instructions guide the user on how to gauge sizes and distances, and how to move easily between constellations. This new edition has been updated with additional mythology information, and a list of the planet positions up to 2016.

Ancient myths and legends of the sky, thousands of years old, are retold to add to the mystery of the stars. Of value to all ages, this book introduces the patterns of the starry skies in a memorable way. No equipment is needed to use this practical guide, apart from normal sight and clear skies. Magically illustrated, this is an ideal introduction to launch the young astronomer on a journey across the starlit skies.

MILTON HEIFETZ is an amateur astronomer, professor of neurosurgery, and inventor of 'The Precession of the Equinoxes' planisphere, now in the Harvard University Museum of Historical Scientific Instruments. It is used to determine positions of the stars in ancient history and years in the future.

WIL TIRION is a freelance uranographer and graphic designer. He is co-author of *The Monthly Sky Guide*, now in its seventh edition (Cambridge University Press, 2006).

MILTON D. HEIFETZ & WIL TIRION

A WALK THROUGH THE
SOUTHERN SKY

A Guide to Stars and
Constellations and their
Legends



CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org

Information on this title: www.cambridge.org/9780521689458

© M. Heifetz and W. Tirion 2007

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2007

Printed in China by Printplus

A catalogue record for this publication is available from the British Library

National Library of Australia Cataloguing in Publication data

Heifetz, Milton D., 1921– .

A walk through the southern sky : a guide to stars and constellations and their legends.

2nd ed.

ISBN 9780521689458 (pbk.).

1. Southern sky (Astronomy) – Observers' manuals. 2. Astronomy – Southern Hemisphere – Observers' manuals. 3. Constellations – Observers' manuals. 4. Stars – Mythology – Southern Hemisphere. I. Tirion, Wil. II. Title.

523.80223

ISBN–13 978-0-521-68945-8 paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

Contents

Acknowledgements *page x*

Introduction 1

Part 1 Measuring distances in the sky 3

Distances to the stars 5

The brightness of stars 5

The Milky Way 6

Life in the heavens 8

Instructions for use of the atlas 8

Four seasonal star maps 9

Part 2 A walk through the heavens 13

A walk through the southern sky 15

The Southern Cross (Crux) 17

Pathways from Crux 19

To locate Musca 19

To locate Corvus 19

To locate Carina 19

To locate Achernar of Eridanus 19

The Centaurus–Crux–Carina–Vela relationship

 The True and False Southern Crosses 21

To locate Vela and the False Southern Cross 21

The Acrux–Canopus–Achernar triangle 23

The Centaurus–Lupus–Ara–Libra–Scorpius
relationship 25

Pathways from Centaurus 25

To Lupus 25

To locate Libra 25

Contents

To Ara	25
To Circinus and Triangulum Australe	25
The Sagittarius–Centaurus–Hydrus–Pavo– relationship	27
To locate Peacock in Pavo	27
The Achernar–Fomalhaut–Peacock triangle	29
To locate Grus	29
Pathways from Grus	29
To locate Tucana	29
To locate Indus	29
To locate Capricornus	29
The Diphda–Fomalhaut–Achernar–Peacock triangles	31
To locate Ankaa in the constellation of Phoenix	31
The Grus, Sagittarius, Scorpius and Lupus relationship	33
To locate Microscopium	33
To locate Telescopium	33
To locate Norma	33
The Canis Major–Puppis–Carina relationship	35
To locate Puppis	35
The River Eridanus	37
Guides to the South Celestial Pole (SCP)	39
The Magellanic Clouds	39
Starting from Orion	41
Pathways from Orion	43
To locate Sirius in Canis Major	43
To locate Procyon in Canis Minor	43
To locate Taurus and its star clusters the Hyades and the Pleiades	43
To locate Achernar and Canopus	43
To locate Gemini	45
To locate Auriga	45
To locate Lepus, Columba and Cetus	47
To locate Cetus	47
Orion’s encirclement	49
To locate Arcturus in Bootes	51
To locate Cor Caroli in Canes Venatici	51
To locate Corona Borealis	51
To locate Spica in Virgo	53

To locate Corvus	53
To locate Hydra, the Water Snake	53
To locate Leo	55
To locate Cancer	55
To locate Vega in Lyra	57
To locate the Northern Cross (Cygnus)	59
To locate Pegasus	61
To locate Altair in Aquila	61
To locate Hamal in Aries, Diphda in Cetus and Fomalhaut in Piscis Austrinus	63
To locate Aries	63
To locate Fomalhaut in Piscis Austrinus	63
To locate Diphda in Cetus	63
To locate Perseus and Andromeda	65
To locate Hercules	67
To locate Ophiuchus	69
To locate Serpens	69
To locate Antares in Scorpius	69
To locate Sagittarius	69
General summary of pathways	70
The Milky Way and related constellations	73
Four major localizing triangles	74

Part 3 Legends of the constellations 75


Legend of Andromeda	75
Legend of Aquarius	75
Legend of Aquila	76
Legends of Ara	76
Argo Navis	77
Legends of Aries	78
Legend of Auriga	78
Legend of Bootes	79
Legends of Canis Major and Minor	79
Legends of Canopus in Carina	79
Legend of Cassiopeia	80
Legends of Centaurus	81
Legend of Cetus	82
Legend of Columba	82
Legend of Coma Berenices	82
Legend of Corona Australis	82

Contents

Legend of Corona Borealis	82
Legend of Corvus	83
Legend of the Crater	83
Legend of Crux	83
Legend of Cygnus	84
Legend of Delphinus	84
Legend of Draco the Dragon	85
Legend of Eridanus	85
Legends of Gemini	85
Legend of Grus	86
Legend of Hercules	86
Legend of Hydra the Water Snake	87
Legend of Leo	87
Legend of Libra	87
Legends of Lyra	87
Legends of Ophiuchus	88
Legends of Orion	88
Legend of Pegasus	89
Legend of Perseus	90
Legend of the Phoenix	91
Legends of the Pleiades	91
Legend of Sagitta the Arrow	92
Legend of Sagittarius	92
Legend of Scorpius	93
Legend of Taurus	94
Legend of Ursa Major	95
Legend of Virgo	95
Legends of the Milky Way	96

Part 4 There's more to see! 99

Circumpolar constellations	99
Test of vision	100
Color test	100
Star brightness test	100
Binocular sights	102
Location of planets	102
The Ecliptic and the Zodiac	105
Navigational stars	108
Minor constellations	108
Constellations index	109



This book is dedicated to our grandchildren:

Elena, Sari, Ariel, Jenny, Litan, Ilan, David, Ariana, Ori, Kylian, and those yet to come

Acknowledgements

I wish to acknowledge the courtesy of Larry Schindler and Ron Dantowitz for use of the Hayden Planetarium of Boston. I also wish to express my gratitude to Robert Kimberk and Freeman Deutsch of the Harvard University Center of Astrophysics for their generous computer assistance and to Robert S. Strobie, Brian Warner and John Menzie of the South African Astronomical Observatory in Sutherland for their courtesy during my study of the Southern Constellations. I also wish to acknowledge the excellent advice I received from Dan Ben-Amos, Yosef Dan, Jarita Holbrook, Jan Knappert, Edwin Krupp, Harold Scheub, Gregory Schremp, and Gary Urton regarding sources for the legends of Africa, South America and the Pacific Islands, and especially Suzanne Blair, who allowed me complete access to her voluminous research on the cosmological folklore of the natives of Africa.

Any errors are strictly my own and the artistic license I may have taken in relation to the legends is also my own responsibility.

Introduction

This book is written for those who look at the stars with wonderment and would like to feel more at home with them, to go for a friendly walk with them.

In order to walk through the heavens and to know where you are, you must recognize what your eye sees. To know the names of stars and constellations is to form a friendship with our heavenly neighbors.

As we walk among the constellations, you will feel the immensity and quiet peace of the night sky. Do not ignore the legends about the constellations in Part 3 of the book. These legends will lend greater feeling to your vision of the world above. Friendship with the stars will deepen as we sense the thoughts and dreams of people who imagined people and animals living among the constellations.

Our walk will take us to the brightest stars in the sky. When we become familiar with them they will lead us to the dim stars.

It is not enough simply to find a constellation. Try to see relationships between constellations. This is best done

if you know different pathways to the constellations.

From the time of early humans, people have looked at the stars to help them navigate across seas and deserts, know when to plant and to harvest, establish their legends, mark the change of seasons and even align their temples of worship. To aid in recognizing specific stars they placed the brighter ones into star group patterns we now call **constellations**.

Constellations were recorded over 5000 years ago and lists of such patterns were written 2400 years ago by the Greek astronomer Eudoxus who studied under Plato. Ptolemy, who lived 2100 years ago, compiled a list of 48 constellations which has remained relatively standard to this day. Later, Johann Bayer (1572–1625), Johannes Hevelius (1611–1687) and Nicolas de Lacaille (1713–1762) added more constellations to the list. Professional astronomers now officially recognize 88 constellations which they regard simply as areas of the sky, not as star ‘pictures’ or patterns. These patterns have never been made ‘official’, so you should feel free to make any constellation design you wish.

Introduction

Before we begin our walk through the heavens, we should understand two concepts: how to measure distances in the sky, and the brightness of the stars. After this is done, follow the instructions on how to use the atlas to best advantage.

In Part 2, 'A walk through the heavens', the design or picture of a group of stars to form a constellation image will usually, but not always, contain stars which are bright enough to be seen easily. Most of the constellation patterns are well recognized images, but some are new.

For convenience, each star in each constellation will be numbered and some will be named so that we can more easily identify specific stars to help us walk

around the sky. We will follow several paths to a constellation. By doing this you will have a better sense of star relationships.

Since I have been disturbed with the violence that is part of the commonly used legends associated with the constellations, I have taken the liberty of modifying and abridging them. Legends have been and will continue to be modified with each generation.

This book applies to people living in the Southern Hemisphere, but it is also of value to those living slightly north as well as south of the equator.

Relax and enjoy yourself as you travel across the sky.

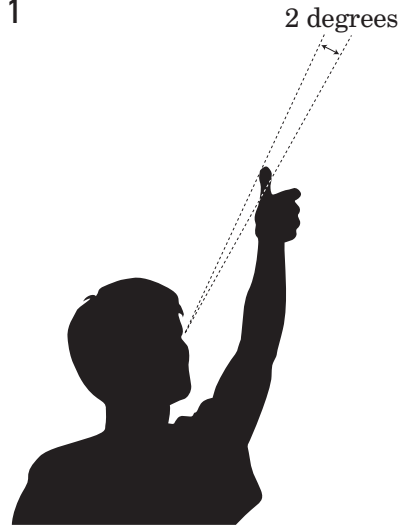
Part 1

Measuring distances in the sky

How do we measure the size of Scorpius or the distance between two stars? We cannot measure these distances in inches or millimeters, which are linear measurements (measurements along a line). Instead, we must use a measuring system using angles to determine how far apart one star or constellation may be from another.

To do this in a practical way without fancy instruments we use our eye as the corner of the angle and part of our hand to hide the sky between the stars or constellations of interest. The further apart the stars are, the more of our hand we need to use to cover the space between them. Look at Fig. 1.

Fig. 1

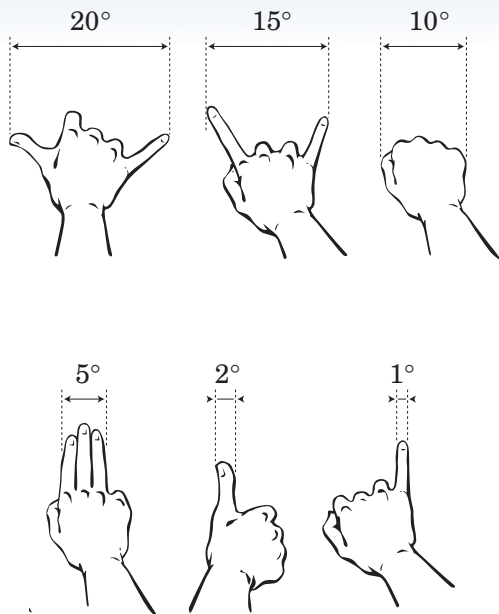


With your arm outstretched, your hand will help you determine angular distances. Extend your arm out in front of you and hold your thumb upright. It is now hiding part of what is in front of your vision. The amount of view that is hidden behind your thumb will depend upon how long your arm is and how thick your thumb may be. The shorter the arm, or the thicker the thumb, the more of your view will be hidden.

Measuring distances in the sky

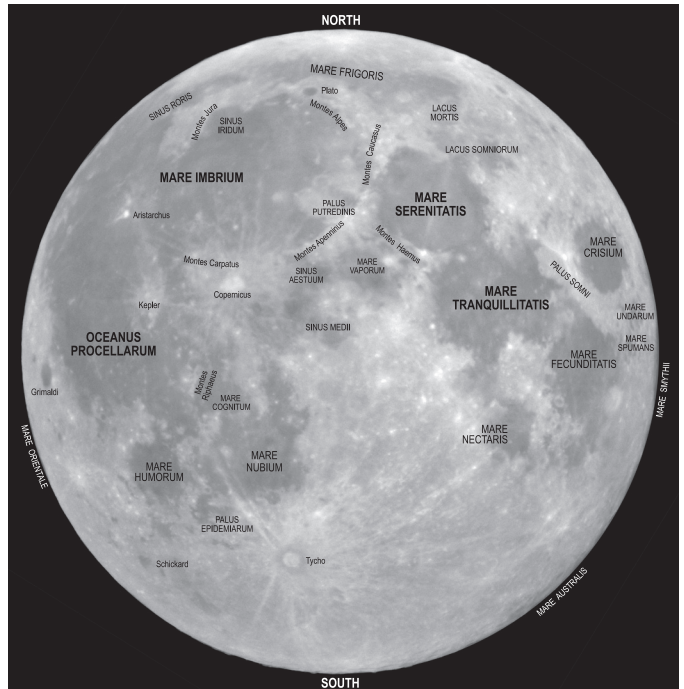
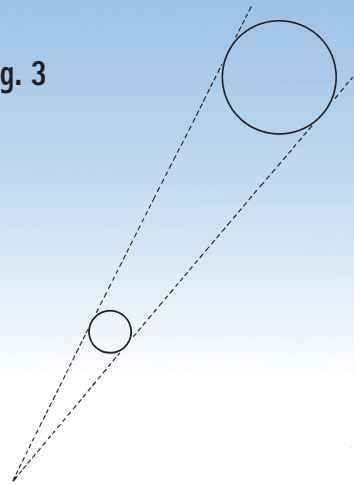
So our hand becomes an excellent device for measuring distances in degrees in the sky. Different parts of your hand can be used to measure different angles. Look at Fig. 2.

Fig. 2



The tip of your small finger will cover approximately 1 degree of sky. In your room look at the door knob or light switch across the room. Your finger can cover it. Now look at a building across the street. The same finger will cover a large part of the building. Now look at the Moon. The same finger can cover the Moon. How can this be since one is so much larger than the other? Look at Fig. 3.

Fig. 3



Although the Moon is so much larger than the building across the street, it can actually be hidden by a narrow object like a finger. The diameter of the Moon, when measured this way, is seen to be only about $\frac{1}{2}$ degree wide. The farther away an object is, the smaller the angle needed to hide it from sight. The Moon looks much bigger than a star because it is so much closer to us.

Distances to the stars

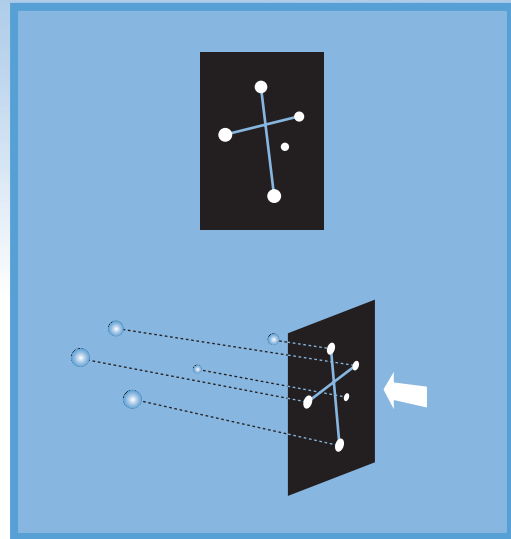
We measure the distance between a star and the Earth, not in miles or kilometers, but in **light years** by using the speed of light. It is important to remember that a light year is a distance, it is not a measure of time. The distance light travels in one year is a light year. Light travels 186 000 miles per second (299 000 kilometers per second), which is 680 760 000 miles per hour (1 096 000 000 kilometers per hour). Therefore, a light year is a distance of almost 6 000 000 000 000 (6 trillion) miles, or 9.6 trillion kilometers.

It takes more than one second for light from the Moon to reach the Earth and more than 8 minutes for light from the Sun to reach Earth. Compare this with the 4.3 years that it takes for the light from the nearest star, Rigil of Centaurus, to reach the Earth. Deneb in the Northern Cross is over 1000 light years away. That means the light we now see left the star over 1000 years ago. It is therefore possible that the star may not even be there any more.

Three-dimensional awareness

The stars within each constellation appear as if painted on a flat surface. This is an illusion. As you study the diagram of the constellation Crux (Fig. 4) try to imagine the tremendous degree of separation of each star from what would appear to be its close neighbor. This three-

Fig.4



dimensional phenomenon holds true for the relationships between all stars in the heavens.

The brightness of stars

Some stars appear much brighter than others. This does not necessarily mean that the bright star is bigger or giving off more light than the dimmer star. The **apparent brightness** (how bright it seems to us) depends upon three things: (1) how big it is; (2) how far away it is from Earth; and (3) how much light it actually emanates per diameter of the star. The brightest star to us is our Sun, but it is only an average size star. It seems the brightest because it is the nearest star to us on Earth.

The star Sirius in the constellation of

Canis Major appears considerably brighter than Rigel in Orion. However, Rigel is actually thousands of times brighter than Sirius. It appears fainter because it is over a thousand light years away, while Sirius is only $8\frac{1}{2}$ light years from us.

We measure the brightness of the stars as seen with the naked eye on a scale called the **magnitude** scale. Hipparchus, a Greek astronomer, rated the importance of stars by their brightness and used the word magnitude to describe their relative brightness. Magnitude means bigness. In ancient times they may have assumed that the brighter star is a bigger star. A very bright star would have a magnitude of 1 or less and a very faint star a magnitude of 6. The smaller the number, the brighter the star. A very powerful telescope can see very faint stars beyond magnitude 20. You may be able to see stars with a magnitude of 6 to 7 with your naked eye under very clear, moonless skies. The very brightest planets have a magnitude of -1 to -4 . Unfortunately, light pollution from home and street lamps may prevent you from seeing as many stars as you could if your surroundings were in total darkness. Remember, magnitude is a measure of

star brightness, not how much light the star actually produces, nor how big it is.

Although there are billions of stars, we can only see approximately 2500 stars with our naked eye at one time under the best of conditions. Read how to test your vision in Part 4.

The Milky Way

The space around us seems to be endless. It is a space occupied by billions upon billions of galaxies, each of which is composed of billions and billions of stars, of which our Sun is an average-sized example. The faint band of stars that arches across the sky was called the Milky Way by the early Greeks. It is our view of the galaxy in which we live from within one of our galaxy's spiral arms. The location of our Sun and Earth in that spiral arm is approximately 30000 light years from the center of our galaxy.

What we see with our naked eye is confined to our own galaxy. However, with good eyesight, and if the night is dark enough, you may see a neighboring galaxy as a faint blur in the constellation

Fig. 5 – Side view of a galaxy

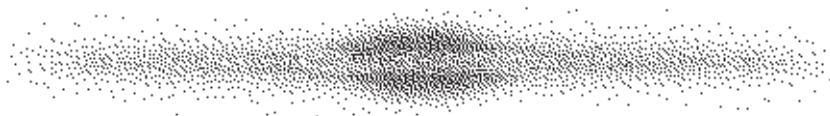
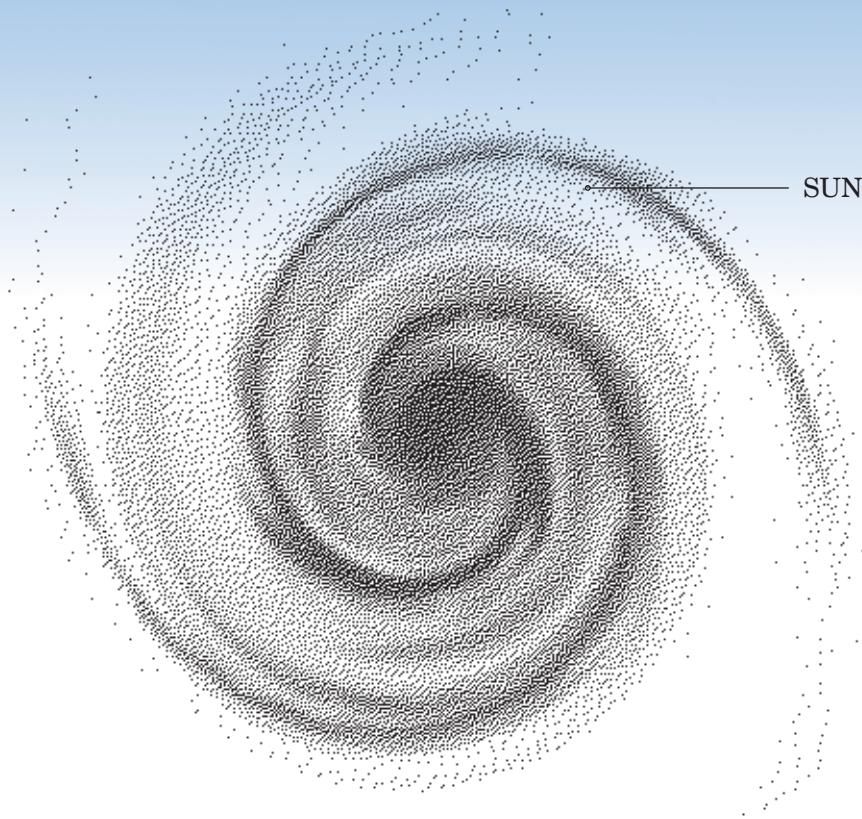


Fig. 6 – Top view of our galaxy, showing the position of our Sun



Andromeda, or the Small and Large Magellanic Clouds in the region of the constellation Hydrus.

Although our galaxy is whirling in space at tremendous speed it still takes 225 million years to complete one revolution. That time period is called the Galactic Year.

Imagine yourself sitting near the end of a spiral arm of our galaxy. If you look straight up or down you will see neighboring stars in our spiral arm of our galaxy but when you look toward Sagittarius you are looking along the flat side of the spiral

arm toward the wider and more dense center bulge of our galaxy. We cannot see the spiral arm opposite us because it is hidden by the billions of stars in the center of the galaxy.

As you look along the Milky Way you will notice that some areas appear to have dark holes or slots in it. These are not empty spaces, but rather dark masses of dust, star debris and gases that hide the stars behind them. There is a very definite dark slit in the area of Cygnus, sometimes called the Cygnus Rift, or the Northern Coalsack, and a similar dark

patch in area of the Southern Cross, called the Southern Coalsack.

Life in the heavens

There are nine known planets orbiting our Sun. There are over 100 000 000 000 (100 billion) suns (stars) in our galaxy. There are billions of galaxies. Just imagine how many planets there must be in our galaxy alone.

In 1995, three planets were almost certainly identified in distant stars. Two of them appear to be as far from their Sun as Earth is from our Sun. This suggests that at least as far as distance to the life-giving source of a Sun is concerned they are not unlike Earth. It is also important to realize that the basic elements necessary for life as we know it, carbon, hydrogen, oxygen and nitrogen, exist throughout the heavens, and that amino acids have been found in meteorites. Given the proper environmental conditions these molecules may join to form the proteins and RNA of living cells, which can then replicate themselves. Such action would signify life.

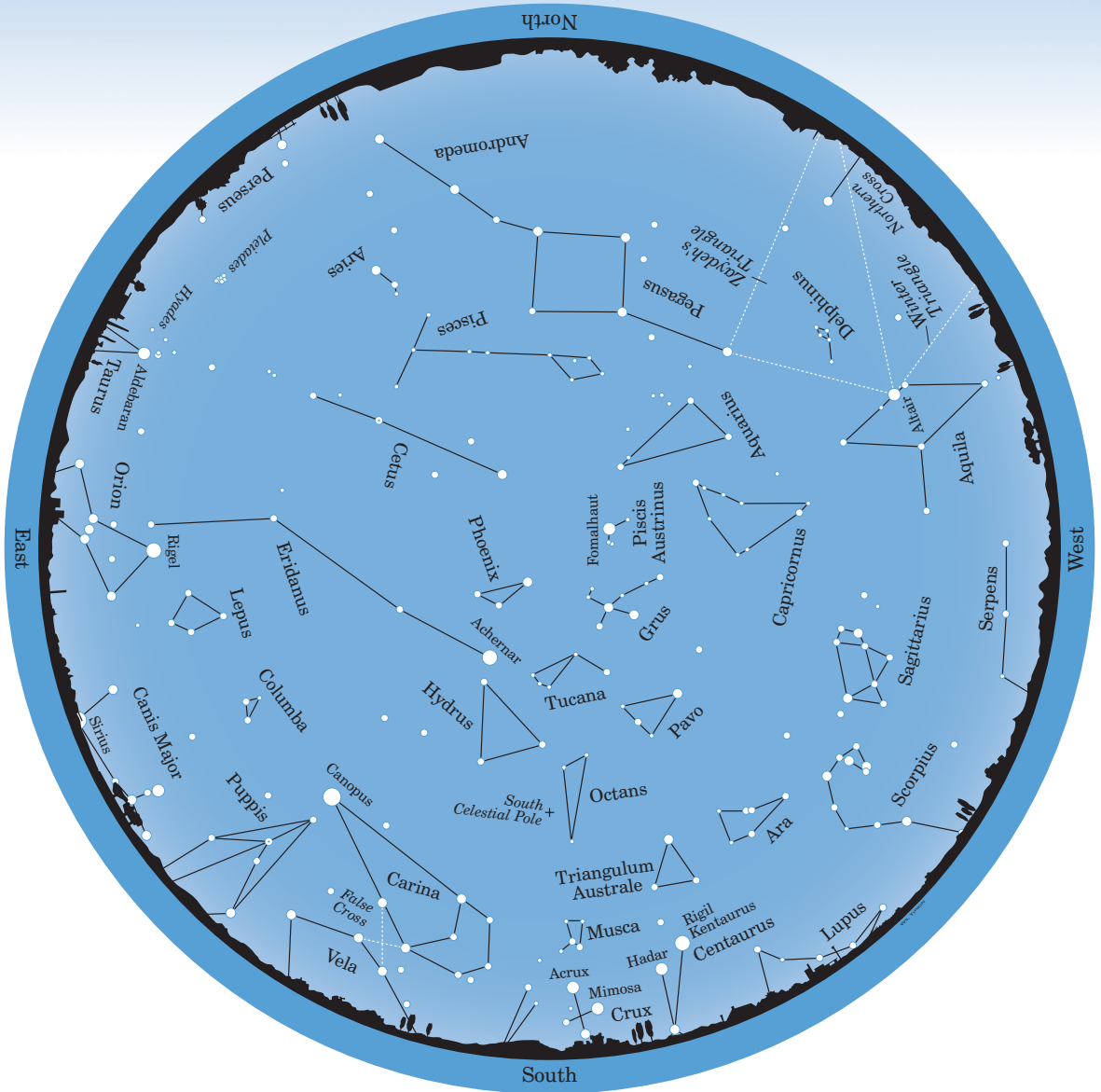
It is almost impossible to assume that we are the only planet with life on it. There are probably massive colonies of microorganisms living in the deep rock structures of planets. The question is not whether there are any living organisms among the stars, but rather, what kind of life is there and are they trying to contact us?

Instructions for use of the atlas

Begin your walk through the sky by first determining which constellations are visible overhead during the month of your walk. Look at the following four star charts which give an overview of the constellations visible during each of the four seasons. Hold the chart in front of you like reading a book. Do not place it overhead. You will notice north or south marked at the bottom of the diagram. Face north or south and compare the lower half of the chart with the stars in the sky. Then face east or west and turn the star chart around so that the direction you are facing is at the bottom of the chart. When you have determined which constellation you wish to see, turn to the index, which will identify the diagrams concerning that constellation. There is a date at the top of each diagram. Even though you may be looking at the sky on a different date, the positions of the constellations will not change in relationship to each other. Those relationships are constant, but, due to the Earth's rotation, you may have to turn the diagram in order for the constellations to appear as they do at your time and date. If you are not familiar with the constellations then start your walk with Crux on page 15. If you are familiar with some of the star groups, then, depending upon the season, look for a specific constellation by using the index to find the diagram dealing with that constellation's relationship to other constellations. If you are slightly familiar with some constellations these four charts can help you find others.

Spring Stars

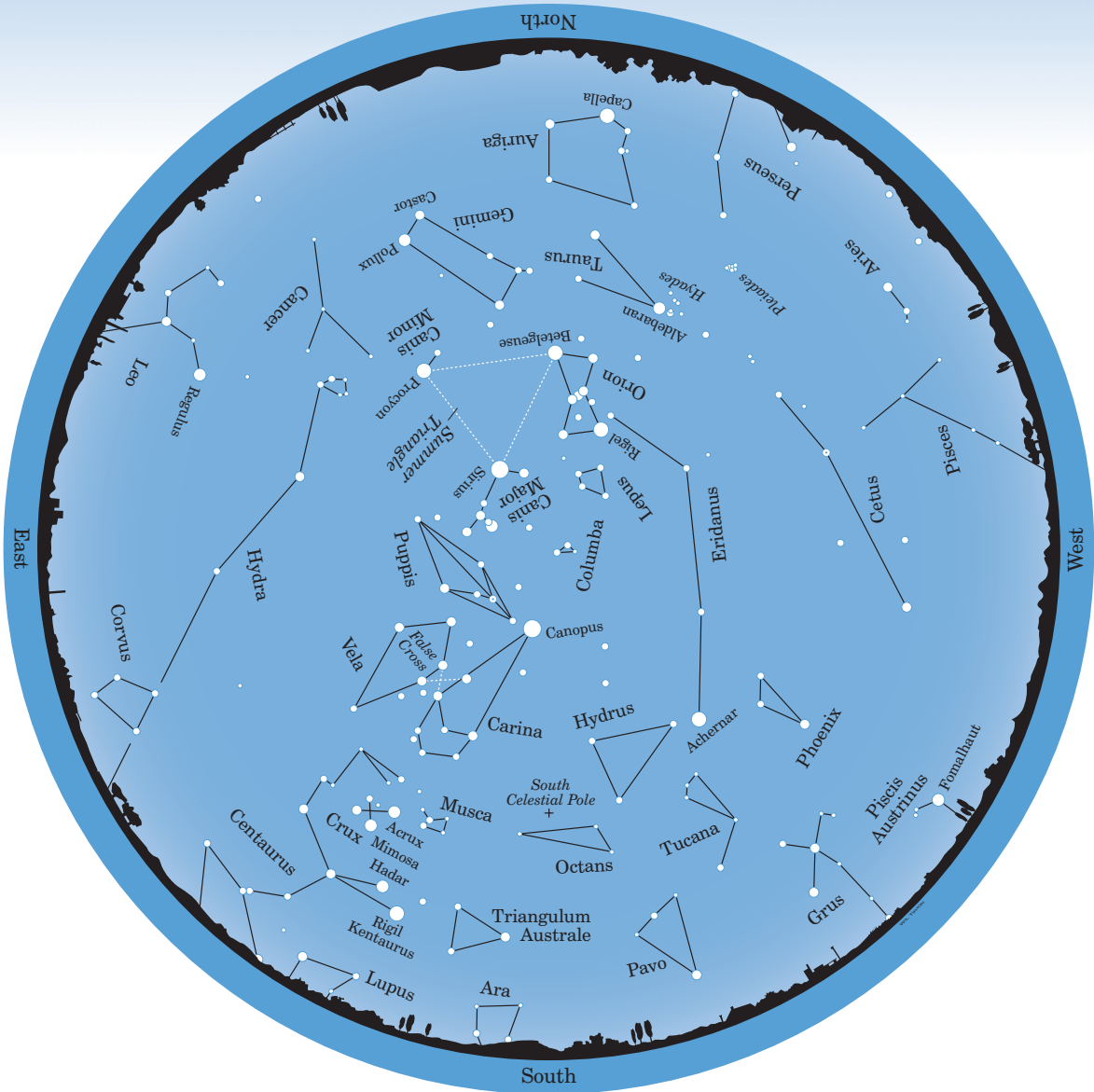
September–October 10–12 pm
November–December 7–9 pm



Summer Stars

December–January 10–12 pm

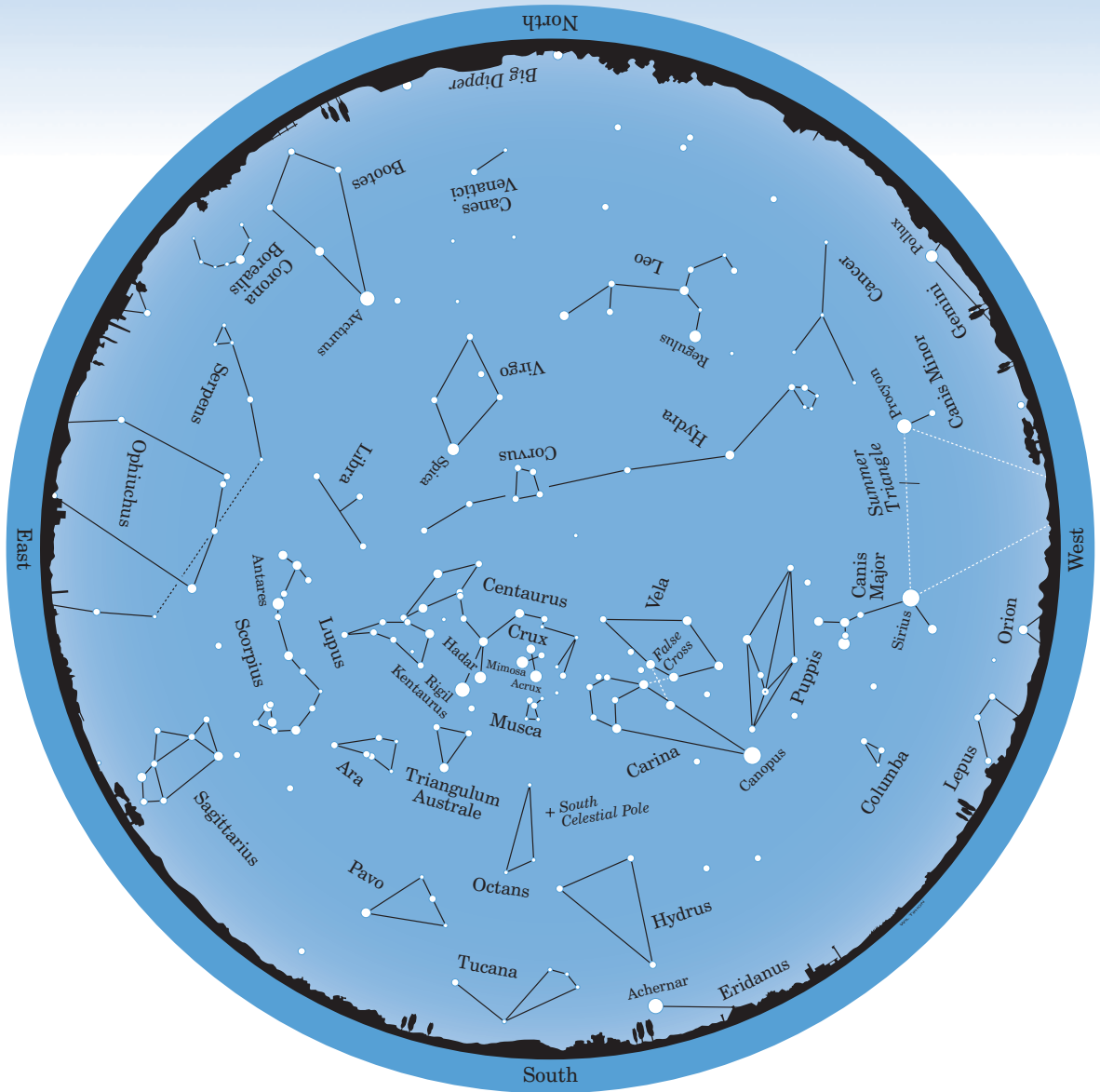
February–March 7–9 pm



Autumn Stars

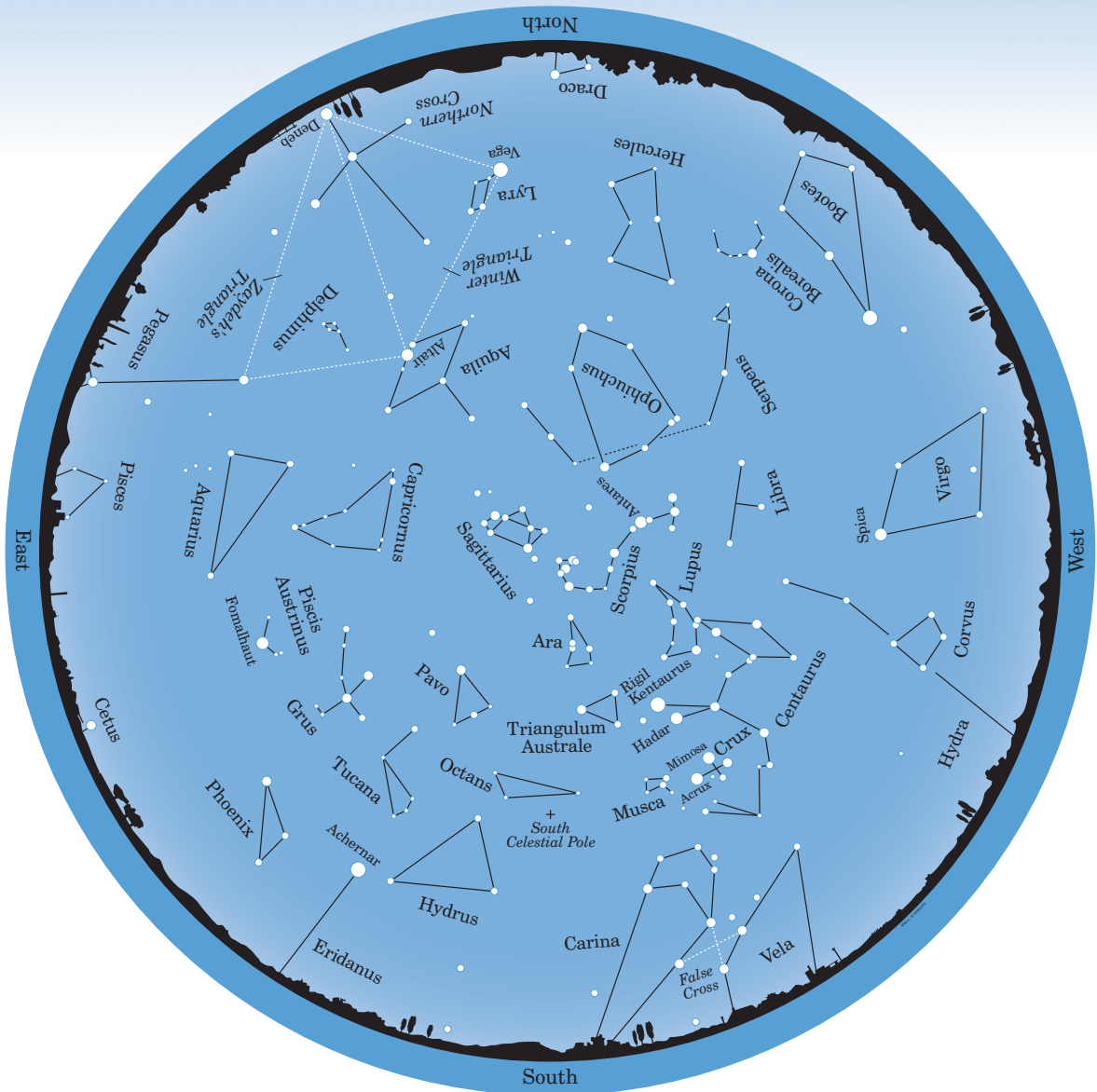
March–April 10–12 pm

May–June 7–9 pm



Winter Stars

June–July 10–12 pm
August–September 7–9 pm





Part 2

A walk through the heavens

Fig. 7 – The first stars to be seen at dusk

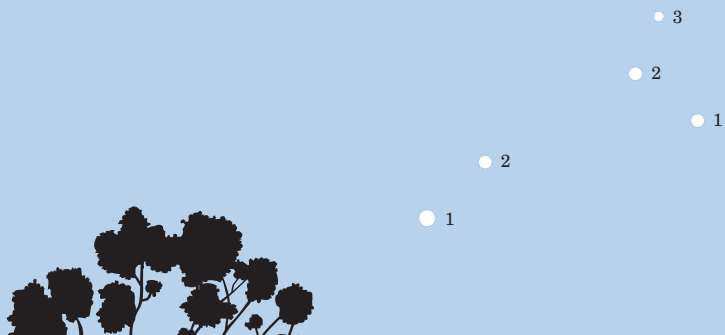
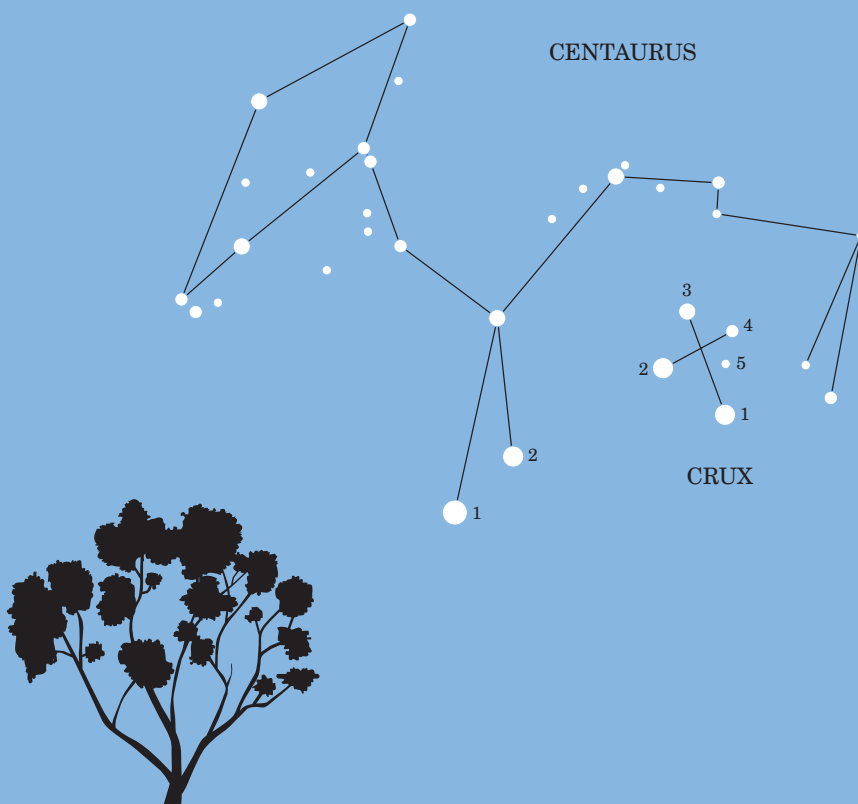


Fig. 8



A walk through the southern sky

The constellations Crux (The Southern Cross) and Centaurus are very conspicuous and may be seen throughout the year, but during the months of October through December they lie very low in the southern horizon. During that time Orion is very visible just north of overhead and remains visible from November to April. Therefore, we should concentrate upon both groups as starting points to walk from one constellation to another.

Since the written descriptions are from direct observation of the celestial sphere they are more accurate than the diagrams, which are flattened out versions of the celestial globe.

Let us start our walk by locating the constellations The Southern Cross (Crux), and Centaurus (the Centaur).

As the Sun goes down and the first stars appear you may note one or two bright stars that seem to be quite isolated in the sky. Ignore them at present. Face south and notice a five star group, of which Stars 1 and 2 which appear separate from the other three stars are especially bright. See Fig. 7.

As the night deepens and more stars appear this group becomes more defined. Stars 1 and 2 are the pointer stars of Centaurus and the other three stars are part of Crux (The Southern Cross). See Fig. 8.

Fig. 9

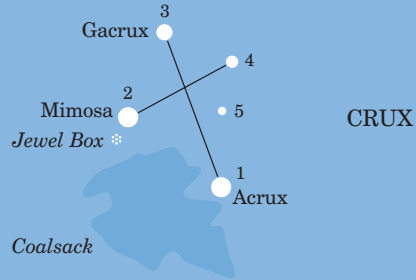
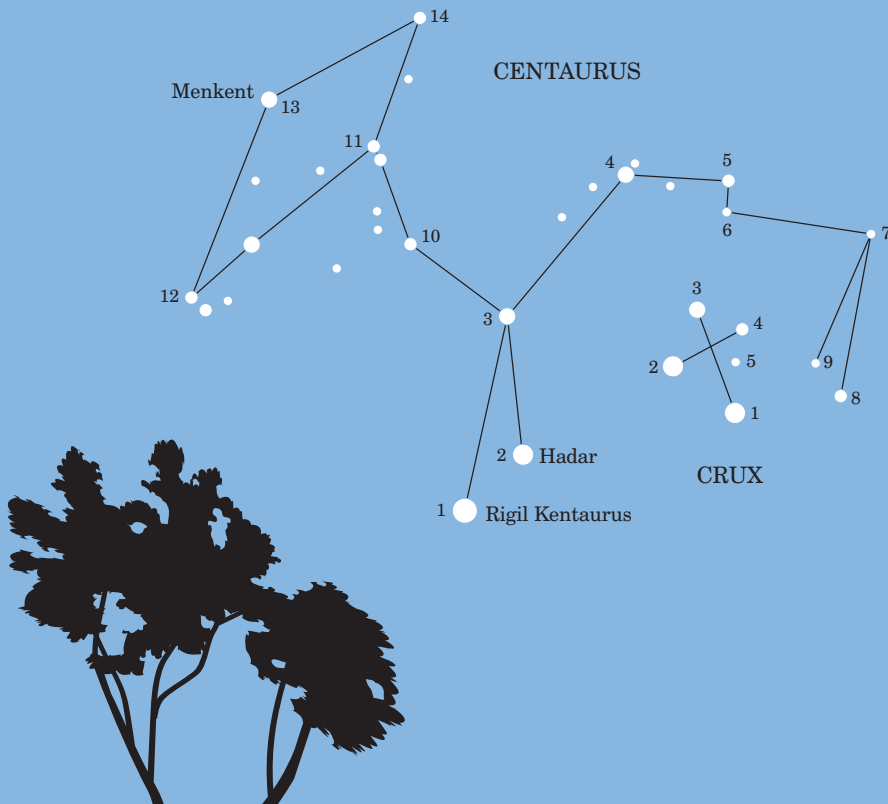


Fig. 10



The Southern Cross (Crux) (Fig. 9)

- * Stars 1, 2 and 3 are brighter than Stars 4 and 5.
- * Notice a hazy patch just below Star 2 of Crux. This is a globular cluster called the Jewel Box. It is best seen through binoculars.
- * Just below the Jewel Box is an area of relative darkness due to the presence of a dark nebula in this region that hides the stars behind it. This area is called the Coalsack.

It is good to learn the names of some of the stars as we walk among them. They become much friendlier, so from now on I will refer to Star 1 of Crux by its proper name 'Acruz'.

When you are familiar with the Southern Cross you will note that a line from Star 4 through Star 2 leads to the pointer stars of Centaurus (Stars 1 and 2). See Fig. 10. Star 1, Rigil Kentaurus, or Alpha Kentaurus, is the closest star to Earth. It is 4.3 light years away.

At this time study the relationship between Centaurus and Crux until the visual image is clear. Notice that Centaurus, which vaguely resembles a camel with a diamond-shaped head, surrounds Crux on three sides.

Test your measuring ability. Star 8 of Centaurus is 20.5 degrees from Star 1 of Centaurus. Star 14 of Centaurus is 19 degrees from Star 12.

Read the legend of Centaurus.

Fig. 11

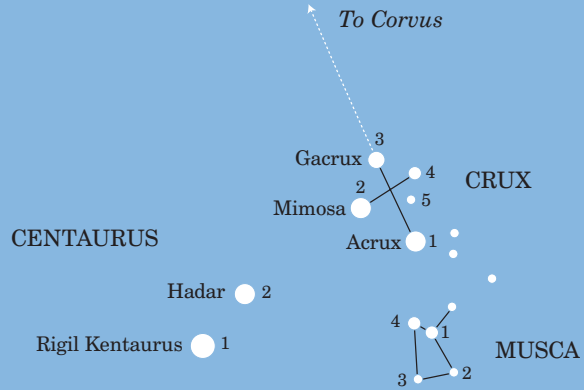
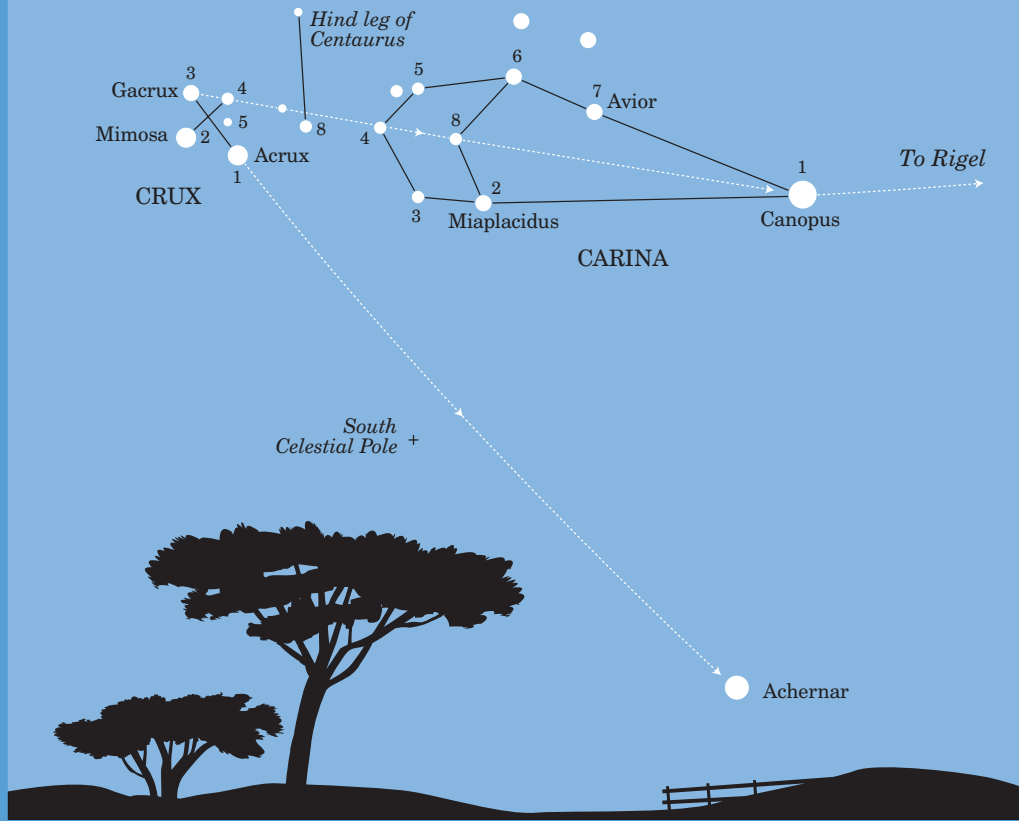


Fig. 12 - Facing South - March 10 pm



Pathways from Crux

To locate Musca (Fig. 11)

- * Just below Crux is the dim constellation of Musca, the Fly.

To locate Corvus

- * A line from Acrux (Star 1) through Star 3 of Crux leads straight to Corvus.

To locate Carina (Fig. 12)

- * A line from Star 3 through Star 4 of Crux leads straight through the constellation of Carina and in a slight curve to Canopus, the second brightest star in the sky.
- * A line from Star 2 of Crux through Acrux (Star 1) leads to Star 2 (Miplacidus) of Carina and moves in a slight curve to Canopus.

- * Carina looks like an ice cream cone with the top of the ice cream (Star 4) slightly off center.
- * A line from Star 5 of Crux through Star 8 of Centaurus goes to Star 4 of Carina (tip of the ice cream), past Star 8 (top of the cone cracker) to Canopus.
- * A line from Star 2 of Crux through Canopus leads straight to Rigel of Orion.

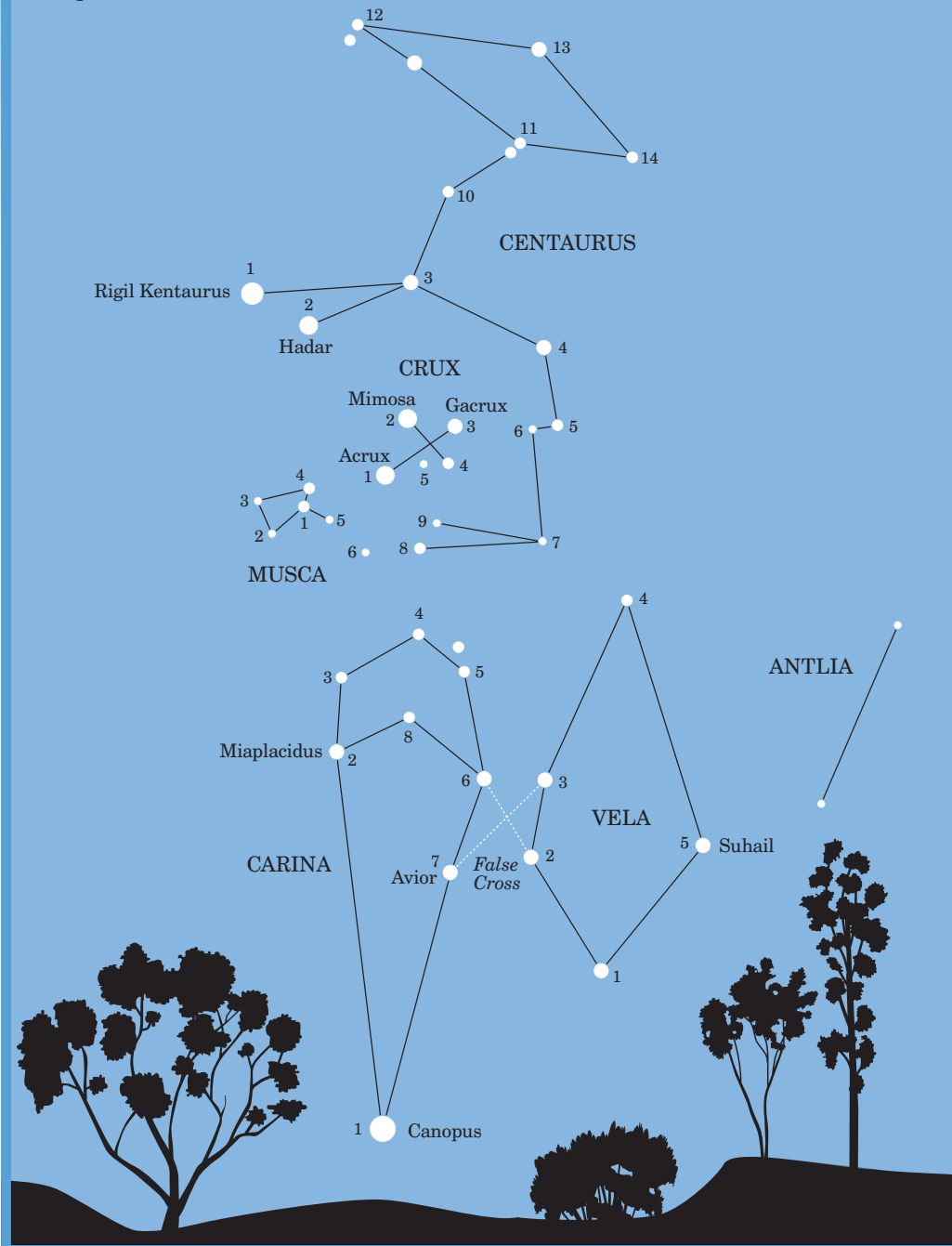
To locate Achernar of Eridanus

- * A line from Star 3 of Crux through Acrux (Star 1) passes in a slight curve next to the South Celestial Pole to the bright star Achernar, the end of the heavenly river Eridanus.

At this time study the relationships between Canopus, Achernar and Crux and confirm your visualization of Carina.

A walk through the heavens

Fig. 13 - Facing South-West - June 10 pm



The Centaurus–Crux–Carina–Vela relationship The True and False Southern Crosses

*To locate Vela and the False Southern Cross
(Fig. 13)*

- * Vela lies north of Carina between Centaurus and Canis Major. It is tied to Carina by a design that resembles Crux, the Southern Cross. It is therefore called the False Southern Cross. Some observers mistakenly think it is Crux.
- * The False Cross is larger, but not as bright as Crux. It consists of Stars 3 and 2 of Vela and Stars 6 and 7 of Carina.
- * Study the shape of Vela, which resembles a kite. Note that Stars 2 and 5 of Vela are wider apart than Stars 2 and 6 of Carina.

Fig. 14 – Facing South – March 10 pm



The Acrux–Canopus–Achernar triangle (Fig. 14). Best seen 9 pm December–April.

This triangle is remarkable in that it encloses two constellations and partially encloses eight others. The triangle contains the constellations of Mensa and Volans and partially encloses Musca, Chamaeleon, Carina, Pictor, Dorado, Horologium, Reticulum, and Hydrus. It also encloses the Large Magellanic Cloud.

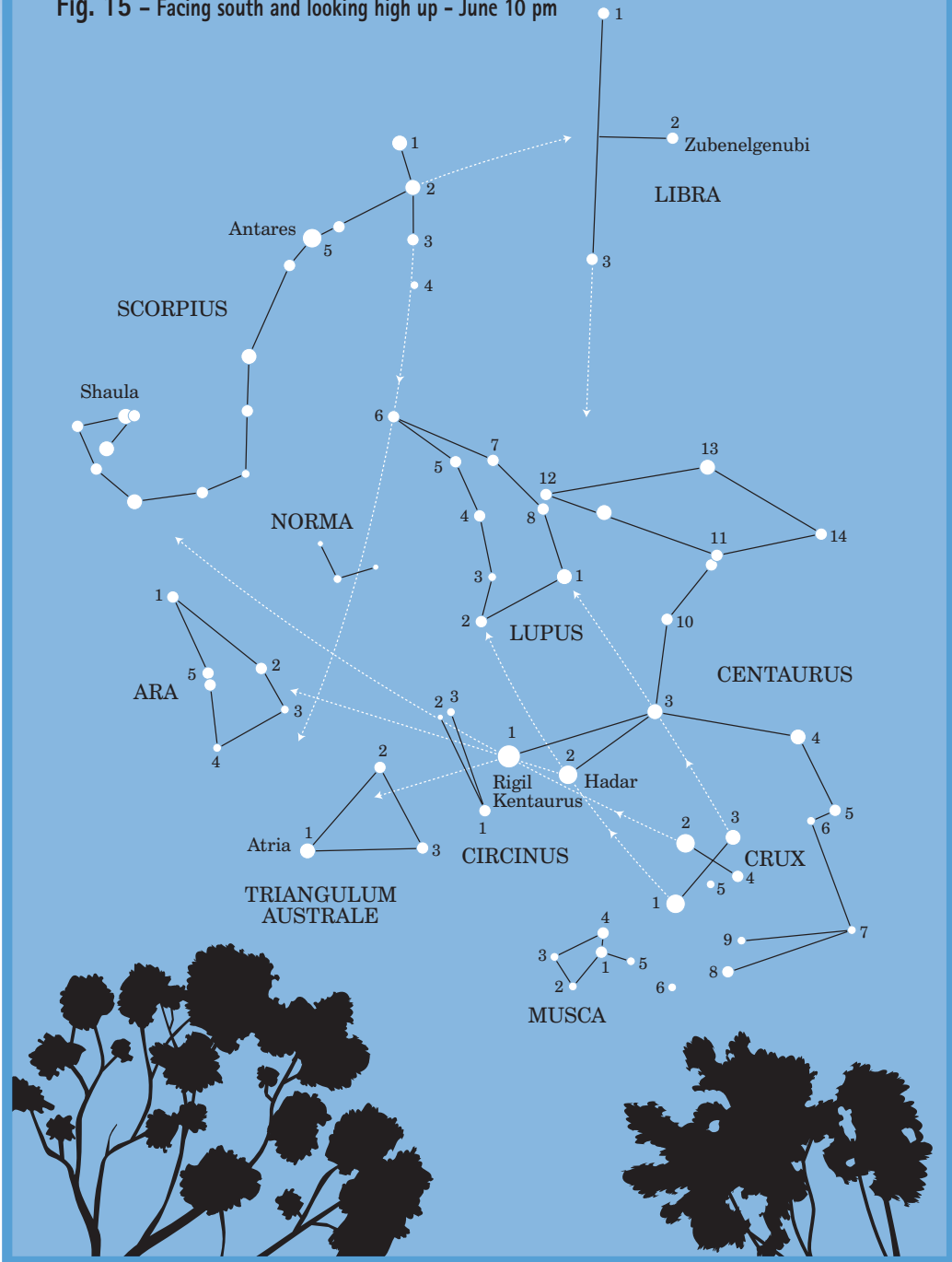
Study this triangle to help visualize these constellations. They are very faint and unimportant except for Hydrus and Star 1 of Musca. Achernar is a bright star that is approximately four fully extended hand spans from Crux.

Notice the relationship between Octans and the South Celestial Pole.

The brightnesses of the relevant constellations are:

- Dorado – magnitude of 3.3 or dimmer
- Chamaeleon – magnitude of 4.0 or dimmer
- Mensa – magnitude of 5.1 or dimmer
- Musca – magnitude of 2.7 or dimmer
- Pictor – magnitude of 3.3 or dimmer
- Reticulum – magnitude of 3.4 or dimmer
- Volans – magnitude of 3.8 or dimmer
- Apus – magnitude of 3.8 or dimmer
- Octans – magnitude of 3.8 or dimmer
- Hydrus – magnitude of 3.2 or dimmer
- Horologium – magnitude of 5.0 or dimmer

Fig. 15 - Facing south and looking high up - June 10 pm



The Centaurus–Lupus–Ara–Libra–Scorpius relationship (Fig. 15)

The name of Star 1 of Centaurus is Rigil Kentaurus. Star 2 is Hadar.

Pathways from Centaurus

To Lupus

- ★ Lupus looks like a large rhinoceros horn. Star 12 of the head of Centaurus almost touches Star 8 of Lupus.
- ★ Star 3 of Crux through Star 3 of Centaurus leads to Star 1 of Lupus.
- ★ Star 1 of Crux through Star 2 of Centaurus is equidistant to and leads directly to Star 2 of Lupus.
- ★ Star 2 of Crux through Star 1 (Rigil Kentaurus) of Centaurus leads to the tail of Scorpius. Follow the curve of the tail northward to Antares and to the four-star head of Scorpius.
- ★ Follow the curve of the head of Scorpius to the tip of Lupus and continue past Norma in a curve to near the base of Ara, which resembles a small rhinoceros horn.

To locate Libra

- ★ A line from Antares of Scorpius through Star 2 in the head of Scorpius leads directly to Libra, the Scale of Justice.
- ★ The crossbar of Libra (the Scale) leads to the head of Centaurus.

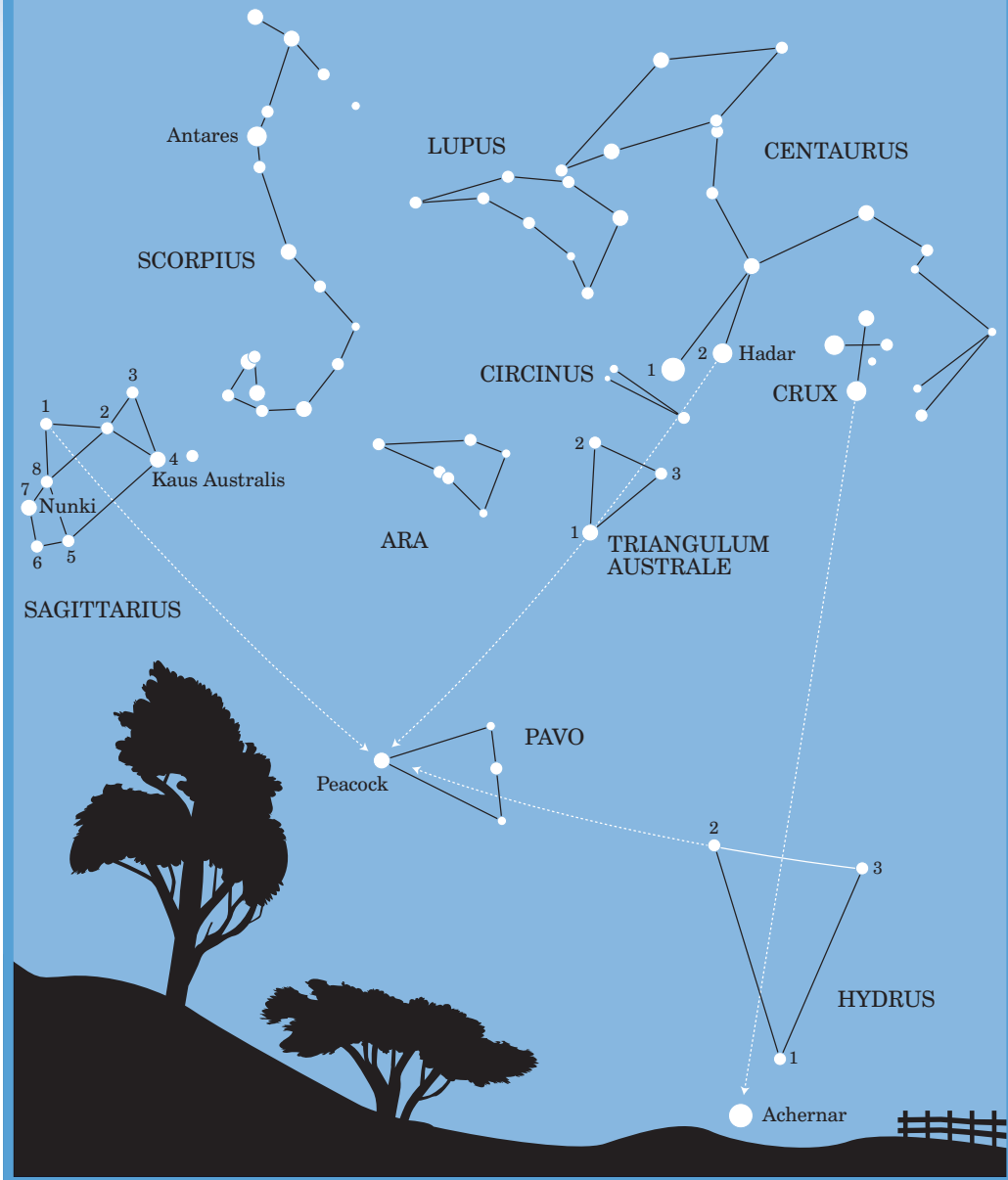
To Ara

- ★ Star 2 through Star 1 of Centaurus leads to Ara. It lies south of Scorpius and between Scorpius and Triangulum Australe.

To Circinus and Triangulum Australe

- ★ A line from Star 3 of Centaurus through Rigil Kentaurus passes through the center of Circinus and continues to cross Triangulum Australe.

Fig. 16 - Facing South - May 10 pm



**The Sagittarius–Centaurus–
Hydrus– Pavo relationship
(Fig. 16). Best seen 9 pm July
(May–September)**

The positions of the constellations are distorted in order to understand the pathways better.

To locate Peacock in Pavo

It is important to recognize the star Peacock in the constellation of Pavo. It serves as a good reference point, as a corner of a triangle that will later make it easy to locate the constellations of Grus, Tucana and Indus.

- * A line from Hadar (Star 2) of Centaurus through Star 1 of Triangulum Australe goes directly to Peacock.
- * A line from Star 3 of Triangulum Australe through Star 1 of the triangle leads to the Peacock area.
- * A line from the top of the Sagittarius teapot (Star 1) moving through the base of the teapot (between Stars 4 and 5) leads directly to Peacock.
- * A line from Star 3 of Hydrus through Star 2 of Hydrus leads to Peacock.

Fig. 17 - Facing South and looking high up - September 10 pm

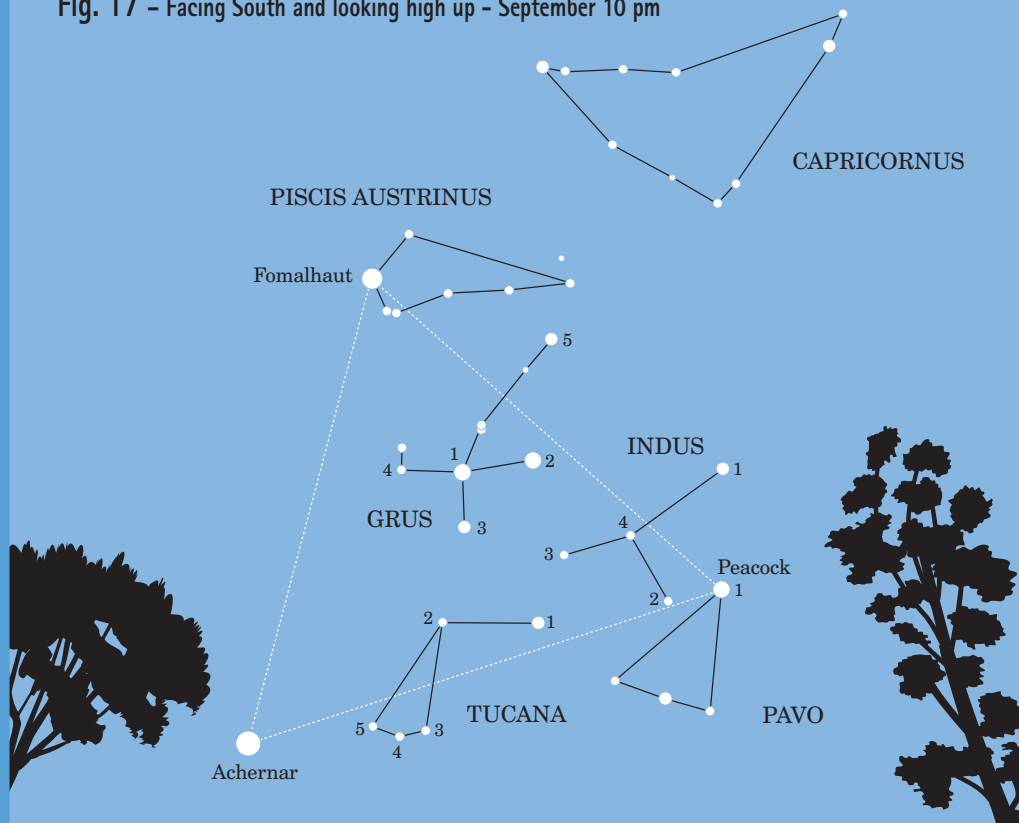
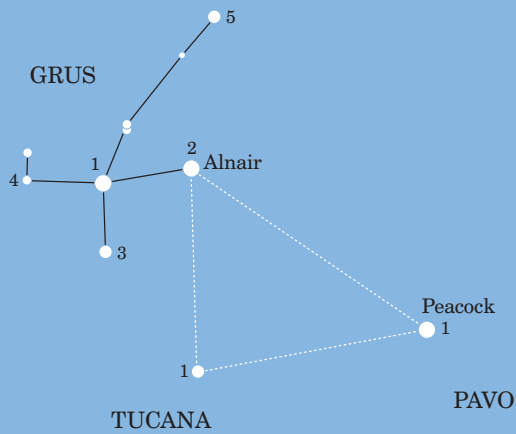


Fig. 18



The Achernar–Fomalhaut–Peacock triangle

*To locate Grus (Fig. 17) Best seen 9 pm
July–January*

Now that you have identified Peacock of Pavo and Achernar of Eridanus, visualize a line between them, and look straight north to locate Fomalhaut of Piscis Austrinus. It is a bright star in a relatively dark area of the sky (see Fig. 35). Form a triangle joining them together. This triangle encloses Grus, and its lines cross Indus and Tucana.

One may draw a curve going from Fomalhaut through Grus through Pavo through Centaurus to the Southern Cross.

Pathways from Grus

To locate Tucana (Figs. 17 and 18)

- ★ A line from Star 2 of Grus perpendicular to the bar 4–1–2 of Grus moving southward touches Star 1 of Tucana. If you then move at right angles from Tucana you reach the fairly bright star Peacock of Pavo. This almost forms a right-angle triangle.
- ★ A line from Star 1 through Star 3 of Grus leads to Tucana.

To locate Indus (Fig. 17)

- ★ A line from Star 4 of Grus through Stars 1 and 2 of Grus leads just above Star 1 of Indus.
- ★ Star 2 of Indus is a faint star that is on a line between Star 1 of Tucana and Peacock.
- ★ A line from Fomalhaut of Piscis Austrinus through Star 2 of Grus leads in a slight curve to Peacock.

To Locate Capricornus

- ★ Follow a curve from Star 1 through Star 5 of Grus to Capricornus.

Before moving to the next section study the relationships formed by the triangle in Fig. 17.

Fig. 19 - Facing South-West - November 10 pm



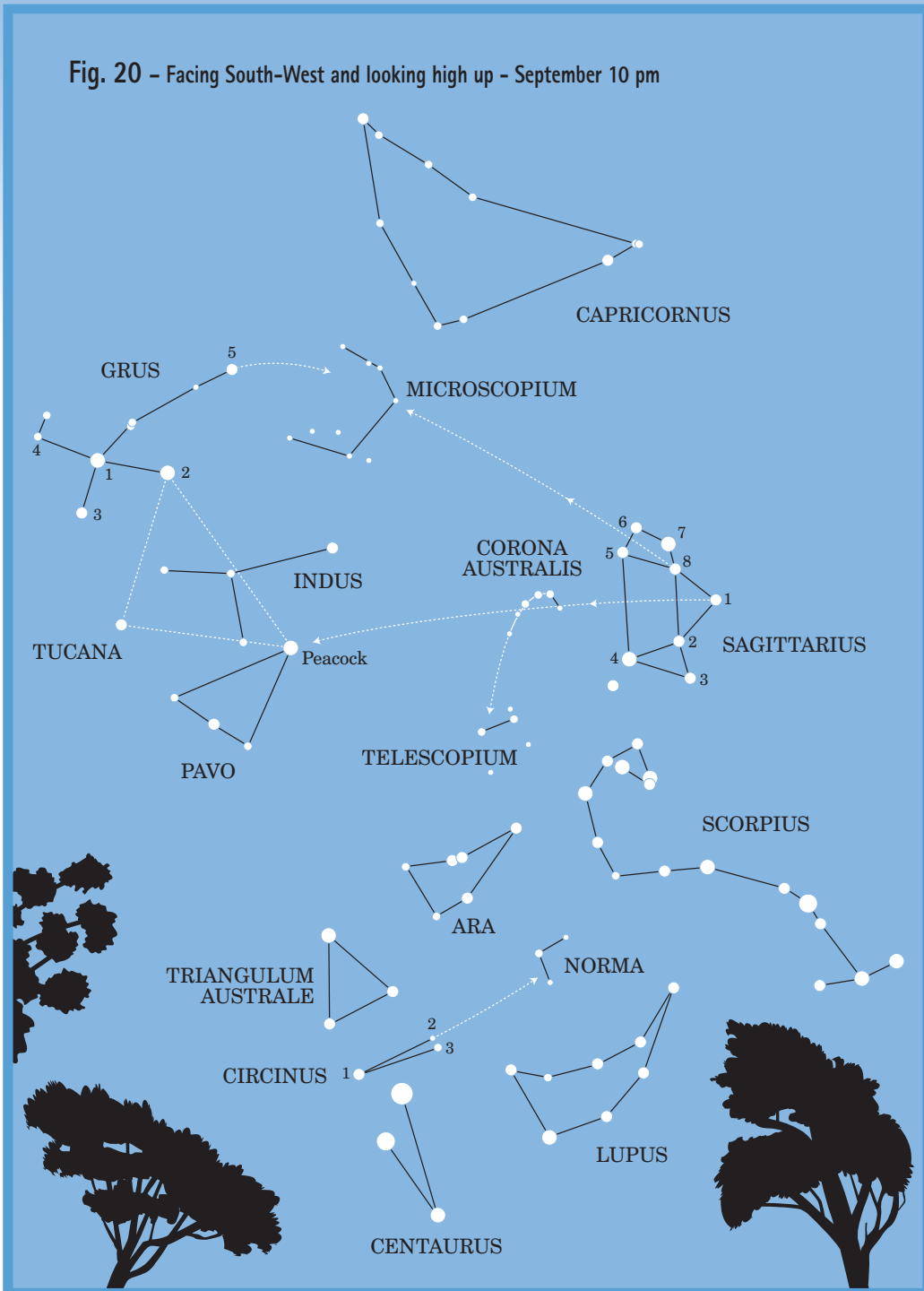
The Diphda–Fomalhaut–Achernar– Peacock triangles

*To locate Ankaa in the constellation of Phoenix
(Fig. 19)*

Review the triangle formed by the stars
Fomalhaut, Peacock and Achernar.

- ★ Visualize a triangle joining Diphda of Cetus with Fomalhaut and Achernar. See Fig. 35 to see relationships of Diphda and Fomalhaut to Pegasus.
- ★ This triangle encloses much of Phoenix, including its brightest star Ankaa, which lies in the approximate center of the triangle.
- ★ Notice that the line from Achernar to Diphda crosses Star 2 of Phoenix.
- ★ Star 2 through Star 4 of Grus leads to Ankaa, not quite equidistant.

Fig. 20 - Facing South-West and looking high up - September 10 pm



The Grus, Sagittarius, Scorpius and Lupus relationship (Fig. 20)

Study the above relationship as well as the four constellations Microscopium, Corona Australis, Norma and Telescopium. These constellation are very faint and unimportant.

To locate Microscopium

- * Microscopium may be visualized as a wide bucket. Follow the curve of Grus from Star 1 through 5, and a sharp curve aims into the bucket.
- * Star 1 through Star 8 of Sagittarius points to the bottom of the bucket.

To locate Telescopium

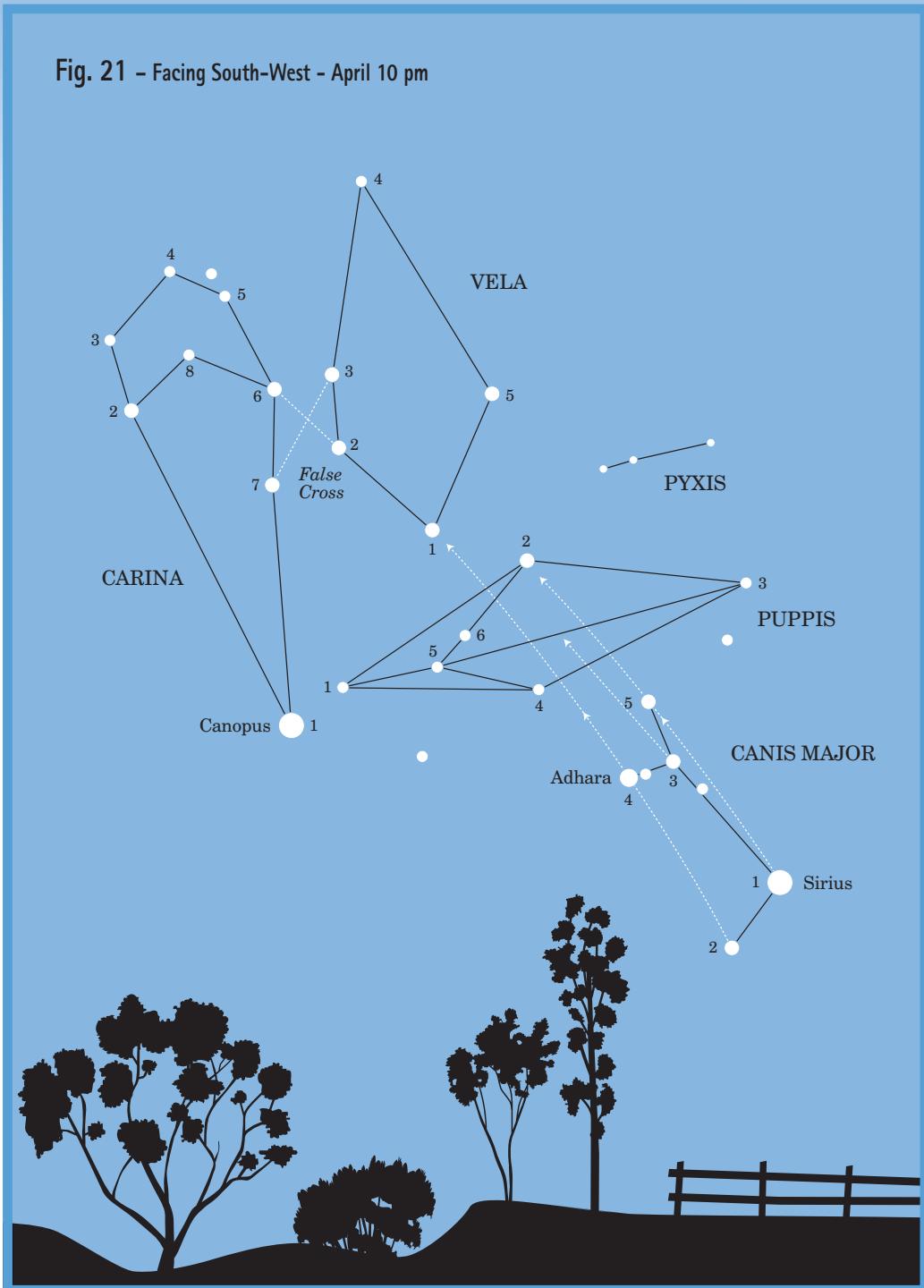
- * The curve of Corona Australis points to Telescopium.

To locate Norma

- * Norma is on a line with Star 1 and Star 2 of Circinus approximately $1.5 \times$ the distance between Star 1 and Star 2.

Microscopium – magnitude of 4.7 or dimmer
Corona Australis – magnitude of 4.1 or dimmer
Norma – magnitude of 4.0 or dimmer
Telescopium – magnitude of 3.5 or dimmer

Fig. 21 - Facing South-West - April 10 pm

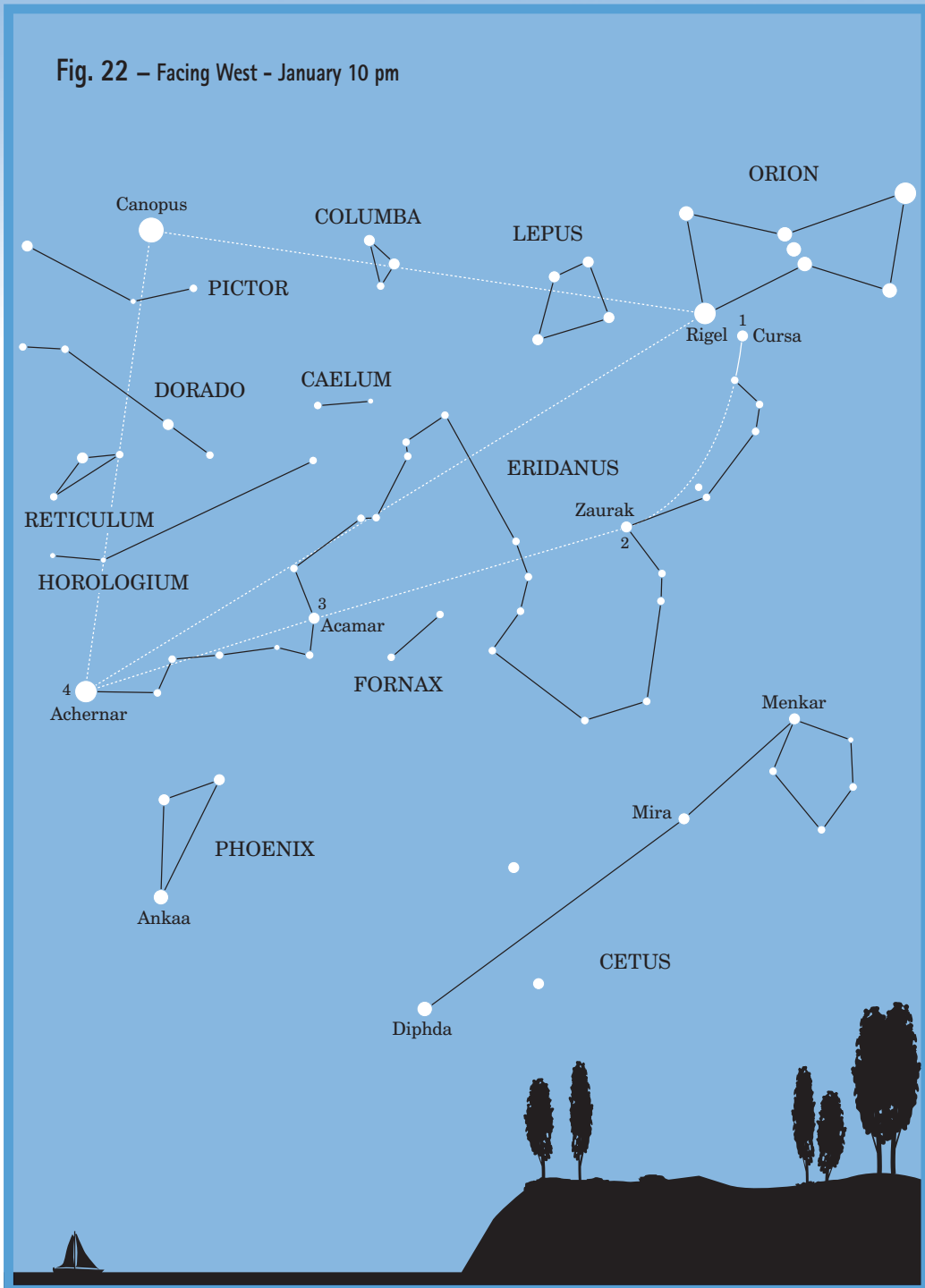


The Canis Major–Puppis–Carina (Canopus) relationship

To locate Puppis (Fig. 21)

- * Puppis may be visualized as a long-faceted diamond that lies between Canis Major, Vela and Carina.
- * A line from Sirius through Star 3 of Canis Major points to the center of Puppis.
- * Star 1 of Canis Major, Sirius, through Star 5 leads to Star 2 of Puppis.
- * A line from Sirius through Star 4 of Canis Major leads to Star 5 of Puppis.
- * A line from Star 2 of Canis Major through Star 4 crosses Puppis to Star 1 of Vela.
- * Notice that Star 1 of Puppis is close to Canopus, the second brightest star in the sky and that moving from Canopus through Star 1 of Puppis goes to Star 2 of Puppis.

Fig. 22 – Facing West - January 10 pm



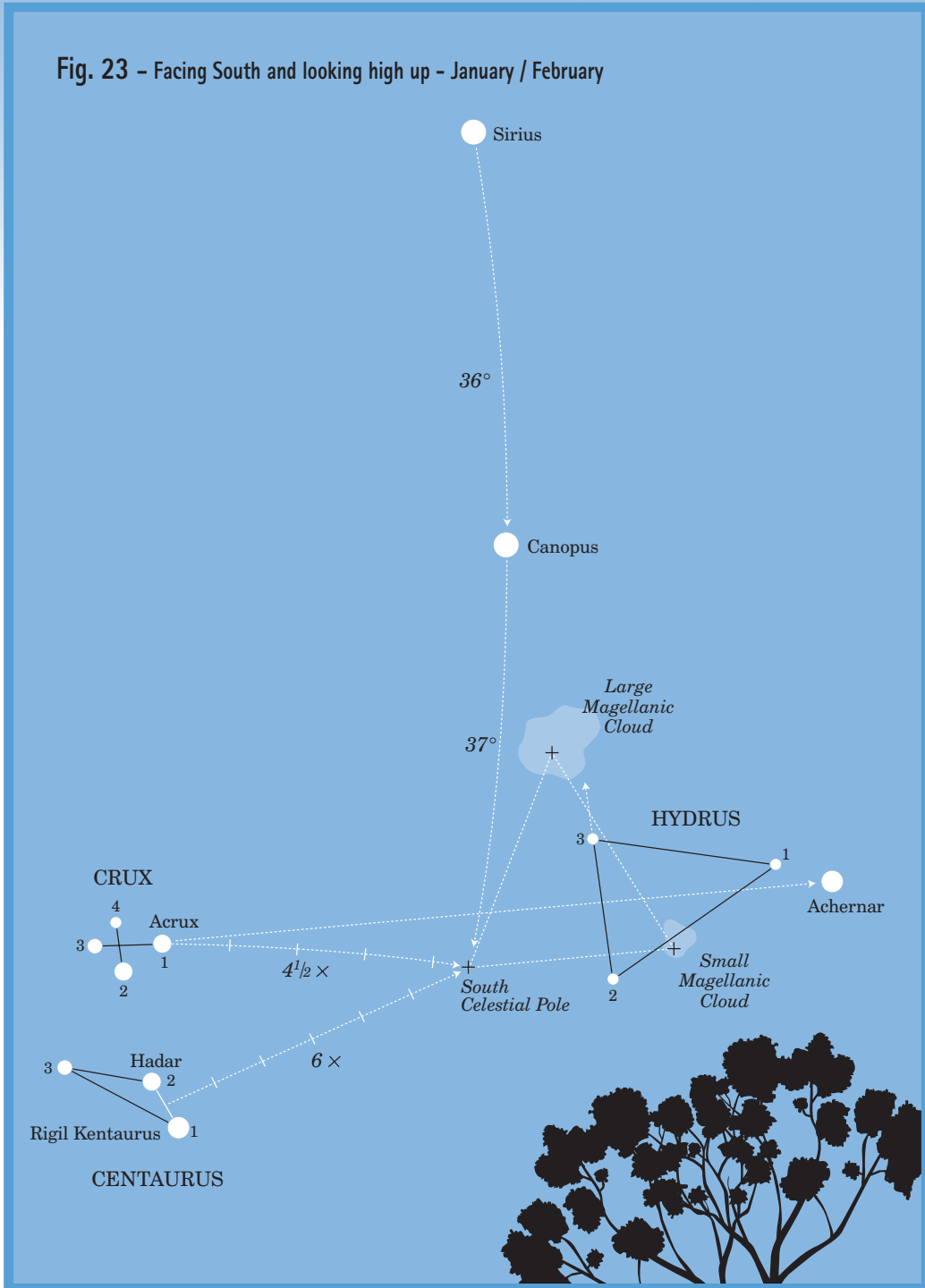
The River Eridanus (Fig. 22). Best seen 9 pm November to March

The complete extent of Eridanus lies directly overhead at approximately 9 pm January 1.

- * Eridanus starts from the star Cursa, which lies next to Rigel of Orion. It then rambles southward to end at Achernar.
- * The only bright stars in the constellation are Cursa (Star 1), Zaurak (Star 2), Acamar (Star 3) and Achernar (Star 4).
- * It may be simpler to visualize the river by joining stars 1–2–3–4 to form a sinuous line from Cursa to Achernar.

Notice that Eridanus partially surrounds the faint constellation of Fornax.

Fig. 23 – Facing South and looking high up – January / February



Guides to the South Celestial Pole (SCP) (Fig. 23, not to scale)

- * The closest constellation to the South Celestial Pole is the dim constellation Octans. It is too dim to be of much value in locating the SCP.
- * The South Celestial Pole lies midway between Acrux (Star 1 of Crux) and Achernar of Eridanus, but 4.5 degrees to the side of that line.
- * Moving along the line from Star 3 of Crux through Acrux, approximately $4\frac{1}{2}$ times the length of Crux leads to the South Celestial Pole.
- * The South Celestial Pole is on a line perpendicular to the midpoint of a line between Rigil Kentaurus (Star 1) and Hadar (Star 2) of Centaurus. The distance to the SCP is approximately six times the distance between Rigil Kentaurus and Hadar.
- * If you flip the triangle of Hydrus over, Star 1 of Hydrus, which is closest to Achernar, will lay near the South Celestial Pole.
- * Star 2 of Hydrus is 13 degrees from the South Celestial Pole.

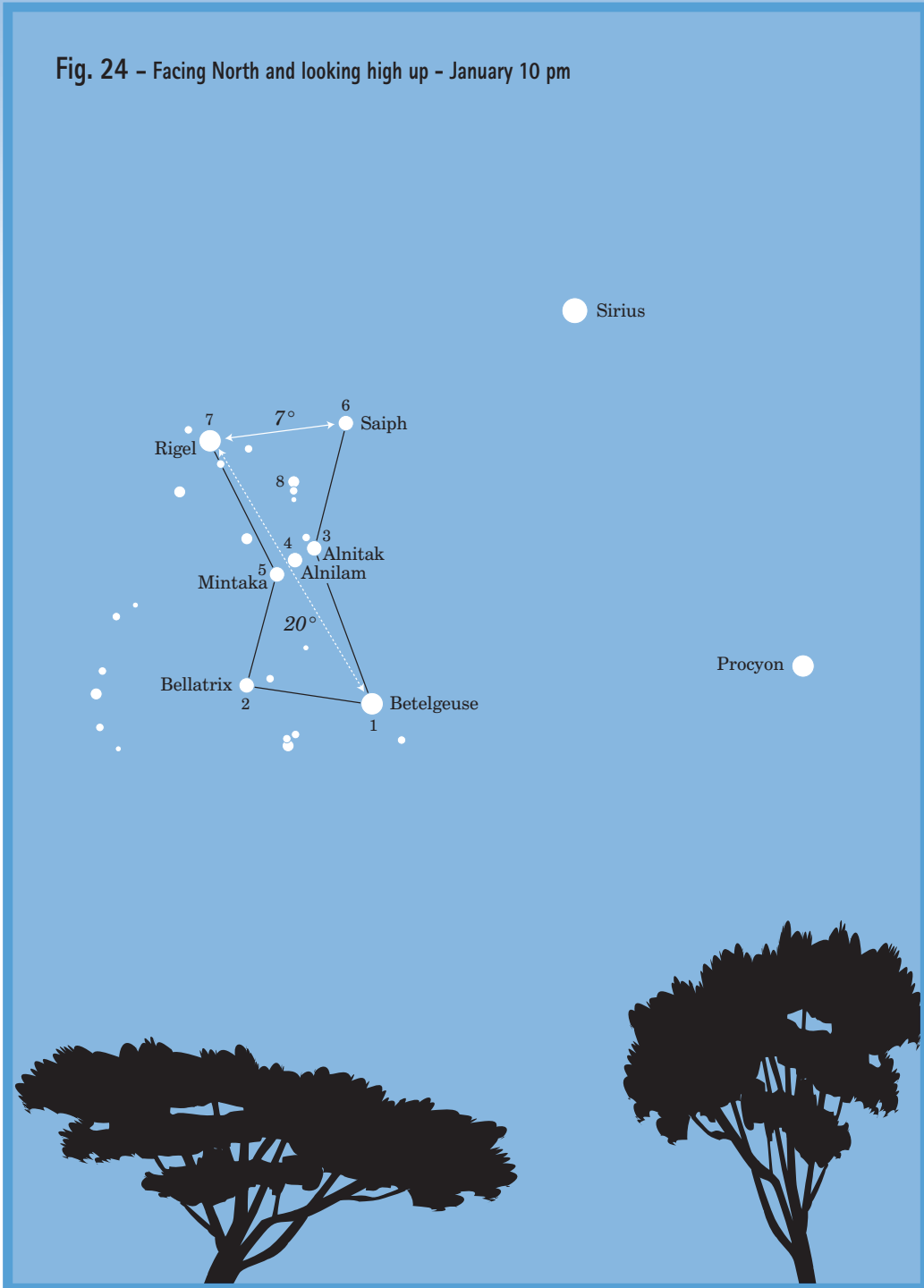
- * A line from Sirius to Canopus leads to the South Celestial Pole. The distance between Sirius and Canopus is 36 degrees, between Canopus and the SCP is 37 degrees – almost equidistant.
- * Canopus and Achernar form an almost equilateral triangle with the SCP.
- * The Small Magellanic Cloud (SMC) and the Large Magellanic Cloud (LMC) form a nice equilateral triangle with the South Celestial Pole.

The Magellanic Clouds (best seen September–March)

The Magellanic Clouds, or Clouds of Magellan, originally called the Cape Clouds, were discovered before the time of the explorer Ferdinand Magellan. They are companion galaxies to our own galaxy and appear as fuzzy patches.

- * Star 2 through Star 3 of Hydrus leads to the LMC. The line joining Stars 1 and 2 of Hydrus crosses the SMC.

Fig. 24 – Facing North and looking high up – January 10 pm

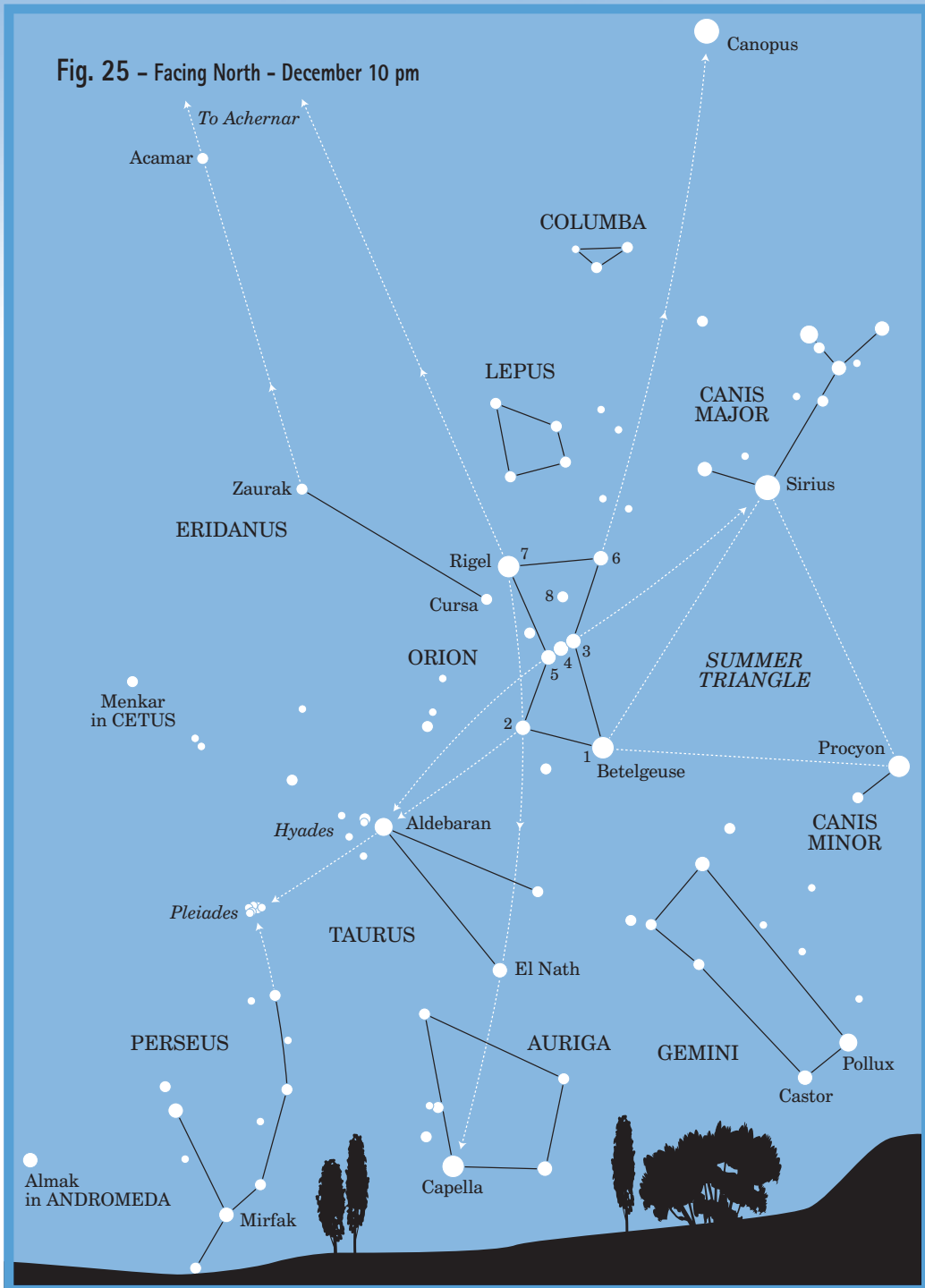


Starting from Orion (Fig. 24)

Orion, the Hunter, is a large striking constellation that may be seen in the northern sky during the summer months December to April. Look for seven bright stars in the shape of an hourglass with three bright stars (Stars 3, 4, 5) in a row forming the waist of the hourglass or the belt of the Hunter. Star 1 is Betelgeuse and Star 7 is Rigel.

Once you have identified Orion, test your ability to measure distances. Stars 6 and 7 are approximately 7 degrees apart. The distance between Stars 1 and 7 is 20 degrees.

Study Orion closely since it serves as an excellent guide to the surrounding constellations and to the Pleiades.



Pathways from Orion

To locate Sirius in Canis Major (Fig. 25)

Sirius is the brightest star in the sky.

- ★ A line through the belt of Orion (Stars 3, 4, 5), curves slightly southward to Sirius on one side and slightly northward to Aldebaran of Taurus on the other side. Sirius is about 15 degrees from Star 6 (Saiph) of Orion. Aldebaran is 15 degrees from Star 2 (Bellatrix) of Orion.

To locate Procyon in Canis Minor

This is a bright star 25 degrees in a northerly direction from Sirius. You may notice that the Milky Way lies between Procyon and Sirius.

The Summer Triangle (Winter Triangle in the Northern Hemisphere) is an equilateral triangle joining Betelgeuse of Orion, Sirius of Canis Major and Procyon of Canis Minor.

To locate Taurus and its star clusters the Hyades and the Pleiades

- ★ A line from Rigel (Star 7) through Bellatrix (Star 2) of Orion leads directly to El Nath of Taurus and then almost in a straight line to Capella in Auriga.
- ★ From Orion walk past Aldebaran approximately 10 degrees to a faint hazy cluster of stars, the Pleiades.
- ★ Move from Mirfak of Perseus and then southward along the curve of Perseus to the Pleiades.

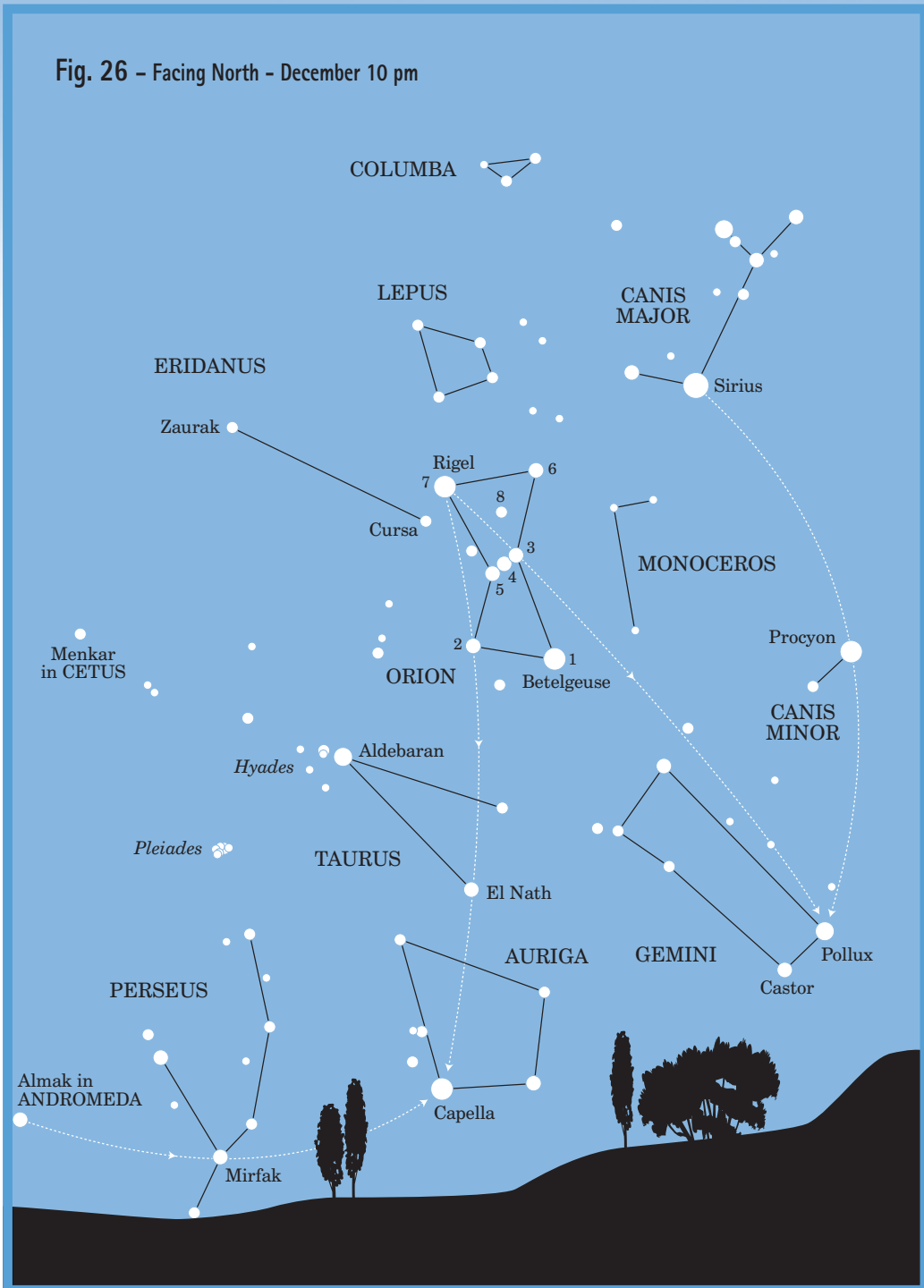
To locate Achernar and Canopus

- ★ A line from Star 5 of Orion moving through Rigel (Star 7) of Orion leads in a straight line to Achernar.
- ★ A line from Star 3 through Star 6 of Orion passes between Lepus and Canis Major to Canopus.

Read about the Pleiades in the legends of Taurus and Ursa Major.

A walk through the heavens

Fig. 26 - Facing North - December 10 pm



To locate Gemini (Fig. 26)

Gemini forms a nice rectangle that includes the stars Pollux and Castor, which are frequently referred to as the Twins. They symbolize true friendship.

- * A curve from Sirius to Procyon leads to Pollux and Castor.
- * A line from Star 7 (Rigel) of Orion through Star 3 leads to Pollux.

To locate Auriga

Auriga, the Charioteer, is shaped like a kite. It lies north of the horns of Taurus. Capella is the sixth brightest star in the sky. Just below Capella are three faint stars, called the Kids (baby goats).

- * An arc from Almak of Andromeda through Mirfak of Perseus leads to the bright star Capella.
- * A walk from Star 4 of Orion going between Star 2 and Star 1, passes through El Nath of Taurus to Capella.

Capella is 23 degrees from Aldebaran and from Castor. It is 10 degrees from Mirfak and 35 degrees from Betelgeuse. Test your ability to measure these distances.

A walk through the heavens

Fig. 27 - Facing North - December 10 pm



To locate Lepus, Columba and Cetus (Fig. 27)

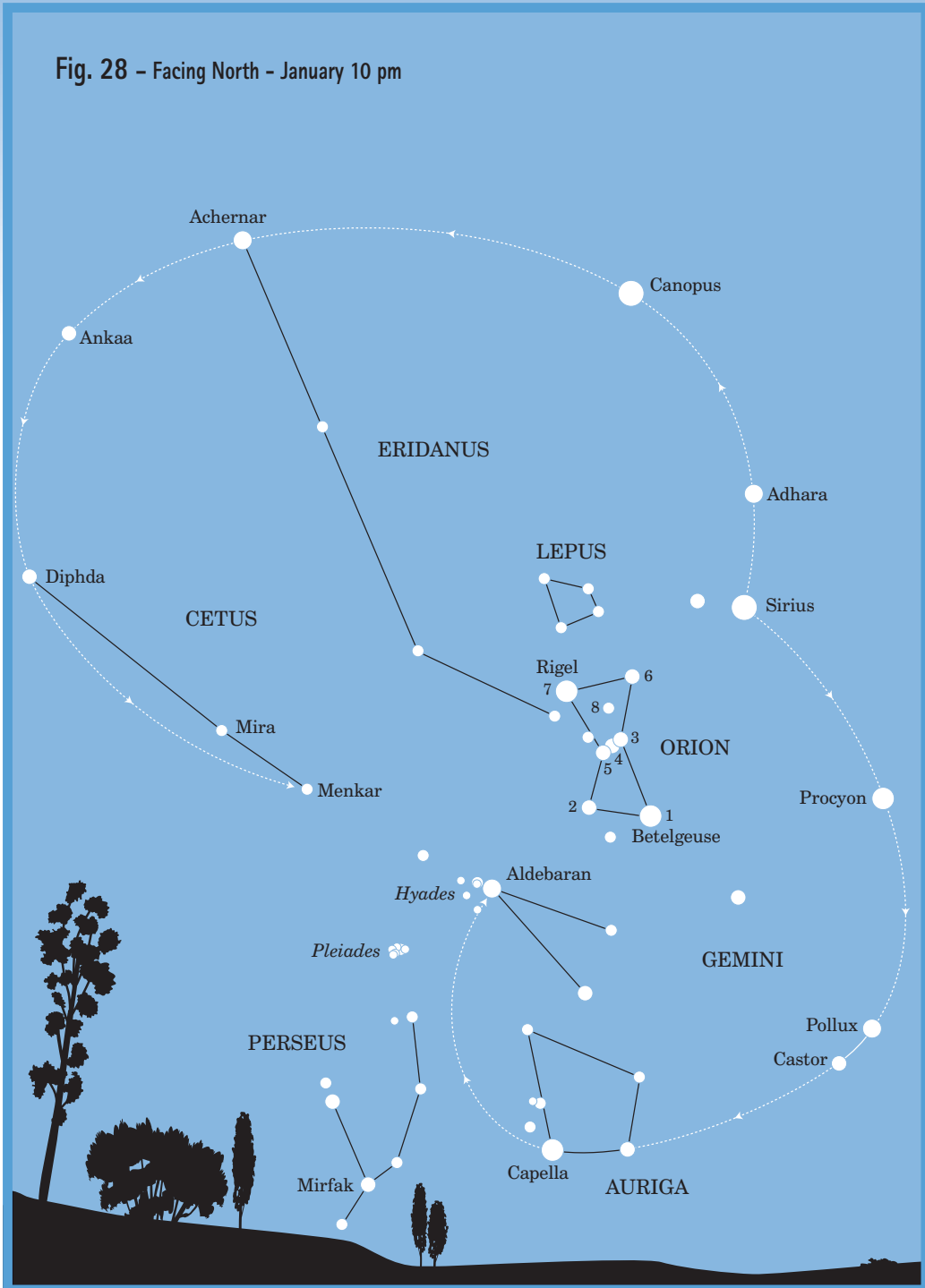
- * A line from Star 4 of Orion through Star 8 leads to Arnab of Lepus. This line continues to Phact of Columba.
- * Stars 6 and 7 of Orion form a triangle with Arnab in Lepus.

To locate Cetus

This constellation has three fairly bright stars, Menkar, Star 1, Mira, Star 2 (which is a variable star; its brightness fluctuates) and Diphda, Star 3.

- * A large right triangle is formed by joining the Pleiades, Aldebaran of Taurus and Menkar of Cetus.
- * The tip of the southern horn of Taurus (Star 3) through Aldebaran (Star 1) of Taurus curves slightly to Menkar in Cetus – 25 degrees from Aldebaran.

Fig. 28 - Facing North - January 10 pm

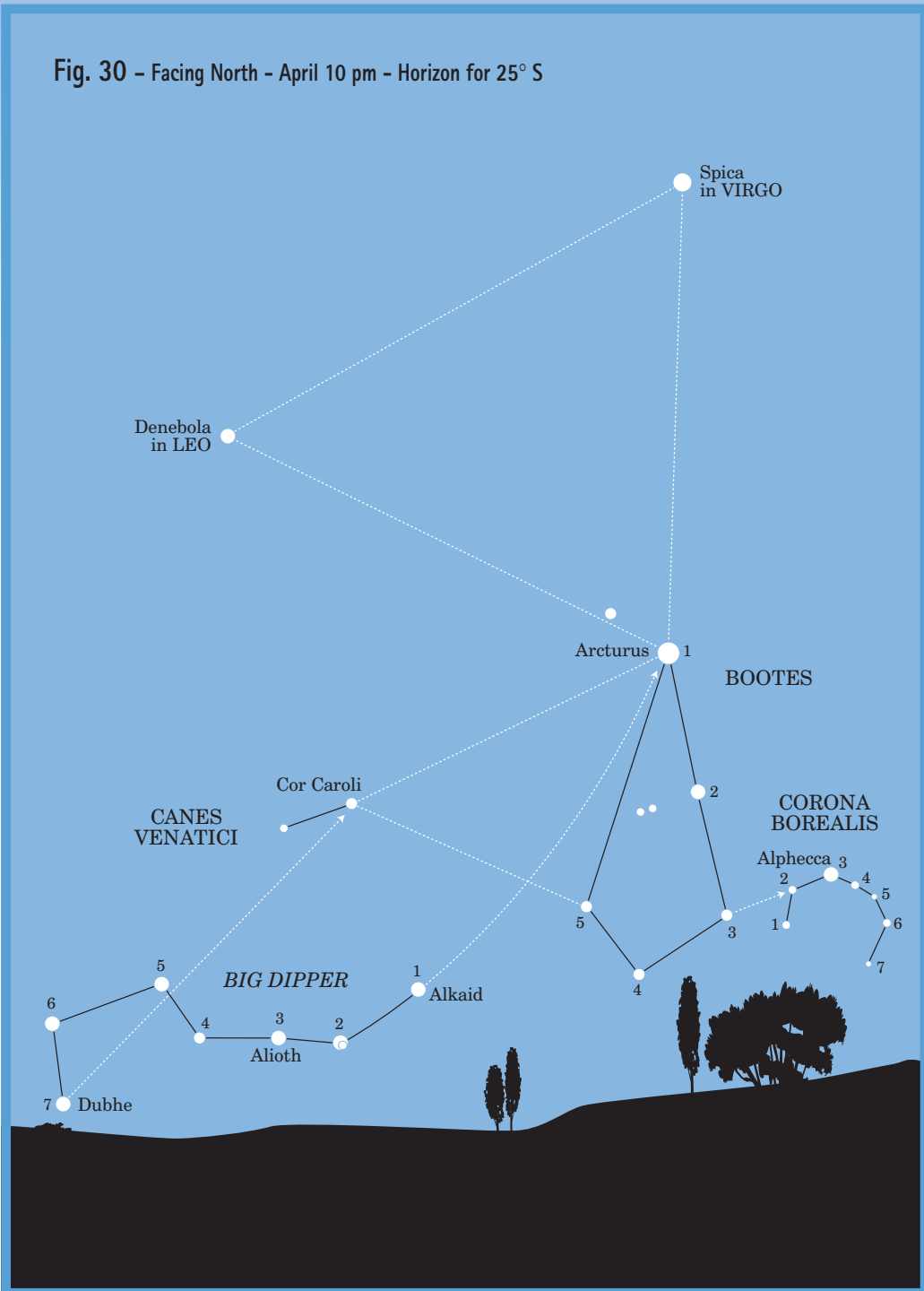


Orion's encirclement (Fig. 28)

- * *The northern area* of Orion is surrounded by five very bright stars. Starting from Betelgeuse (Star 1) of Orion move to Procyon of Canis Minor and then in a curve through Pollux of Gemini, Castor of Gemini, Capella of Auriga, and then to Aldebaran of Taurus.
- * *The southern area* of Orion is surrounded by six prominent stars. Starting from the belt of Orion move in a curve to Sirius of Canis Major, Canopus of Carina, Achernar of Eridanus, Ankaa of Phoenix, Diphda of Cetus, and Menkar of Cetus.

Solidify a mental image of the stars encircling Orion.

Fig. 30 – Facing North – April 10 pm – Horizon for 25° S



To locate Arcturus in Bootes (Fig. 29). Best seen 9 pm May 1 to August 1

Bootes looks like a giant kite. In 1933 the light from Arcturus, the fourth brightest star in the sky, which is approximately 36 light years away, was focused onto a photo-electric cell which produced electrical current. This current was amplified and then used to open the gate of the 1933 World's Fair in Chicago Illinois, USA. That light had left Arcturus in 1897!

- * Follow the curve of the handle of Ursa Major to Arcturus, the first bright star along that curve.
- * A line from Antares of Scorpius through Star 1 of Scorpius leads in a very slight curve to Arcturus. See Fig. 30.
- * Using Fig. 30, follow a line from Acrux (Star 1) of Crux through Star 2 of Crux leads across the sky to the very bright star Arcturus near the northern horizon.
- * Form an equilateral triangle joining Denebola in Leo, Spica in Virgo and Arcturus.

To locate Cor Caroli in Canes Venatici

- * A line from Star 7 of Ursa Major going between Stars 4 and 5 leads to Cor Caroli.
- * Stars 1 and 5 of Bootes form a triangle with Cor Caroli.

To locate Corona Borealis

Corona Borealis, the Northern Crown, is a charming constellation. It lies between Bootes and Hercules, but is closer to Bootes (see Fig. 38). Alphecca, Star 3, is called The Jewel in the Crown. The six other stars are very faint.

- * Move from Arcturus to Star 3 of Bootes. Alphecca is just to the side of this star.

Fig. 30 - Facing North - May 10 pm - Horizon for 25° S



To locate Spica in Virgo (Fig. 30)

- * Follow the arc of the handle of Ursa Major past Arcturus and continue the arc to a bright star which is Spica. Find the irregular diamond shape of Virgo.
- * A line from Antares of Scorpius through Star 2 of Scorpius goes directly through Libra in a curve to Spica.
- * Spica is part of an equilateral triangle with Arcturus, and Denebola of Leo.

To locate Corvus

- * Follow the curve of the handle of Ursa Major to Arcturus continuing past Spica to locate Kraz, which is Star 1 in Corvus.
- * A line from Star 1 of Crux through Star 3 leads to Corvus and continues to Denebola of Leo.

To locate Hydra, the Water Snake

This serpent, which was slain by Hercules, is the longest constellation in the sky, 100 degrees long. During autumn it extends across the sky south of Virgo, Corvus, Leo and Cancer. It actually cuts across Crater and Corvus. There is only one bright star – Alphard.

- * A line from Star 4 of Leo through Star 6 (Regulus) leads directly to Alphard.

Fig. 31 - Facing North - April 10 pm - Horizon for 25° S

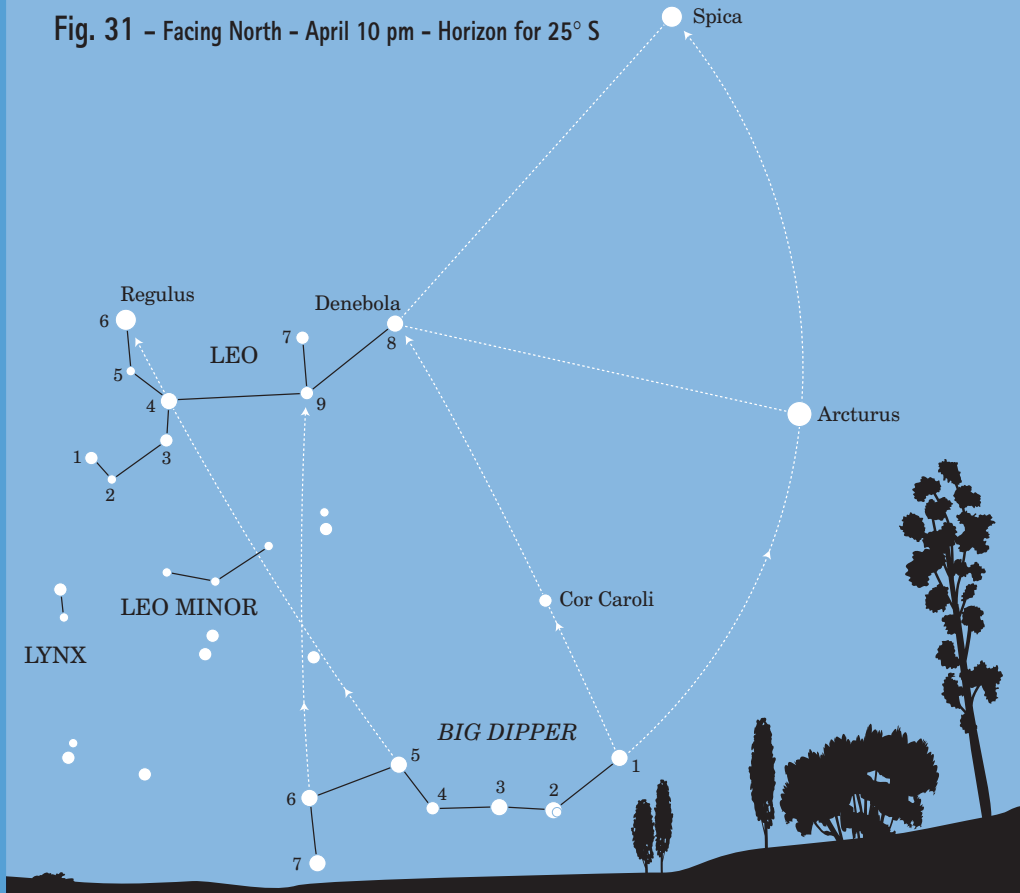
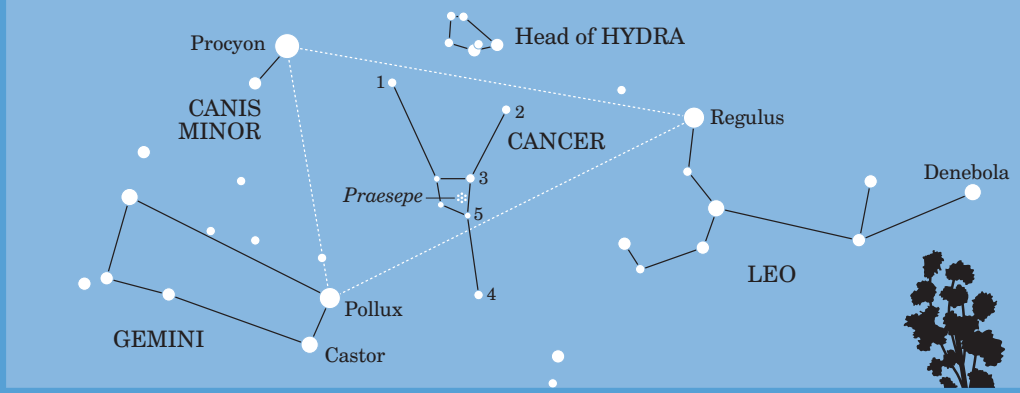


Fig. 32 - Facing North - March/April 10 pm



To locate Leo (Fig. 31). Best seen 9pm March 1 to 9 pm mid-June

Leo looks like a toy horse. The head, chest and front legs look like a backwards question mark. There are two stars in Leo whose names you should learn. Star 6 is Regulus, which means Little King. The tip of Leo's tail, Star 8, is Denebola.

- * A line from Acrux, Star 1 of Crux through Star 3 of Crux leads through Corvus and then to Denebola, the tail of Leo. See Fig. 30.
- * Form a triangle joining Arcturus of Bootes, Spica of Virgo and Denebola of Leo.
- * A line from Betelgeuse of Orion to Procyon of Canis Minor leads in a slight curve to Regulus.
- * Leo lies under the bowl of Ursa Major and lies inside the curve formed by the handle of the Ursa Major, Arcturus, Spica and Kraz in Corvus.
- * A line from Star 4 of Ursa Major through Star 5 crosses the neck of Leo to Regulus. See Fig. 31.
- * Form a triangle joining Pollux of Gemini, Procyon of Canis Minor and Regulus. See Fig. 32.

To locate Cancer (Fig. 32)

The very faint constellation of Cancer lies in the center of the triangle formed by Procyon of Canis Minor, Pollux of Gemini and Regulus of Leo. In the center of the square of Cancer is a faint cluster of stars called the Beehive or Praesepe.

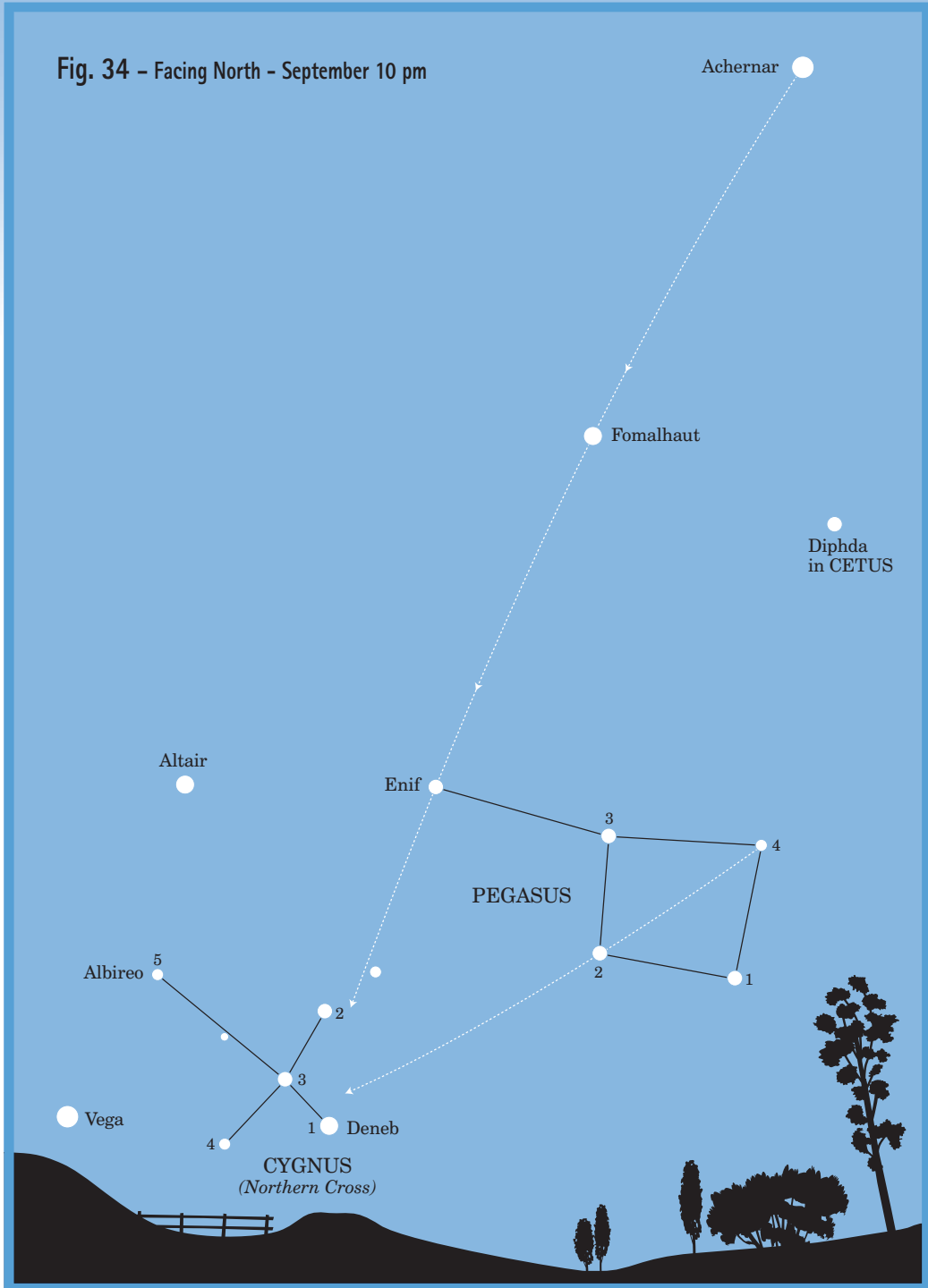
Fig. 33 - Facing North - August 10 pm



To locate Vega in Lyra (Fig. 33)

Vega is one of the brightest stars in the northern sky (magnitude 0.3).

- * Go from Deneb (Star 1 of Cygnus) in a slight curve past Star 4 to the very bright star Vega.
- * A line from Antares of Scorpius through Rasalhague of Ophiuchus leads across the sky in a mild curve to Vega.
- * Follow the curve of the head of Scorpius through Ophiuchus to Vega near the northern horizon.



**To locate the Northern Cross
(Cygnus) (Fig. 34). Best seen 9 pm
mid-August to October**

Cygnus, the Swan, lies along the Milky Way near the northern horizon. Star 1 (Deneb), a supergiant, is 60 000 times brighter than the Sun, but is 1500 light years away.

- * A line from Star 4 of Pegasus through Star 2 leads to the area of Star 1 and Star 3 of Cygnus.
- * A mild curve from Achernar through Fomalhaut through Enif of Pegasus leads across the sky to Cygnus at the northern horizon.

Study the Northern Cross and Vega relationship.

Fig. 35 – Facing North – September 10 pm



To locate Pegasus (Figs. 35 and 36)

There are several ways to find the giant square of Pegasus, the winged horse.

- * A line from Achernar going between Diphda of Cetus and Fomalhaut of Piscis Austrinus leads to Pegasus near the northern horizon.
- * We should be aware of the **Winter Triangle**
This important star relationship is formed by Deneb of Cygnus (the Northern Cross), Vega of Lyra, and a third bright star, Altair of Aquila.
- * Join Deneb, Altair and Enif to form Zaydeh's triangle opposite the Winter Triangle. This triangle is an easy way to identify Enif and then to move from Altair through Enif in an mild curve to the square of Pegasus.
- * The crossbar of Cygnus points in a slight curve to Enif in Pegasus.
- * A line from Star 3 of Cygnus between Deneb and Star 2 goes directly to Star 1 of Pegasus.
- * Follow a line in a soft curve from Mirfak in Perseus (see Fig. 27) to Almak of Andromeda past Star 2 to Star 3 of Andromeda, which is the same as Star 1 of Pegasus. This is one corner of the square of Pegasus.

To locate Altair in Aquila

- * A line from Deneb going between Stars 2 and 3 of Cygnus leads to Altair in Aquila. Aquila is a diamond-shaped constellation with a tail at the corner of the diamond opposite Altair. Altair is its only bright star. Look closely at Altair; notice the faint stars on either side of it.

Study the **Winter Triangle** (see Fig. 35), which contains the constellations of Sagitta and Vulpecula. Zaydeh's triangle contains Delphinus and meets Equuleus.

Study these relationships to get a good image of the giant square of Pegasus, which is over 15 degrees wide.

Fig. 36 - Facing North-West - November 10 pm - Horizon for 25° S



To locate Hamal in Aries, Diphda in Cetus and Fomalhaut in Piscis Austrinus (Fig. 36)

To locate Aries

From Perseus:

- * Algol of Perseus and Almak of Andromeda form a triangle with the star Hamal of Aries.

From the square of Pegasus:

- * Star 1 and Star 4 of Pegasus, when joined to Hamal of Aries, form a large isosceles triangle.

From Orion:

- * Find Aldebaran in Taurus (see Fig. 27) then move through the Pleiades and continue in a soft curve southward approximately 25 degrees to the moderately bright star Hamal of Aries.

To locate Fomalhaut in Piscis Austrinus

Fomalhaut is one of the brightest isolated stars in the southern sky.

- * A line from Star 2 (Scheat) of Pegasus through Star 3 (Markab) leads to Fomalhaut, which is approximately 50 degrees from Star 3.

To locate Diphda in Cetus

- * A line from Star 1 of Pegasus through Star 4 leads to Diphda, which is to the side of Fomalhaut.

An important orienting triangle is formed by joining Diphda, Fomalhaut and Achernar.

Study the relationship between Pegasus, Pisces, Aquarius, Capricornus, Delphinus and Aquila.

Fig. 37 - Facing North - November 10 pm - Horizon for 25° S



To locate Perseus and Andromeda (Fig. 37)

Perseus crosses the Milky Way. It may be seen on the extreme northern horizon.

- * Using Fig. 28, follow the northern circle of stars over Orion from Procyon to Pollux to Castor to Capella and then instead of curving southward to Aldebaran, continue in a soft curve to Mirfak in Perseus and to Almak of Andromeda. See Fig. 37.
- * Algol (Star 5 of Perseus) almost forms a right-angle triangle with Mirfak and Almak of Andromeda. Mirfak and Algol are the two brightest stars in Perseus.
- * Using Fig. 26, from the belt of Orion move to Aldebaran and to the Pleiades. Just northerly of the Pleiades is the curve of stars of Perseus leading to Mirfak.

Now visualize the curve of five or six stars of Perseus which leads to the Pleiades going south, or to Cassiopeia going north. Cassiopeia may be below the northern horizon.

Andromeda lies between Perseus and Pegasus. It contains the only major galaxy outside of our own galaxy that we can see with our naked eye.

Fig. 38 – Facing North – July 10 pm – Horizon for 25° S

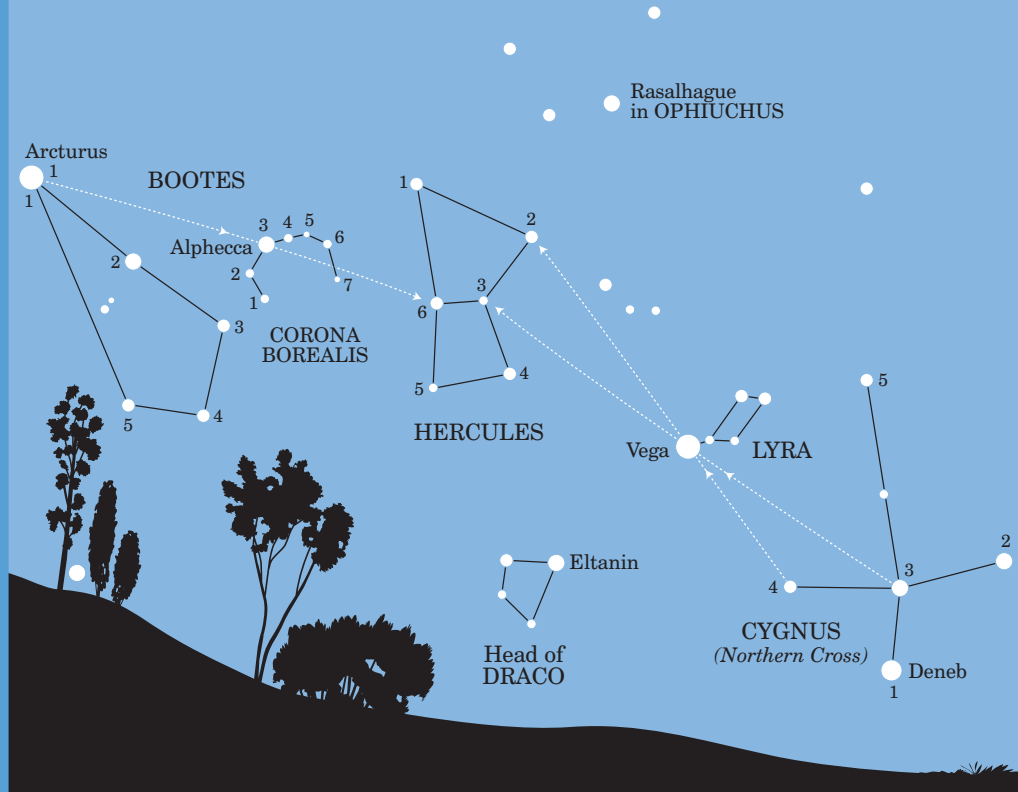
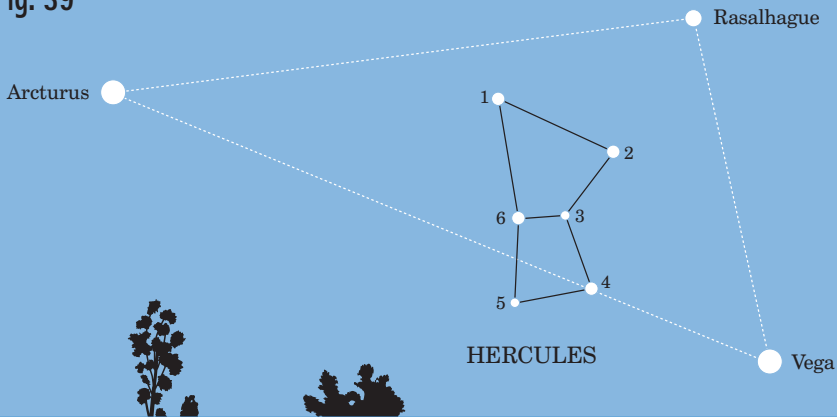


Fig. 39



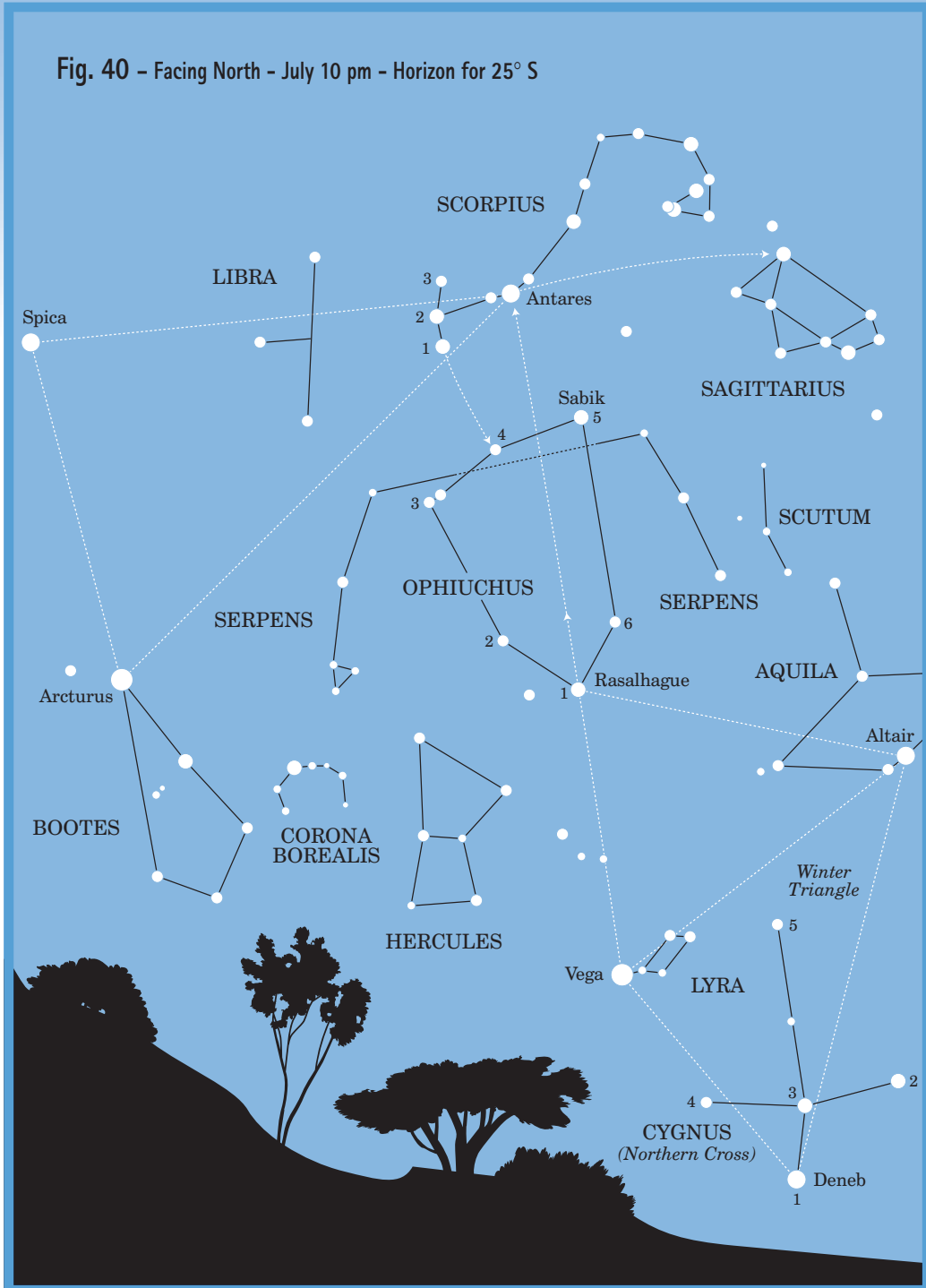
To locate Hercules (Fig. 38)

Hercules is a faint constellation near the northern horizon that lies between Lyra and Corona Borealis. Most of Hercules lies within a giant triangle formed by Vega of Lyra, Arcturus of Bootes and Rasalhague of Ophiuchus. See Fig. 39.

- ★ A line from Star 4 of Cygnus through Vega goes to Star 2 of Hercules. This distance is about $1\frac{1}{2}$ times the distance between the tip of the crossbar of Cygnus and Vega.
- ★ A line from Star 3 of Cygnus through Vega goes to Star 3 of Hercules.
- ★ From Arcturus through Alphecca, the bright star of Corona Borealis (Star 3), to Star 6 of Hercules is a straight line.

Now construct the bent hourglass shape of the six stars of Hercules.

Fig. 40 – Facing North – July 10 pm – Horizon for 25° S



To locate Ophiuchus (Fig. 40)

Ophiuchus is known as the Serpent Bearer.

- * On the south side of the Winter Triangle form an equilateral triangle by joining Altair of Aquila, Vega of Lyra and Rasalhague (Star 1) of Ophiuchus.
- * The arc of Scorpius 3-2-1 leads to Star 4 of Ophiuchus.

Rasalhague (Star 1) is about 30 degrees from Sabik (Star 5).

To locate Serpens

Serpens is a divided constellation which appears to pass through the lower part of Ophiuchus. Its head and tail point northward.

To locate Antares in Scorpius

Scorpius is a bright constellation that actually resembles a large scorpion. Its brightest star, Antares, is flanked by a star on either side.

- * From the north a line from Vega of Lyra crosses the sky to Rasalhague of Ophiuchus and then goes in a mild curve to Antares.
- * A large triangle is formed by joining Arcturus of Bootes, Spica of Virgo and Antares.
- * A line from Acrux (Star 1 of Crux) through Hadar (Star 2 of Centaurus) leads to Antares. See Fig. 15.
- * The nose of Centaurus points to Scorpius. See Fig. 15.
- * Review Fig. 15.

To locate Sagittarius

Sagittarius, the Teapot, lies between our solar system and the center of our galaxy. The Milky Way is widest and most dense behind Sagittarius.

- * A line from the mid star of the head of Scorpius (Star 2) through Antares leads to the bottom star of Sagittarius. See also Fig. 16.

Study relationships between Altair of Aquila, Scorpius, Sagittarius, Cygnus, Vega of Lyra, Arcturus of Bootes and Spica of Virgo.

General summary of pathways

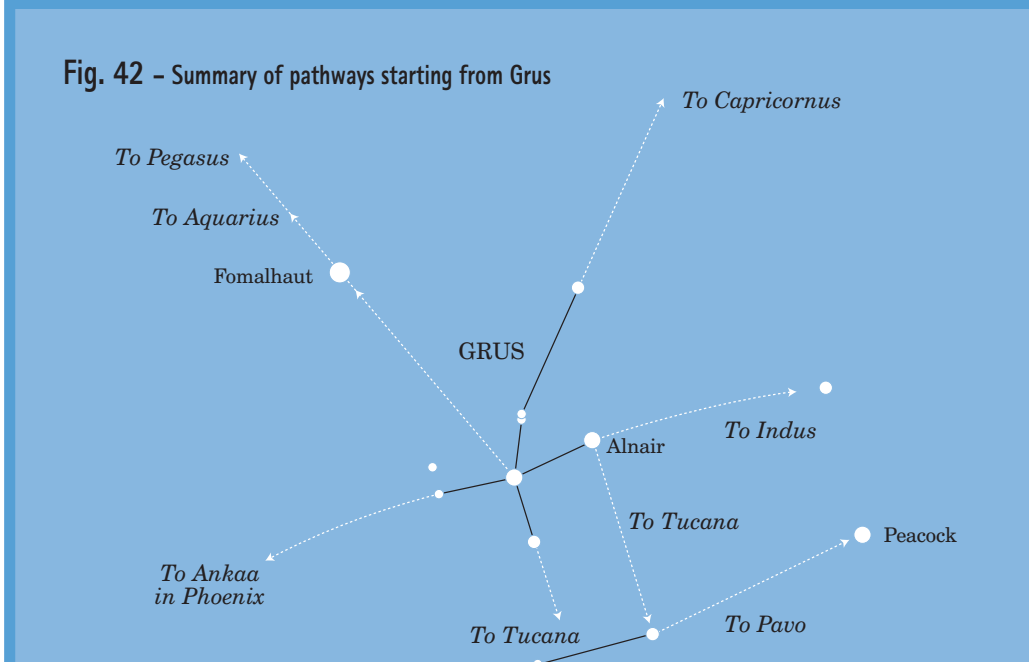
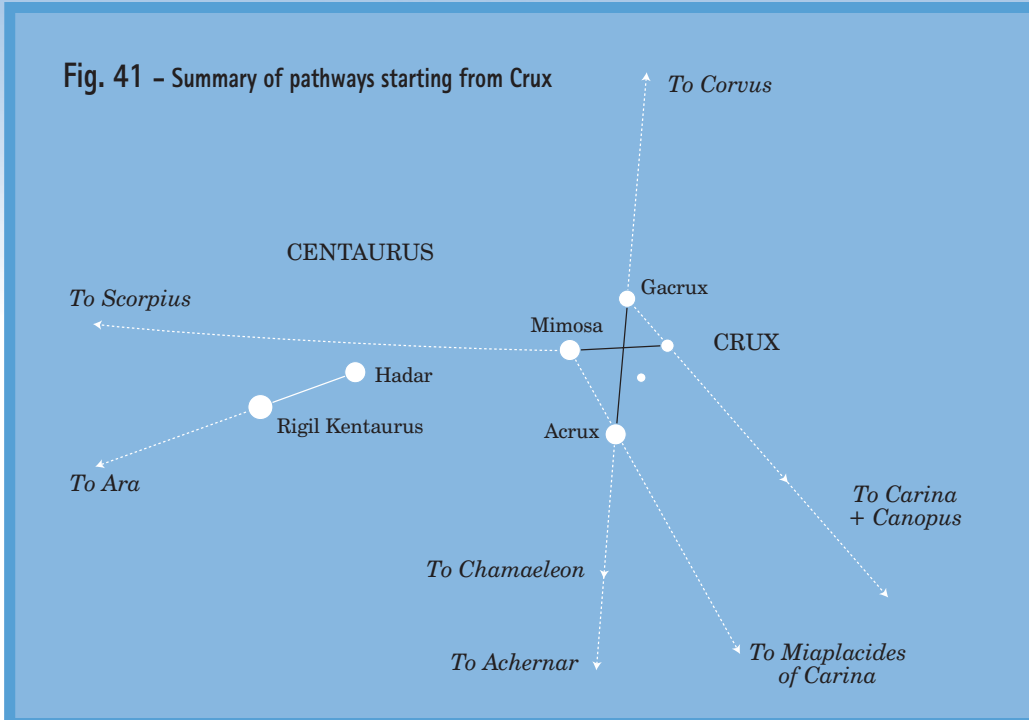


Fig. 43 – Summary of pathways starting from Scorpius

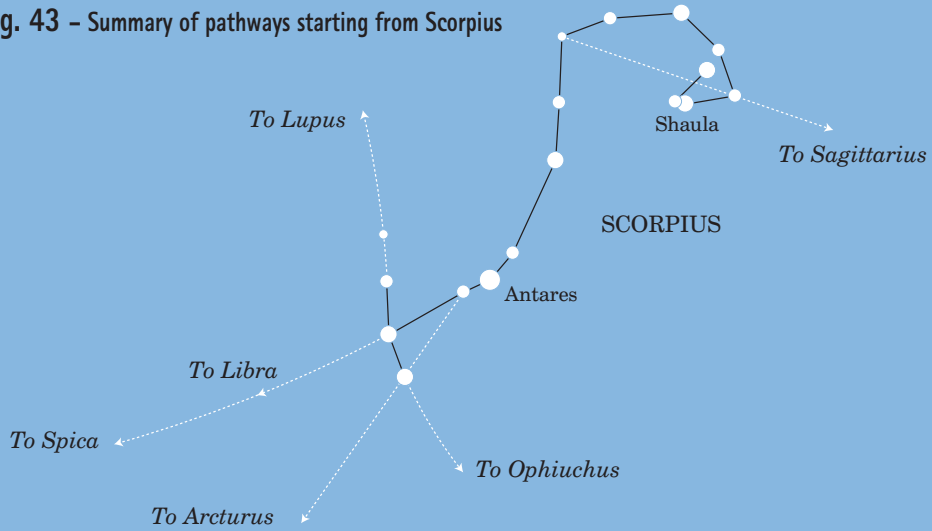


Fig. 44 – Summary of pathways starting from Orion

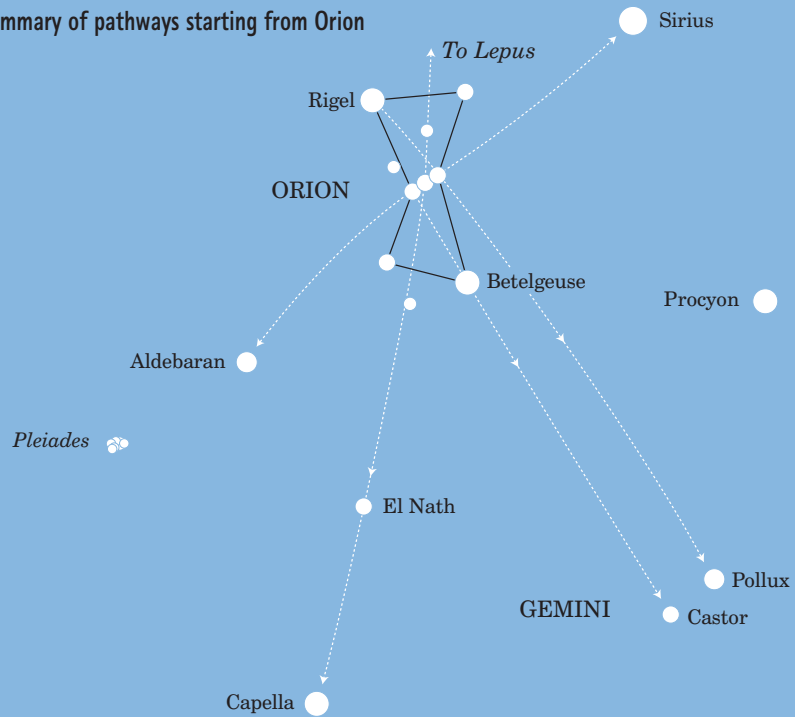


Fig. 45 – Summary of pathways starting from Cygnus

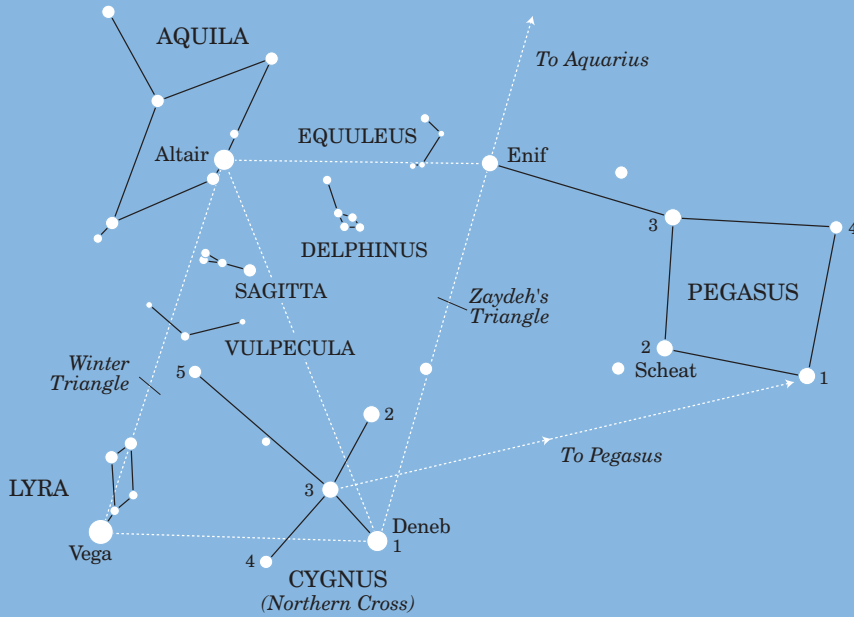
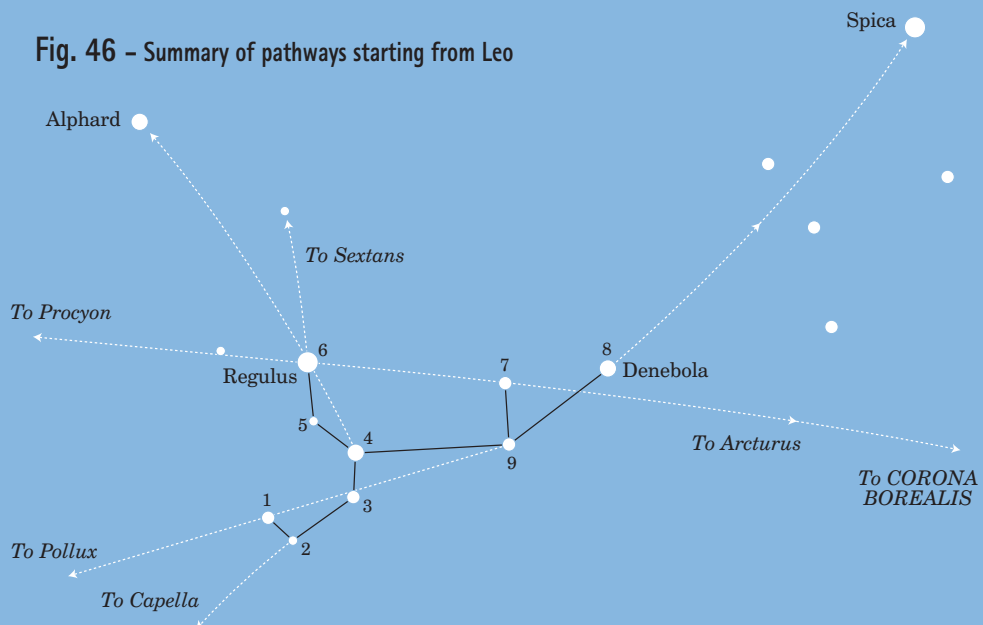


Fig. 46 – Summary of pathways starting from Leo



A walk through the heavens

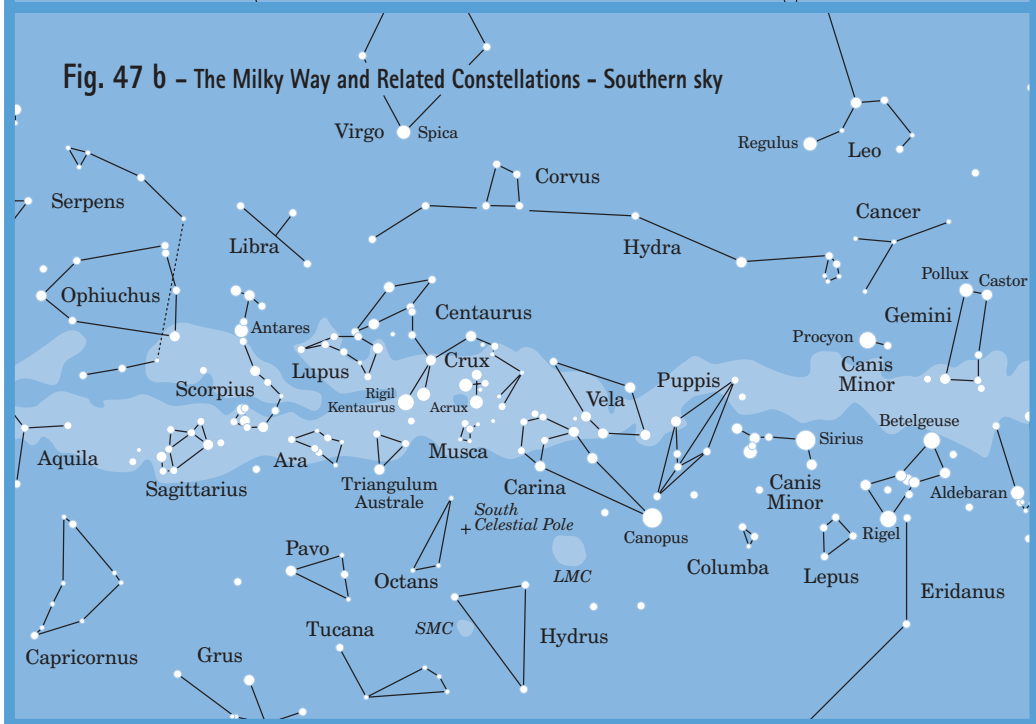
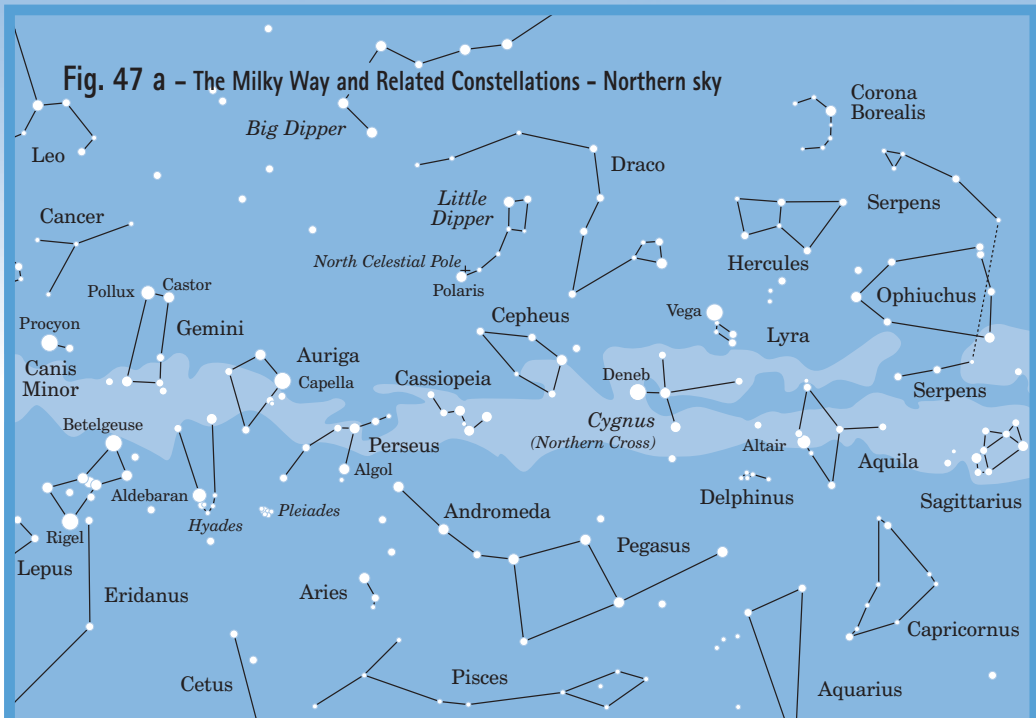
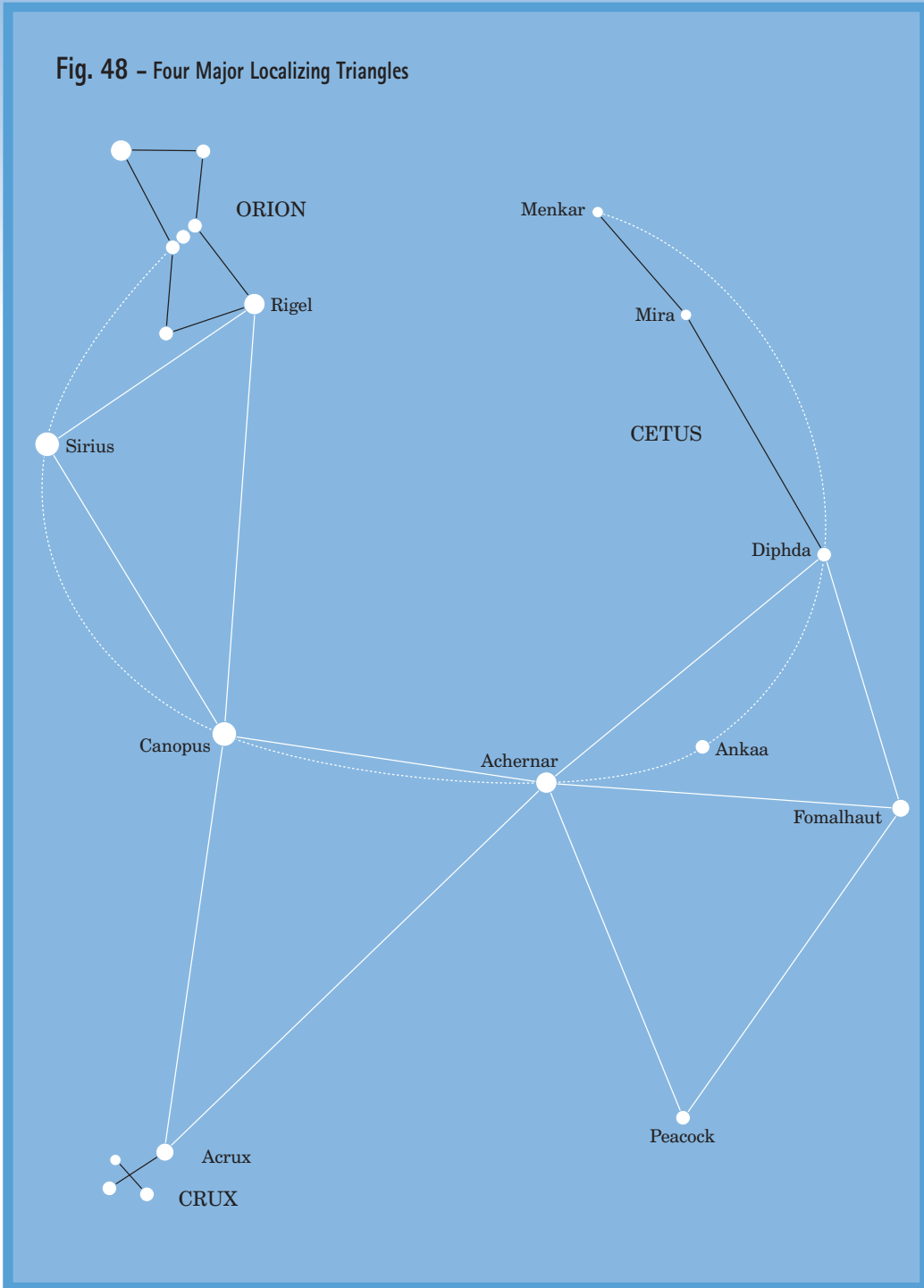


Fig. 48 - Four Major Localizing Triangles



Part 3

Legends of the constellations

The names of many of the constellations are strongly tied to Greek and Roman legends, but the indigenous people living in the Southern Hemisphere did not visualize star groups in the same manner as the ancient Greeks.

The astronomical mythology, except for cosmological myths, of the various Southern Hemisphere people seemed to be primarily concerned with the appearance or disappearance of certain prominent stars, as it may signify the time for a religious ritual or agricultural act. Relatively few elaborate legends have been recorded that relate to a star group, except for myths about the Pleiades, which seemed to have piqued the imagination of many diverse ethnic groups.

Legend of Andromeda

See the legends of Cassiopeia and Perseus.

Legend of Aquarius

Ganymede was a very kind and gentle shepherd boy. One day, while tending his sheep and playing with his dog Argos, the god Zeus sent Aquila, his giant eagle, to swoop down to the plains of Troy to take Ganymede to the temple of the Gods to become Jupiter's favorite water carrier. He was then given ambrosia, the food of the gods, to make him immortal. Wherever Jupiter went Ganymede would accompany him by riding on the back of Aquila the eagle.

Ganymede's kindness was made evident to the gods when he asked Jupiter if he could help the Earth people who were in need of water. Jupiter, who was usually not very kind, was softened by Ganymede's compassion and gave him permission to do as he wished. Ganymede realized that to send a great deal of water to Earth at one time would be dangerous so he decided to send it in smaller amounts and in an intermittent manner in the form of rain. That is how Ganymede, the shepherd boy, became known as the god of rain.

Legend of Aquila

Aquila was Zeus's pet Eagle. Aquila was not only involved with Ganymede in the legend of Aquarius and how Earth was given rain, but was also part of the story of how people got fire.

The Titans were giant gods who were fighting the Greek god of Olympia, Zeus, the new ruler of the world. Prometheus, one of the Titan gods, did not oppose Zeus during the war. After the Titans were beaten he became an advisor to Zeus. While serving Zeus he became aware that the Earth people did not have fire and were not only suffering from the cold but could not have warm food. Zeus was aware of their plight, but was not concerned. Prometheus felt sorry for them and therefore stole a ray of sunshine, hid it in a bamboo container, and sent it down to Earth. With this ray of sun the Earth people made fire to warm their bodies.

Zeus became very angry when he saw that the Earth people were given fire without his permission. He captured Prometheus and chained him to the side of a mountain in the Caucasus where he was to remain forever. He then sent Aquila, his pet eagle, to repeatedly attack Prometheus. After every attack the wound would heal and then would be ripped open again by Aquila. One day when Aquila was about to bite into the abdomen of this kind Titan god, Hercules, who agreed with Prometheus's act of kindness, and who was angered at what Jupiter had done, shot one of his magic

arrows into Aquila. Aquila fell seriously wounded. Zeus healed the wounds of his pet eagle and then placed it in the heavens so that it may still soar. It flies near the tail of Cygnus the swan.

Legends of Ara

The constellation of Ara is related to the story of Noah. In the Old Testament it is written that Noah had been told by God that great rains would soon fall until the Earth was covered and all evil would be destroyed. God commanded him to build a giant ark, fill it with all the different seeds, at least two of each form of life and prepare to be cast upon the waters. Noah, his wife and their three sons, Shem, Ham and Japheth and their wives toiled to build the ark as commanded. After all the animals and seeds had been gathered together in the ark the rains came and lasted forty days and nights after which time the Earth was flooded. Even the top of the highest mountain was under water. All life was gone except for those in the floating ark. The floods continued for 150 days at which time a giant wind began to blow and the waters began to subside. Soon their gigantic ark came to rest upon the top of a mountain, possibly Mt Ararat in northern Turkey. The waters continued to fall and after forty days Noah released a raven that flew away only to return and fly in circles over the ark. He then sent out a dove with the realization that if the dove did not return land must be near.

The exhausted dove returned suggesting that most of the land was still covered by the waters. Seven days later Noah released the dove again. After waiting for hours the dove finally returned in the evening with the leaf of an olive tree. Noah waited seven more days, released the dove and when the dove did not return Noah realized that the Earth was once more livable. With great joy they opened the ark and released all the animals. Noah immediately built an altar to pay homage to God. The constellation Ara symbolizes that altar. The dove is symbolized in the constellation Columba. Its brightest star is called Phact, an Arabic word for 'ring dove'.

The flood story is also among the legends of the Sumerian people who lived along the Euphrates in Babylon.

When sailors see the constellation surrounded by clouds they believe it signifies an oncoming gale and stormy seas.

Argo Navis

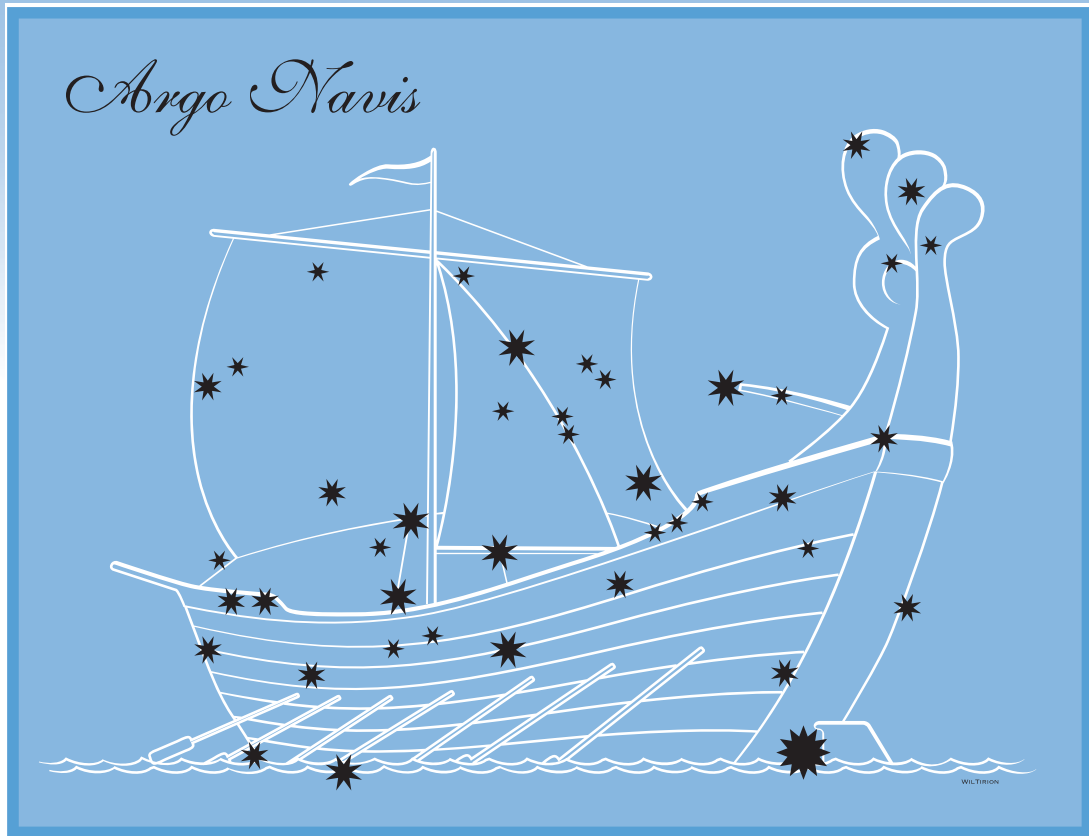
The ancient constellation 'Argo Navis' is a gigantic star group lying in the area of the Milky Way with Canopus as its brightest star. Argo Navis is symbolic of a great ship. The origin of the image of a giant ship in the sky is not precisely known. The origin of the word Argo is very vague. It is possibly related to the Hebrew word 'arookh' meaning long, and since 'Navis' in Latin refers to a ship, the name 'Argo Navis' may possibly be

descriptive of a long ship, a large ark.

The mythology of gigantic floods covering the Earth dates from at least the Sumerian culture 5500 years ago. A Sumerian cylinder seal dating from 3000 BCE depicts a crescent-shaped ship on what may be a flood scene. The Sumerians may have envisioned a ship in the sky that carried Uto-Napishtim and his wife during the Black Sea flood. It possibly was the origin of the Accadian legend of a deluge and the legend of Noah among the Hebrews. It is doubtful that the Sumerian and Hebrew legends of the flood are related to the ship of the Argonauts. The concept of gigantic floods has also been part of the mythology of Egyptian and Hindu culture. The Egyptians visualized an ark that carried Isis and Osiris during the flood, while the Hindus conceived of a ship that carried Isi and Iswara in their flood legend.

It would be intriguing to assume that the Hebrews viewed the Giant Ship in the Sky as symbolizing the ark that Noah built in anticipation of the Great Flood. To the Greeks Argo Navis represented Argo, the ship that Jason and the Argonauts used during their search for the Golden Fleece.

In 1753 the French cartographer Nicolas de Lacaille divided Argo Navis into four constellations: Carina (the keel), Vela (the sail), Puppis (the stern or poop deck) and Malis (the mast). Malis is now separate as the constellation Pyxis (the mariner's compass). Canopus is now part of the constellation Carina.



Legends of Aries

Aries was the pet ram of Zeus, the Greek ruler of the heavens. Its coat was made of golden fleece instead of white wool. One day Zeus was looking down on the Earth people when he suddenly noticed that two children on Earth were in danger of being killed. He immediately sent Aries down to Earth to save them. Aries arrived just in time for the children to jump on his back. He then raced to safety. To honor the effort his ram had made, Zeus placed him in the heavens where he can roam freely near the flying horse Pegasus.

Aries also symbolizes the ram caught in the thicket where Abraham was about to sacrifice Isaac. In gratitude to God who sent the angel to stop the hand of Abraham, the ram was placed upon the altar and sacrificed to honor God.

Legend of Auriga

Auriga is portrayed as carrying a goat in his arms as he rides through the sky on his chariot. He is considered the guardian of the shepherds. Shepherds believe that

when the constellation of Auriga appears in the sky their sheep will flourish.

It is said that the god Jupiter accidentally broke a horn of one of the goats. He apologized for this accident by filling the broken horn with good things. Such a horn has been called the 'Horn of Plenty' or a cornucopia.

Legend of Bootes

Bootes was the son of Demeter, the Greek goddess of agriculture. He was a sensitive young man with a great sense of purpose and social consciousness. When he saw the Earth people struggling to find food he wanted to help them. He realized that if he were to send them food they would always need his help. Instead, he decided to help them to be able to help themselves. In order for them to be independent, he built the first plough and sent it to Earth. Since then people have been able to plow the land and grow their own food. Because of this great deed for mankind the gods honored him by placing him in the heavens near the handle of the Big Dipper (which is also known as The Plough).

Legends of Canis Major and Minor

Canis Major and Canis Minor were the hunting dogs of Orion. Canis Major was so swift a runner that it could overtake any animal. It was therefore greatly valued by Orion.

The early Egyptians saw the bright star Sirius in Canis Major as the god Anubis, the god with a man's body and the head of a jackal. When Sirius would appear in the sky before dawn, it was the time of the flooding of the Nile, which was of great importance to the farmers who lived along the river since the flood always brought new silt to the land and replenished the soil. It became known as the Dog Star, and the hot days of summer, between July and early September, became known as the Dog Days.

Legends of Canopus in Carina

There are many legends concerning the second brightest star in the sky and the brightest star in the southern hemisphere.

Among the Polynesians Canopus was referred to as Atutuahi, the God of the Heavens, and sung to as the 'Mother of the Moon and the Stars'. It was a major navigational star during their long sea voyages.

Canopus was worshipped by the Egyptians as the god of waters. Several temples were possibly oriented toward Canopus. The desert nomads considered this bright bluish tinted star as a thing of great beauty and called it Al-Suhail, meaning beauty.

Among the Greeks, Canopus was named after the pilot of the great ship of the argonauts that carried Jason, who

with the help of fifty argonauts and Medea the sorcerer, successfully captured the golden fleece. Canopus unfortunately died on their return voyage. A monument was erected in his honor around which the city of Canopus was established. The city of Abukir rose upon its ruins. It was in this region that Ptolemy studied the motion of the planets and the stars in the second century CE in Alexandria.

Legend of Cassiopeia

Cassiopeia, the wife of King Cepheus, was the beautiful queen of Ethiopia. She was so proud of her beauty that she became arrogant. She even boasted that her beauty was greater than that of the sea nymphs the Nereids. This boast angered the sea nymphs, who were the daughters of the sea god Nereus, not because they were so vain, but because Cassiopeia failed to appreciate that her external beauty was something she was born with and not something she had achieved. Gratitude for her good fortune would have been acceptable, but not pride. To be proud of something which was not gained through personal effort, but rather with which you were born, showed a poor sense of values.

The Nereids asked the ruling god of the sea, Poseidon (Neptune), to punish Cassiopeia because of her distorted sense of values and her conceit. Poseidon therefore ordered the giant sea monster, Cetus, to destroy their kingdom of Ethiopia.

When King Cepheus and Queen Cassiopeia were informed of Neptune's decision they went to the old wise oracle of Ethiopia for advice. He told them that they must sacrifice their lovely daughter Andromeda to appease the sea gods. Although they were heartbroken, they chained Andromeda to a rock on a cliff overlooking the sea knowing that Cetus, the sea monster, would destroy her.

When Cetus, the sea monster, began to race toward her she screamed for help. Meanwhile, Perseus, who was on the great winged horse Pegasus returning home with the head of Medusa (see the legend of Perseus), heard her cry and immediately flew to her rescue. He arrived just in time to hold up the head of Medusa as Cetus approached. The sea monster was immediately stopped, since anyone who looked directly at the head of Medusa was turned to stone. Perseus carefully placed the head back in its sack, taking care that Andromeda would not look at it. He then unchained Andromeda who fell into his arms. When they gazed into each other's eyes they immediately fell in love.

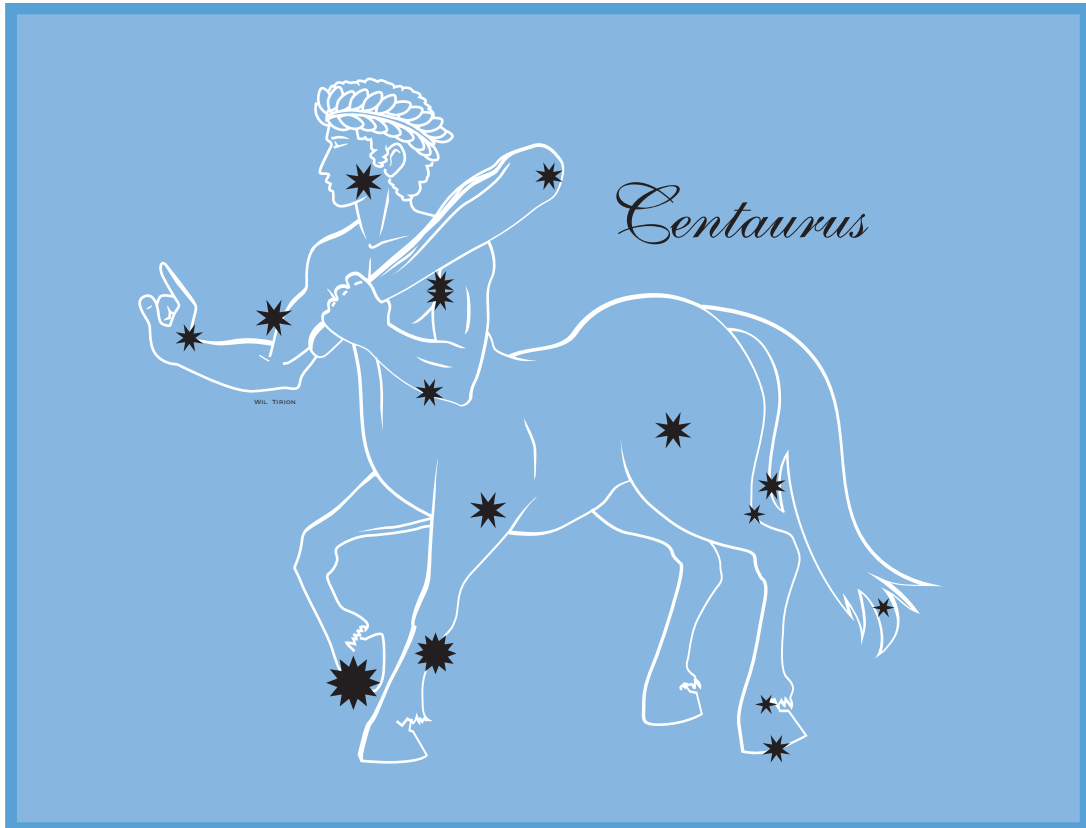
Although the sea god was angry because the punishment he decreed was not fulfilled, he was so touched by the love of Perseus and Andromeda that he placed them next to each other in the heavens so that their love will always be seen and felt by us on Earth. Poseidon felt that Cassiopeia deserved more punishment. He therefore placed her in the sky in a position where she is condemned to circle around the North Celestial Pole forever,

half of the time in an upside-down position.

Legends of Centaurus

Among the people of the Andes mountains in South America those who breed llamas believe good fortune will be theirs if during the birthing season of the llamas (November), the eyes of the celestial llama appears over the southeastern horizon. The eyes of the celestial llama are Hadar and Rigil Kentaurus of Centaurus.

Among the Greeks, centaurs were mythical creatures, half horse half man. Most centaurs were considered to be savage. There was one exception, the son of Kronus and Philyra. When Kronus, who was married to Rhea, was discovered making love to Philyra, the beautiful sea nymph, he turned himself and Philyra into horses. When Philyra gave birth her child was half horse, half man, a centaur, Philyra was so distressed that she changed her form into a linden tree. Her son was named Chiron. Chiron grew up to be the wisest and gentlest of the centaurs. He lived at the foot of Mt Pelion and established the finest school in



Greece. Chiron learned the art of medicine from Artemis the Huntress and the science of astronomy and music from Diana. Jason, Achilles, Hercules, Hylas the Fair, Pollux, Castor and Orpheus all spent part of their childhood studying under Chiron. He was asked to teach Apollo's son Aesculapius the art of healing.

Chiron died as a result of a strange accident. He had taught Hercules how to overcome and capture the wild boar. At the celebration of this deed and during an archery exhibition in which Chiron also participated, a poisoned arrow shot by Hercules accidentally struck Chiron in the knee. The pain would not end and was so intense that Hercules begged the god Zeus to grant Chiron's wish to die. After his death Zeus honored him by placing him in the sky where he remains as a symbol of wisdom, goodness and kindness.

Legend of Cetus

Read the legends of Perseus and Cassiopeia.

Legend of Columba (Noah's Dove)

See the Legend of Ara.

Legend of Coma Berenices

Berenice was a beautiful woman whose hair was most glorious. She was married to the Egyptian King Evergetes. When the king left on a dangerous mission Berenice vowed to dedicate her hair to the goddess of beauty if the king were to return unharmed. When he finally returned safely she cut her beautiful hair which Jupiter then placed among the stars. It appears as a cluster of faint stars with a lacy appearance that lies near Arcturus of Bootes and Cor Coroli of Canes Venatici. Coma Berenices has become a symbol of the sacrifices that everyone should be willing to make for their loved ones.

Legend of Corona Australis

Among the desert nomads of ancient Arabia the circle of stars sometimes called the Southern Crown was called the Ostrich Nest. They imagined ostriches in the stars of Sagittarius and Aquila meeting together drinking from the Milky Way, the river in the sky, and then returning to their nest in the circle of stars, the Corona Australis, which lies just south of Sagittarius.

Legend of Corona Borealis

Among the North American Indians this constellation is considered to be a council

of chiefs sitting in a semicircle to discuss the future of their people.

In ancient Greece the story is told of Ariadne, the beautiful daughter of King Minos of Crete. When her lover, who was mortal, found out that she had been promised to be wed to a god, he left her on the island of Naxos. Bacchus, the god of vegetation and wine, saw her, fell in love and asked her to marry him. Ariadne did not believe Bacchus was a god. To prove to her that he was a god, Bacchus asked Venus, the Goddess of love, to design a crown of magnificent jewels as a wedding present for Ariadne. When Venus did this for Bacchus, Ariadne was convinced that he was a god and consented to marry him. Bacchus was so ecstatic with joy that he threw the crown of jewels into the heavens where it has been shining ever since.

Legend of Corvus

Corvus was the pet crow of Apollo, the god of sun and music. He was a magnificent bird with a beautiful song. One day Apollo sent Corvus on an errand with instructions to return without delay. Corvus immediately left on his mission. On his return home he saw a fig tree with unripe fruit. This tantalized him, so he waited under the tree for several days until the figs were ripe enough to eat. After eating them he hurried back to Apollo. When asked why it took so long to return, Corvus made up an excuse, but Apollo knew the excuse was false. He was very disappointed that

Corvus, whom he had trusted, was not honorable enough to tell him the truth. As punishment Apollo changed the beautiful song of the crow to a hoarse caw sound.

Legend of the Crater

The Crater (the cup) is next to the constellation of Corvus the crow. The Egyptians were very aware of the Crater. They knew that when the Crater rose above the horizon the river Nile, which had been flooding the Egyptian plain, would not rise further and would soon begin to recede.

Legend of Crux

Among the indigenous desert nomads of Australia is the belief that a giant eagle lives in the sky and that one can see its footprint among the stars of Crux. It nests in the dark patch of sky adjoining Crux now called the Coalsack, and keeps its weapon, the throwing stick, near at hand in the pointer stars of Centaurus, Rigil Kentaurus and Hadar.

There is also the concept that the Coalsack symbolizes evil. This is possibly based upon a legend whereby the Crux formation of stars is seen as a tree. Under this tree an emu would hide in the darkness of the Coalsack area waiting to catch an opossum hiding among its branches.

The Zulu people of South Africa considered the Southern Cross as the 'Tree of

Life' for it helped those walking in the dangerous bush country at night to find their way.

Legend of Cygnus

Cygnus the swan symbolizes the wonder, the goodness and the dedication which exists in true friendship. Both the constellations of Cygnus and Gemini symbolize the significance of friendship.

Cygnus and Phaethon were very close friends. Phaethon, the son of the mortal woman Clymene, pleaded with his father Heliuss, the sun god, to help him convince the Earth people that he was the son of a god. Heliuss agreed to help and therefore told Phaethon that he would grant him any wish. Phaethon immediately asked for permission to drive the four winged horses pulling the chariot carrying the sun. His father pleaded with him not to ask for the almost impossible task of controlling the winged horses, but Phaethon insisted that his father keep his promise. As dawn neared he mounted the chariot with great excitement and began to race across the sky. The great winged horses sensed the inexperienced control of the reins and raced so fast that Phaethon lost complete control of the horses. The chariot swayed so much that the sun was about to fall out of the chariot and burn the Earth. The god Zeus saw what was happening and in order to save the Earth from being destroyed by the heat of the sun, threw a thunderbolt at the chariot. Phaethon lost

his balance and fell off the chariot into the roaring river Eridanus. Cygnus saw his friend disappear into the river, and immediately, in spite of the danger, dove into the waters to save him. Heliuss was so overwhelmed by this act of true friendship toward his son that he changed Cygnus into a diving swan flying along the line of the Milky Way as a symbol of the greatness and importance of friendship.

Legend of Delphinus

Approximately 2600 years ago, on the island of Lesbos, lived a man by the name of Arion. He was a famous poet who was also endowed with a magnificent voice. Arion performed in concerts throughout Greece and Italy. On one of his trips he was sailing to his home in Corinth Greece with all of his valuable prizes. When the sailors realized the value of the prizes on board their ship they became very greedy and decided to steal the wealth and throw Arion overboard. When Arion realized what they were going to do he pleaded with them to allow him to sing one more song while playing his lyre. They agreed. He sang a beautiful song of gratitude to Apollo the god of music and poetry for blessing him with such wonderful talents. Apollo heard the song and knew what was going to happen. He immediately asked the sea god Poseidon to send his messengers, the dolphins, to surround the boat. As Arion sang he noticed the unusual number of dolphins suddenly

swarming around the boat. He then jumped overboard with his lyre before the sailors had a chance to grab him. As he was sinking into the deep sea the largest dolphin dived under him, raised him to the surface and then surrounded by the other dolphins they raced away carrying Arion to safety. When Apollo heard about the magnificent action of the dolphin he wished to honor it and therefore placed it in the heavens and placed the lyre of Arion nearby in the constellation of Lyra.

Legend of Draco the Dragon

The ancient Chaldeans, who lived in the region of the Euphrates and Tigris rivers, believed that the dragon Tiamat, the monster of chaos, darkness and evil, lived before the sea and the sky were separated. Tiamat was challenged by the light of the sun and the gods who arose out of the sea of chaos. But he was so powerful and frightening that even the gods gave way. Evil appeared to be winning until Marduk, one of the gods of light, appeared. He had been given all the magical powers that the gods of light and goodness could bring together, and with this power he overcame the dragon, light gained over darkness and good over evil. Tiamat the dragon was placed in the sky as Draco to show all gods and all people that goodness can win.

Legend of Eridanus

The river of Eridanus flows from its origin near Rigel of Orion to flow under Taurus toward Cetus the monster whale. See the legend of Cygnus the swan.

Legends of Gemini

Among the Maori of Australia is the tale of twin brothers who were the mortal children of Borabora. The brothers were extremely devoted to each other and preferred to play with each other rather than with other children. This relative isolation disturbed their parents who then decided to separate the boys. The twins overheard their parent's discussion and decided to run away. They sailed away but their mother followed them. They went from island to island but she was always behind them until they reached Tahiti where they hid in the mountains. She discovered their hiding place and was about to capture them when they climbed to the top of a mountain and flew to the sky where they will always remain close together.

In ancient Greece there is the legend of Castor, a famous horse tamer and soldier, and Pollux, a champion boxer, who were the sons of the Greek god Zeus. They were not only brothers, but very close friends and very adventuresome. At one time they decided to go to sea in order to attack pirates which had been raiding honest seamen. They were so successful

in their war against pirates that they became warlike heroes to the sea people, who honored them by carving their images on the prow of their ships. Seamen are aware that during stormy weather sparkling lights may appear on the rigging. When two sparks appear it is an omen that Castor and Pollux are protecting the ship and that the ship will weather the storm. These lights have been called St. Elmo's Fire.

During one of their fights with thieves Castor, who was mortal, was killed. Pollux, who was immortal, was grief stricken and begged Zeus to allow him to be with Castor every other day in the underworld. Zeus was so touched by this request and by Pollux's feeling of true friendship that he not only approved of the request, but placed them in the heavens together so that the Earth people would always be reminded of the preciousness of true friendship.

Legend of Grus

In the Old Testament, Jeremiah (8:7) may have acknowledged Grus as the stork in the heavens. In his condemnation of evil he speaks of the harm one does who does not realize that he or she should go in the direction God has commanded. Jeremiah states that '... even the stork knows her appointed season as God has directed'.

Legend of Hercules

Hercules, the son of the god Zeus/Jupiter and of the beautiful mortal woman Alcymene, was the greatest of ancient Greek heroes. He began to show great physical strength as a young child, but more importantly, Hercules revealed a fine sense of character as a young man when he met two women called Pleasure and Virtue. Pleasure promised him enjoyment while Virtue promised him hard work and glory as a doer of great deeds to help mankind. He chose Virtue and was subsequently taught by the wise centaur Chiron.

His deeds included ridding the world of monsters. He fought for 30 days with Leo the Nemean lion before he was able to kill it. He then destroyed the enormous nine-headed water snake of Lerne, which would capture and eat those who ventured near its swamp. The snake was then thrown into the sky and is represented by the constellation Hydra. While fighting the water snake he also destroyed the giant crab, which is now in the sky as Cancer. He captured the wild boar which was destroying the vineyards as well as the fire-breathing bull which was devastating the land.

Hercules continued his work until he had performed twelve deeds. Several years later he was poisoned by mistake with the blood of a centaur. When he died the gods raised him into heaven where he can still be seen as a symbol of one who is dedicated to helping all people by doing good deeds.

Legend of Hydra the Water Snake

Hydra was a nine-headed snake-like monster that killed and ate people as they traveled near the swamps of Lerneia. Its blood was poisonous. Hercules was asked to destroy the monster. During their fight every time Hercules would cut off a head another would immediately grow back in its place. He finally succeeded in killing the monster by burning the cut surface on the neck, which prevented regrowth of a head.

Legend of Leo

Leo was a lion who lived on the moon. Food was scarce so he tried to attack one of the horses pulling the chariot of the moon goddess Selene. Leo was thrown off and landed on Earth near Nemea in Greece where he began to attack people. No person was able to attack this giant beast so they finally called Hercules to destroy this destructive lion. Hercules made a huge knotty club and approached the lion's den. When the lion attacked he swung and struck the lion on the top of its nose. The lion retreated into its cave, but Hercules was so fearless that he followed it into the cave. The roof of the cave was low so that Hercules could not use his club. He therefore jumped on the lion's back and strangled it with his bare hands.

This heroic act was seen by Zeus who honored Hercules by placing the conquered lion in the sky. See the legend of Hercules.

Legend of Libra

Libra symbolizes Astraea, the goddess of justice. She would weigh the souls of men and women on a balancing scale and hold them responsible for their acts. The Sumerians in 200 BCE called it the 'Balance of Heaven'.

Legends of Lyra

Among the Maori the brightest star in Lyra was called Whanui and symbolizes a legend of a love triangle. One night Whanui met the beautiful wife of Rango-Maui. Her name was Pani. Whanui was so overcome by her beauty that although he knew he would be doing wrong he seduced Pani and made love to her. She subsequently gave birth to the sweet potatoes. Her husband Rango-Maui was so disturbed by their presence that Pani allowed him to send the sweet potato children down to Earth. This so angered Whanui that he, in retaliation, sent three kinds of caterpillars down to earth to feed upon the sweet potatoes. As a result, before Whanui, the brightest star in Lyra, appears in the sky at dawn the Earth people store sweet potatoes in the ground to avoid the caterpillars.

Lyra represents the lyre, a harp, which the Greek god Hermes invented and made from a tortoise shell. Its sound was glorious but Hermes was unable to make it sing, so he gave it to Apollo, his brother. Although Apollo was able to make it sing

he could not make it sound soulful regardless how much he tried, so he called Orpheus, who was a great musician, to test the harp. When Orpheus picked up the instrument and moved his fingers across the strings the Earth seemed to become silent. All things were listening, the beasts, the birds, the trees and even the flowers turned their faces toward Orpheus. When Apollo saw how music affected all living things he gave the lyre to Orpheus who would play so that people would feel the uplift of music when life seems difficult.

There are times, when the night is very dark and still, that one may look up at Lyra and possibly hear the murmur of Orpheus's song among the sounds of the night.

Legends of Ophiuchus

Among the Babylonians the stars of Ophiuchus and Serpens were thought to portray the sun god Marduk fighting with the dragon Tiamat (Draco). But later in Greek mythology, Ophiuchus was identified with Aesculapius, the Greek god of medicine.

Aesculapius was the son of Apollo and the Thessalian princess Coronis, who died giving birth to Aesculapius. When he was a youth he had such a radiant appearance that everyone knew that he had to be one of the gods. Chiron, the wisest of the Centaurs, taught him the art of medicine. One day Aesculapius observed a snake

carrying a herb in its mouth which was used to revive another snake that had been killed. Aesculapius took the herb and with it expanded his knowledge of medicine. Aesculapius was becoming so knowledgeable that the god Zeus feared he would learn how to defeat the death of mortals. To prevent this Zeus felt that Aesculapius must die. He regrettably destroyed him with a bolt of lightning, but then placed him among the stars in the constellation of Ophiuchus. Since then Aesculapius and the snake have been special symbols of healing. Hippocrates, upon whose name all physicians swear an oath to respect the sick, was supposedly a descendant of Aesculapius.

Today's emblem of medicine, the caduceus, commemorates this legend. It is a winged staff with two snakes entwined around it, similar to the staff which was carried by the Greek god Hermes.

Legends of Orion

In the northern tip of Australia in Arnhem Land the aborigines speak of the time when three famous fishermen, who belonged to the kingfish totem, spent several days at sea trying to catch fish. They were successful, but only in catching kingfish, which they could not eat since it was the totem of their people. They were in a terrible dilemma for their children would go hungry if they did not return with some fish. In desperation they decided to break the taboo against eating

kingfish. They resumed fishing and soon caught three more kingfish. The Sun, amazed and angered that they would kill and eat their totem, called upon the clouds, the sea and the wind to create a gigantic waterspout. It was so powerful that it whirled the three fishermen and their canoe high into the sky. To this day they may be seen seated in their canoe as the three stars in a row in Orion. If one looks very carefully, just below the three stars you may be able to see the tiny fish hanging below their canoe.

Among the Ju/Wasi people of Africa is the legend of the god Old/Gao who was hunting for zebras. He finally saw three of them lined up in a row; took aim and shot his arrow, but missed his target. The three zebras escaped and now may be seen as the three center stars of Orion. The arrow may still be seen where it fell. It lies just below the three zebras facing away from them.

In Greek mythology, Hyrieus, a poor farmer who lived in Thebes, was a kind man who frequently befriended strangers although he was poor. One day he helped three unusual strangers. He did not know that they were the gods Zeus, Neptune and Hermes. In return for his kindness he was granted one wish. Hyrieus, who was childless, asked to have a son. The wish was granted and Orion was born. Orion grew up and became a superb hunter for he had been blessed by the gods, but as he became more and more famous as a great hunter he also became insensitive to the animals he hunted. He actually enjoyed the killing of an animal. He did not hunt

and kill for necessity. He was so unfeeling about the life of animals that Artemis, the goddess of hunting, sent the giant scorpion (Scorpius) to attack him. He was stung and about to die when Ophiuchus the healer gave Orion an antidote which saved his life. When Orion recovered he realized, after being so close to death, how precious life is and how pitiless and uncaring he had been. He repented and therefore was placed in the heavens with the scorpion whose sting had taught him that all life is precious. See the legend of Sagittarius.

Legend of Pegasus

Pegasus, the magical winged horse of ancient Greek mythology, was the offspring of Poseidon and Medusa. He helped Perseus race through the sky to save beautiful Andromeda (see the legend of Cassiopeia). He was also the steed who rode on the wind carrying the hero Bellerophon through his adventures.

Bellerophon was the son of Corinth and the grandson of Sisyphus. Sisyphus was a selfish and arrogant man who took advantage of people who were less clever. He was therefore punished by the gods and forced to roll a massive stone to the top of a hill, but whenever the top was almost reached the stone would always slip and fall to the bottom. He was forced to continue this struggle for the rest of his life.

Bellerophon was wrongly accused of

doing something evil. He was therefore sent on several dangerous missions which he was able to accomplish with the help of Pegasus. As a result he was given the right to keep Pegasus.

As Bellerophon grew older he became arrogant like his grandfather and too proud of his possession of a magical horse that could even ride to the gods. Although Bellerophon was only mortal, he tried to force Pegasus to take him to the top of Mount Olympus so he could mingle with the gods. Pegasus was so astounded at this arrogance that he reared up and threw Bellerophon off his back. Bellerophon fell to Earth while Pegasus flew to the Gods.

Legend of Perseus

King Acrisius of Argos in Greece was told by an oracle that he would someday be killed by his grandson. To prevent this he imprisoned his daughter Danae so that no one could reach her. But Jupiter saw her and fell in love with her. The prison was no barrier. When his daughter gave birth to Perseus, the king put them both in a chest and set them adrift on the sea. The chest did not sink, but eventually landed safely on the island of Seriphus controlled by King Polydectes. When Perseus became a young man he was full of adventure and eager for glory. King Polydectes fell in love with Danae, but realized that her devotion to Perseus would interfere with his courtship of her. He therefore decided to send Perseus

away on a long and dangerous mission. He asked Perseus to bring him the head of the Gorgon Medusa. Medusa had once been a beautiful woman, who was so boastful of her beauty that she was turned into a Gorgon, a winged monster with snakes for hair and dragon scales for skin. Whoever looked at Medusa's face would turn to stone.

Perseus needed help to accomplish this task. He coerced three nymphs to help him find the gorgons and to give him the three things he would need to succeed: a pair of winged sandals which allowed him to fly anywhere; a magic helmet which would allow him to see without being seen; and most important he was given a highly polished shield by the Goddess Athena.

After traveling very far he finally found the three Gorgons. They were asleep. He approached them by walking backwards while using his shield as a mirror so he would not look directly at Medusa. He then cut off her head with a sharp sword given to him by Mercury, and placed it in his bag. Immediately after Perseus had killed Medusa, the winged horse Pegasus arose out of her body.

Perseus jumped on the back of Pegasus and they soared away toward home. As he was passing near Ethiopia he heard the scream of Andromeda who was about to be attacked by Cetus the sea monster. He immediately turned and noticed the beautiful Andromeda chained to a huge rock. Read how he rescued her in the Cassiopeia legend.

Perseus and Andromeda were happily married except for one sorrowful incident.

While participating in a discus throwing event, he accidentally struck a bystander and killed him. The bystander was his grandfather, King Acrisius, fulfilling the oracle's prophecy that Perseus would cause his grandfather's death. He was so saddened by the tragedy that he gave away the kingdom he inherited.

Legend of the Phoenix

The phoenix is a bird that is the symbol of immortality and the fires within the rays of the sun.

When the time came for the magnificent phoenix to die at the age of 500 years, it arranged a nest for itself among the most fragrant herbs and spices. When the sun rose to its highest point in the sky the phoenix closed its eyes and died. The rays of the sun focused upon the nest and set the nest on fire. When the flames subsided and the ashes cooled a young phoenix emerged and flew toward the setting sun, the source of recurring life.

Legends of the Pleiades

See the legend of Ursa Major.

Among the Polynesians in Central Australia is the legend that the Seven Sisters hungered for some wild figs which could not be found in the sky world, but only on Earth. They therefore came down to Earth. When they arrived they were

frightened by the new surroundings and hid in a cave. They were unaware that Nirunja, who lives in Orion, and wanted to make love to the sisters, saw them leave their home in the sky. He secretly followed them down to Earth. When he saw them entering the cave he decided to wait until nightfall when they would be asleep. He then built a camouflage of fig leaves and slowly crept toward the sleeping beauties. As he snuggled among them they awoke and fought their way to the rear of the cave where they escaped through a small crevice in the rock and flew up to their home in the sky. Nirunja, enraged, ran out of the cave, climbed to the top of the mountain and raced after the sisters. Just as he was about to catch them Taurus the Bull, who lives between the seven sisters and Nirunja's home in Orion, awakened from his sleep and faced Nirunja threatening him with his gigantic horns. Nirunja stared at Taurus, realized he could not get past him, and in frustration returned to his home in the three stars of Orion.

The Maori of Australia refer to the Pleiades as Matariki which means 'little eyes', but which also refers to a woman. They visualize its seven visible stars as Matariki and her six daughters. When the Pleiades appears before dawn it is considered the beginning of a new year, at which time the seven women are greeted with songs of hope for the future and songs of tears for the departed. It is a time for festivities and offerings of young shoots of sweet potatoes to Matariki, since she and her daughters watch over and protect their crops.

The Masai of East Africa referred to the Pleiades as the 'rain stars', while the Zulus of South Africa refer to them as the 'digging stars', since they appear at the beginning of the rainy season and denote the time to plow the land.

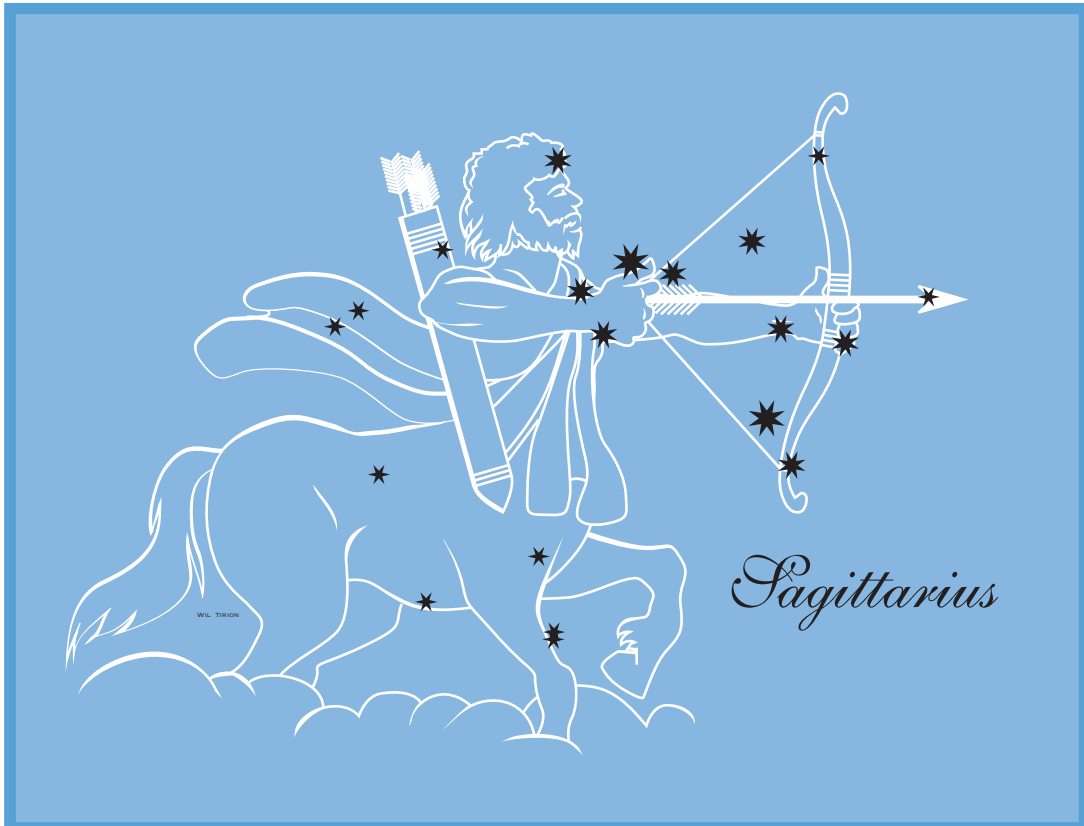
Among the ancient Greeks the seven stars of the Pleiades were the seven daughters of Atlas and Pleione. It is said that Orion the hunter tried to kidnap Pleione while she was walking with her daughters. Fortunately, they escaped, but as the Pleiades moves across the sky Orion is still in pursuit, never far behind Pleione.

Legend of Sagitta the Arrow

This small constellation, next to the constellation of Aquila, commemorates the magic arrow of Hercules which was used to kill Aquila, Jupiter's pet eagle, which was inflicting such agony upon Prometheus. See the legend of Aquila.

Legend of Sagittarius

Sagittarius is considered to be a centaur – half horse, half man, a creature with the



power of a horse and the understanding of a person.

Among the ancient Greeks the king of the centaurs was Chiron, the kindest and wisest centaur. He was the teacher of Hercules the great hunter, Aesculapius the father of medicine, Achilles, and Jason who sought the golden fleece. It was Chiron who arranged the stars in the order we now see them.

During one of the travels of Hercules he had the opportunity to befriend Pholos, the son of Chiron, when Pholos was in danger. Chiron was very grateful to Hercules for befriending his son when in need of help. He therefore placed in the constellation Sagittarius a centaur who was a great archer in order to guard and protect Hercules from Scorpius the scorpion.

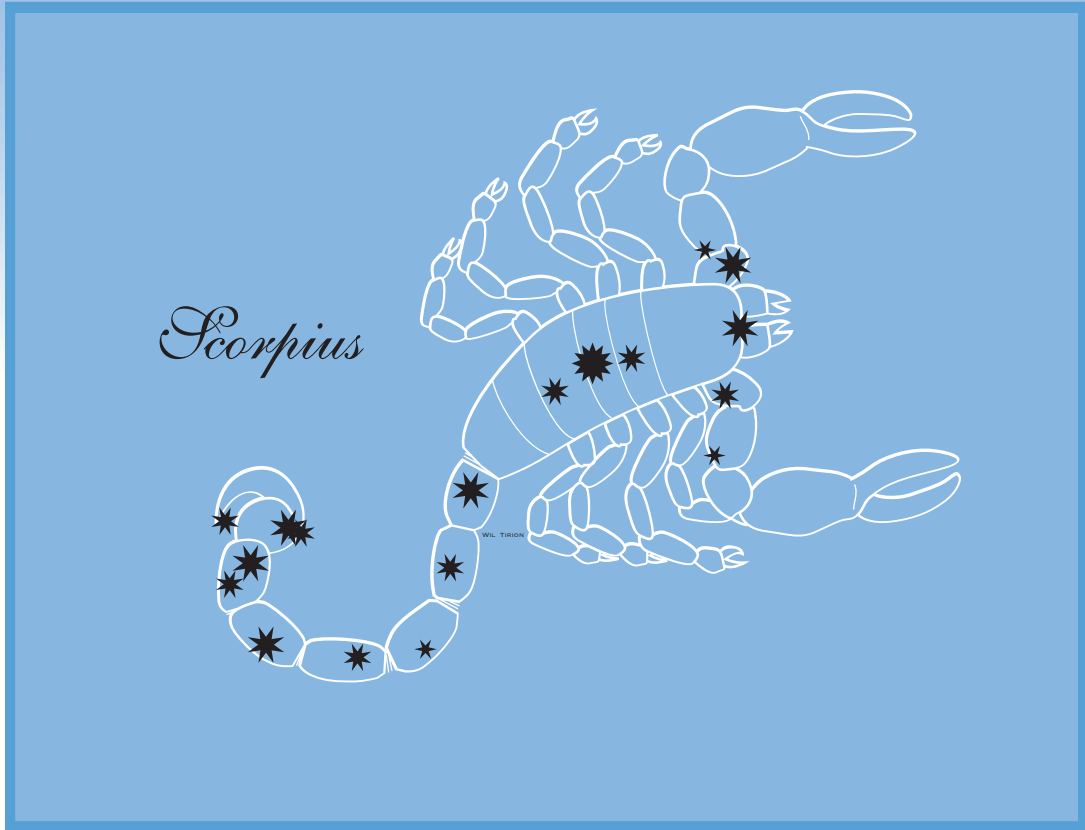
If you look at the heavens at night and watch as Orion sets in the west, you will notice Scorpius rising in the east as if it is following the hunter. But Sagittarius, the archer, follows Scorpius who once attacked Hercules, always ready to attack Scorpius again if it threatens Hercules.

Legend of Scorpius

In China Scorpius was called the 'Azure Dragon'.

The Polynesians of Tahiti tell the story of the boy Pipiri and his sister Rehua. Their mother, who was quite harsh and short tempered, went fishing for the evening meal. It was not until late at

night that she caught enough fish for the family dinner. By the time she returned home her husband and children were asleep. They had gone to bed hungry. She awakened her husband and cooked a wonderful meal. He suggested that she awaken the children who had been quite hungry. She refused despite her husband's insistence and put the children's portion away until the following day. Pipiru and Rehua were awakened by the discussion and were severely hurt by their mother's lack of sensitivity to their hunger. They therefore decided to run away from home. Later that night after their parents were asleep they crept out of the house and ran and ran until they reached a tall hill. They climbed the hill and sank to the ground exhausted. They wept because of leaving their home, but they were determined not to return. Their tears flowed until it actually formed a small pool. Meanwhile just before sunrise their mother awakened, saw their bed stained by their tears and immediately awakened her husband to find the children. She saw their tracks barely visible in the early light and followed their small footprints and trail of tears until they reached the top of the hill where the tracks ended. They were looking around, confused for the children were nowhere to be seen until their father looked up and saw Pipiru and Rehua rising to the stars. They decided to follow. When the children saw their parents getting close to them Pipiru asked a giant stag-beetle to help them escape. He placed the children upon his



back and with tremendous speed flew up to the stars where they may be seen in the two bright stars in the tail of Scorpius. The giant stag-beetle went to its home in Antares, the bright star in the body of Scorpius. In the South Pacific when parents are unfair or too harsh, children sing a song about Pipiru and Rehua. See the legend of Orion.

Legend of Taurus

The bull was an ancient symbol of worship. He was revered by the

Sumerians as the 'Bull of Light', by the Egyptians as Osiris-Apis and was the Golden Calf of biblical times. Taurus, the bull, is the symbol of springtime, which is the time for ploughing and planting, but it is also the symbol of love, which seems to blossom during springtime.

There is a Greek legend that the god Zeus fell in love with the beautiful princess Europa, daughter of King Agenor. Europa had been playing at the seashore. Zeus had been watching her and noticed that when she stopped playing she stood at the edge of the sea and wished that she could go far beyond the horizon. He was so enchanted with

her loveliness that he transformed himself into a magnificent white bull. He moved close to the princess and lowered his head. The princess immediately knew that he was offering her the opportunity to fulfill her dream. When she looked into his pleading eyes and felt his wave of love, she climbed onto his back. Zeus, in the form of the bull, dashed into the sea and with great speed swam beyond the horizon to the island of Crete. There he changed himself back to his true form, told her of his love and that he was an immortal god. The princess was so overwhelmed by the intensity and sincerity of his love that she accepted him as her lover. The constellation of Taurus symbolizes this love story.

In the constellation of Taurus is the star cluster Hyades. Hyades was given a place in heaven because she had nursed Dionysus, the son of Zeus.

The Pleiades, also a star cluster and part of Taurus, were the seven daughters of Pleione and the giant Atlas. There are many legends about the Pleiades. See the legends of the Pleiades and read the legend of Ursa Major, which is also about the Pleiades.

Legend of Ursa Major

When the Earth was very young an American Indian wise man sent his seven sons into the forest to learn how to read the wind. They entered the woods and silently walked while listening to every

sound of the wind. When night approached they found a place to rest and to sleep. The stars were bright.

During the night the oldest brother was suddenly awakened by a strange sound. The wind was singing. He could not read the wind song, but as he looked to the stars he saw a bright light flickering in the Pleiades. He was startled for it was flickering in rhythm with the wind song. It appeared to be beckoning to him.

He immediately awakened his brothers to listen to the song and to help read the wind. They joined hands and began to dance. The song became stronger and their dance more intense. Suddenly they began to rise toward the flickering star who was the youngest of the seven sisters of the Pleiades. She had fallen in love with the youngest brother Mizar. Since then, Mizar and his love, given to him by the wind song, can be seen by those with sharp eyes in the handle of the Big Dipper – the home of the seven brothers.

This legend has been derived from a Mongolian and an American Indian legend.

Legend of Virgo

Virgo symbolizes the Earth goddess and the goddess of fertility. It is also the symbol of harvest time.

In ancient Babylonia they spoke of the time when the Earth was dark. The plants would not grow and the animals

did not give birth. This was the time when Ishtar, the Chaldean goddess of earth and fertility, went through the seven gates of the underworld to find her husband Tammuz, who had been slain by a wild boar and taken to the underworld. As soon as Ishtar entered the first gate to the underworld, the Earth darkened. When she reached the underworld the Queen of Hell refused to give up Tammuz. When the gods over Earth sent a message to the Queen of the underworld to release Tammuz or be destroyed, Ishtar and Tammuz were sprinkled with magic water, set free and ascended through the seven gates of Hell to Earth. As they reentered Earth spring began, flowers bloomed and the sun warmed the land.

Legends of the Milky Way

The Bushmen of the Kalahari Desert in Central Africa speak of the time when a famous hunter was lost in the dangerous bush. Despite days of searching for his village he failed to find the right path. One night, depressed and fatigued, he rested by the edge of a river and prayed to his gods to help him. Hours later, while looking at the sky, he was suddenly aware of a stream of sparkling stars that seemed to point in one direction. He immediately arose and followed that path in the sky and eventually reached his home. His wife, who realized he must have been lost, was throwing embers of the campfire into the sky to form the

path that brought him safely back to her.

The Dogons of Africa had a similar legend in that their god Amma threw pellets of earth into the sky thereby forming the Milky Way.

Among some of the natives of the Andes the Milky Way was considered a river on which the spirits of the dead periodically travelled to return to the land of the living in order to perpetuate communication between the living and the dead.

Among the aboriginals of the southern part of Australia is a tale of woe that took place long ago during their 'Dreaming Time'. A married woman had fallen in love with another man. When she became unfaithful to her husband she tried to hide her affair and therefore lied to him to protect herself and her lover, but he was aware of what she had done. He ordered her to build a large fire. When it was very high he grabbed her and threw her into the flames only to see her immediately float up to the sky where she may be seen as a dark patch in the river of stars, the Milky Way.

The Polynesians also speak of Tane, the son of Rangi who was the sky and light, as the god of the forest, beauty and light as well as the god of the fairies. Rangi and Earth were together in an embrace until Tane separated them, placing the sky high above earth, so that there would be light between them. Tane then threw a basket of stars into the sky to form the Milky Way. Some believe that the Milky Way is the body of Tane's father Rangi.

Some Polynesians consider the Milky Way to be the 'water of life'. They speak of a magnificent blue shark that liked to eat

Legends of the constellations

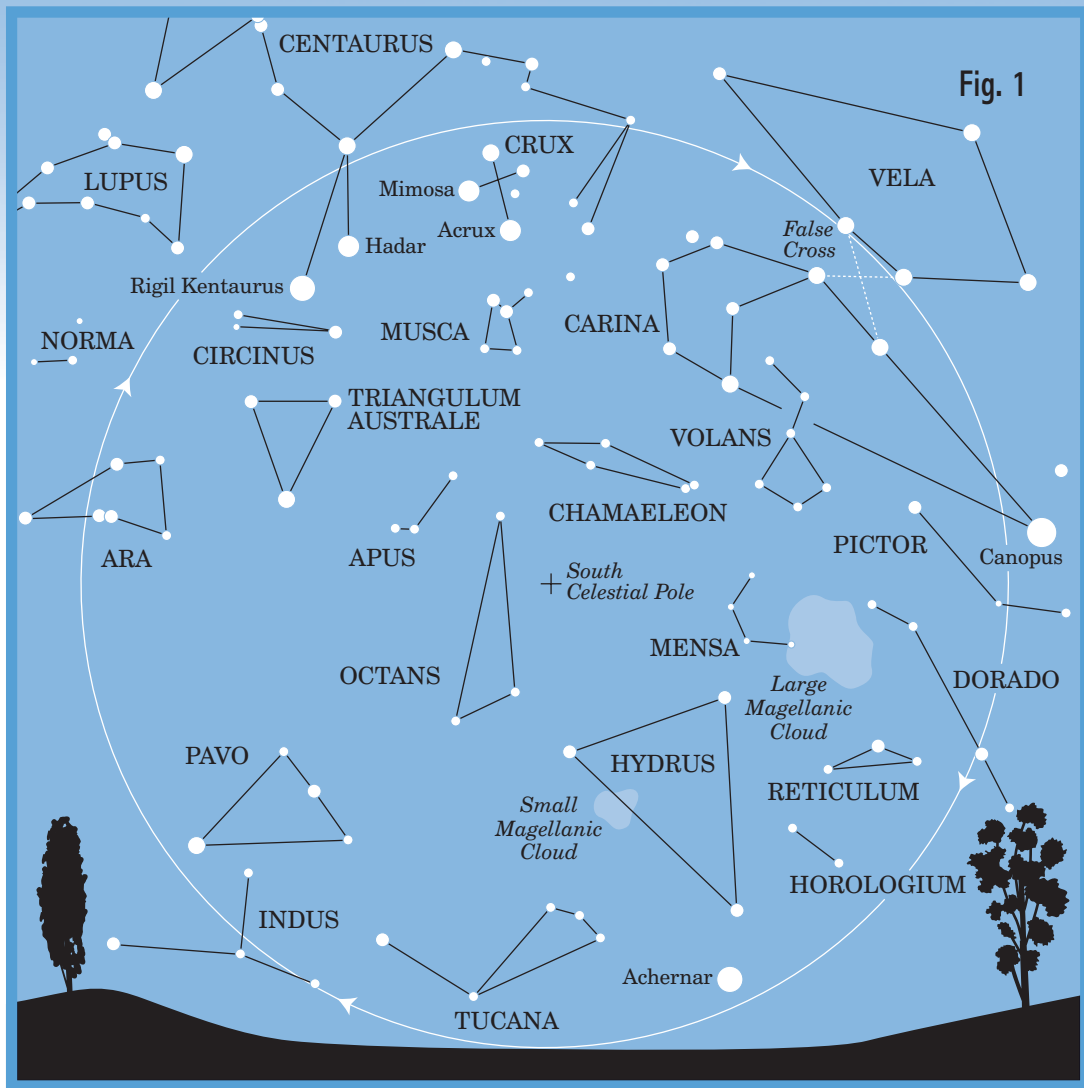
people. It was a pet of the gods. When two young men decided to kill it the gods intervened and placed the shark in the sky where it swims along its river, the Milky Way.

The Milky Way has been thought of as the pathway to the home of Zeus/Jupiter. It was also considered the path of Phaeton's wild ride across the sky in the sun chariot. See the legend of Cygnus.

The Chinese and the Japanese visualized the Milky Way as the silver celestial

river. The Norsemen believed the Milky Way to be the path traveled by the departed souls going to Valhalla. In ancient Wales it was the silver road to the castle of the king of fairies, Caer Groyden.

The Algonquin Indians of North America believed it to be the path of the departed spirits on their way to their villages in the sun. The stars of the Milky Way are the campfires that guided them along the path.



Part 4

There's more to see!

Circumpolar constellations

If an observer is south of latitude 35 degrees south, certain constellations may always be seen above the southern horizon circling the South Celestial Pole (SCP). The circumpolar constellations include Octans, Chamaeleon, most of Carina, Crux, part of Centaurus, Apus, part of Indus, Musca, Circinus, most of Ara, Pavo, Volans, Tucana, Achernar of Eridanus, Horologium, Reticulum, part of Dorado and Pictor, Mensa, part of Vela, Triangulum Australe, Hydrus, as well as the Large and Small Clouds of Magellan.

The illusion of these constellations rotating around the SCP is due to Earth's rotation around its own axis. If a line were drawn from the south pole through the center of the earth through the north pole and extended to the celestial sphere it would end approximately 0.8 degrees from Polaris in the north and 13 degrees from Star 2 of the constellation Hydrus in the south.

Test of vision

Although there are 200 billion stars like our Sun in our galaxy, we can only see about 2500 of them at one time above the horizon under ideal conditions.

Color test

Stars vary in color. These colors depend on a star's temperature (just as the color of a flame depends on its temperature). The coolest stars are red, the hottest blue. If you look closely, you can see some of these colors for the brightest stars. Try looking at some of those listed below.

Reddish

Antares in Scorpius
Aldebaran in Taurus
Betelgeuse in Orion

Yellowish

Capella in Auriga
Rigel in Centaurus
Canopus in Carina

White

Sirius in Canis Major
Fomalhuat in Piscis
 Austrinus
Altair in Aquila

Blue White

Vega in Lyra
Rigel in Orion
Regulus in Leo
Spica in Virgo
Castor in Gemini
Hadar in Centaurus
Acrux in Southern Cross

Orange

Arcturus in Bootes

Yellow White

Procyon in Canis Minor

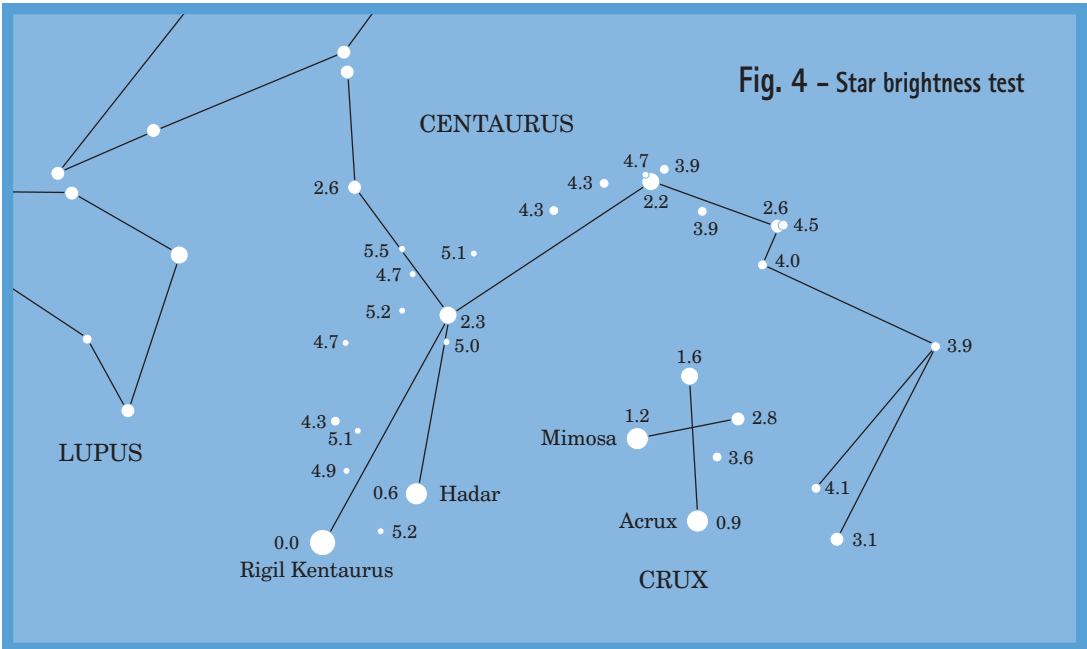
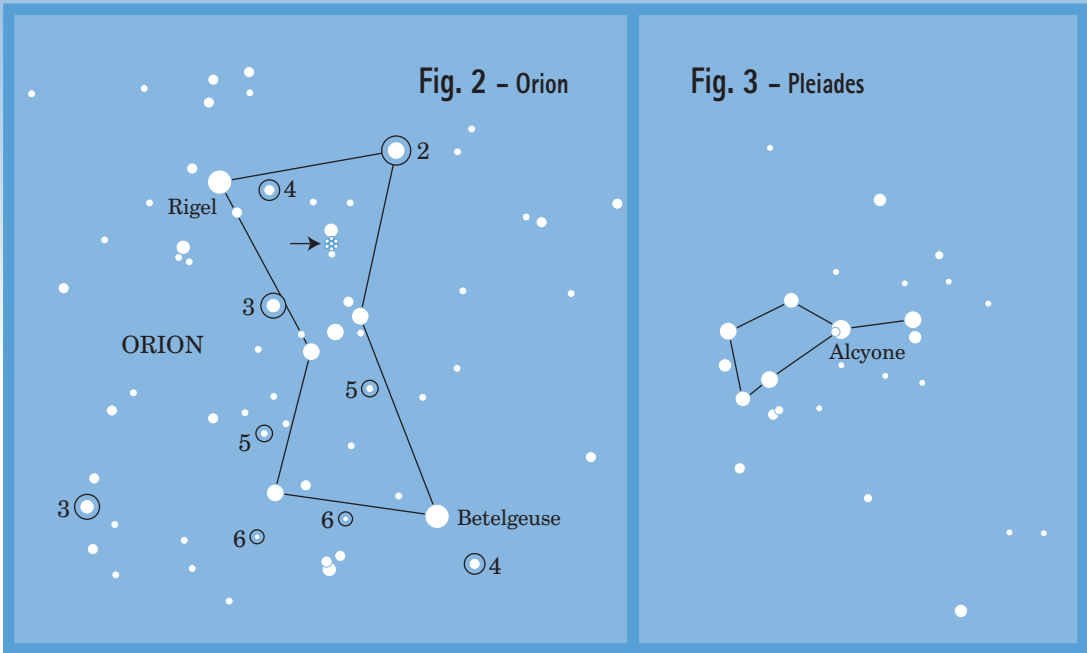
Star brightness test

Most people can see fifth magnitude stars, some can see sixth and even seventh magnitude stars. Remember, the higher the magnitude, the dimmer the star. Orion is an excellent testing ground. Look for the hazy nebula (a mass of dust and gas) above Orion's belt (marked with an arrow on Fig. 2). The numbers show the magnitude (brightness) of each star.

How many stars can you see in the Pleiades? Five is good, six is very good and seven is excellent. To study the faint stars of Centaurus will help to solidify one's mental image of the figure.

The twinkling of the stars is not the star itself twinkling, but the effect of atmospheric air currents that break up the rays of light. If the air is very turbulent even the planets may twinkle.

There's more to see!



Binocular sights

Binoculars are rated by their magnifying power and by the diameter of the objective lens (front lens). The ability of binoculars to increase the amount of light seen by the eye is dependent upon the diameter of the objective lens. The maximum opening of the pupil of the human eye is approximately 8 millimeters. This permits you to see stars with a magnitude of six and possibly seven. A binocular with a rating of 7×32 means that its light-gathering ability, based upon a 32 millimeter objective, would be approximately four times ($32/8$) as great as your naked eye. This greater light-gathering power enables one to see star clusters, nebulae, galaxies and double stars that you could not see with your naked eye, and single stars with a magnitude of nine or ten.

A star cluster is a group of stars that appear very close together. A double star is actually two stars so close together that they appear as one star. Nebulae are clouds of dust and gas that may appear as a dark area against a background of stars, or with a faint glow if a luminous star is nearby. Galaxies are star systems similar to our own Milky Way. They are sometimes referred to as 'Island Universes'.

Location of planets

Planets are spherical bodies that orbit a star and reflect its light. They are probably formed as particles from clouds of gas and dust (a nebula) that slowly cluster together

due to gravitational pull. The word planet is derived from the Greek word 'planetes' meaning wanderer. In ancient times they were called wandering stars.

Planets orbiting distant stars may be detected by noting a faint wobble in a star's movement. This suggests a nearby planet is exerting a tiny gravitational effect upon that star. The same principle may be used to detect a moon orbiting a planet. There are nine known planets in our solar system, Mercury, Venus, Earth, Mars, Jupiter, Neptune, Saturn, Uranus and Pluto, but only Mars, Venus, Mercury, Jupiter and Saturn may be seen with the naked eye.

We may find planets more readily if we understand the following:

- ★ All of our planets except Pluto revolve around the Sun along a fairly narrow path. That orbital path is called the ecliptic. It may be visualized as a flat plane with the Sun in the center.
- ★ Although the orbital paths of the planets lie along the same general pathway around the sun, they arrive at different times along any given point in their orbit. That is why they are not always seen together. When they do appear close together they are said to be in conjunction.
- ★ Since the Sun and Earth are on the same plane against a background of stars, thirteen different constellations are sequentially hidden from our view as we revolve around the sun. Astrologers do not include the constellation Ophiuchus in order to make it an even twelve. These constellations comprise the Zodiac that was first described in approximately 500 BCE. Planets are therefore always near one of the Zodiac constellations.

Fig. 5 - Binocular Sights (1)

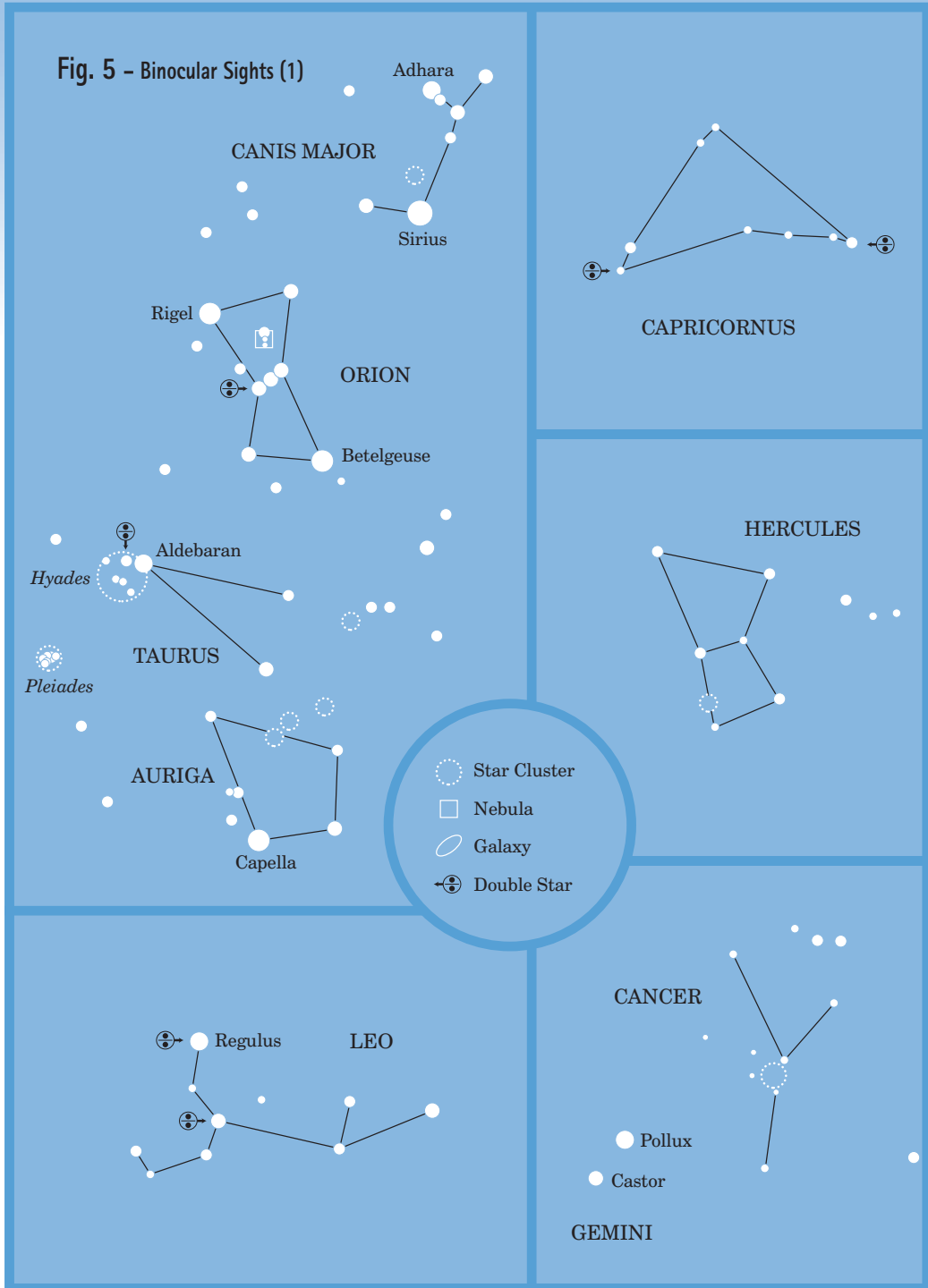
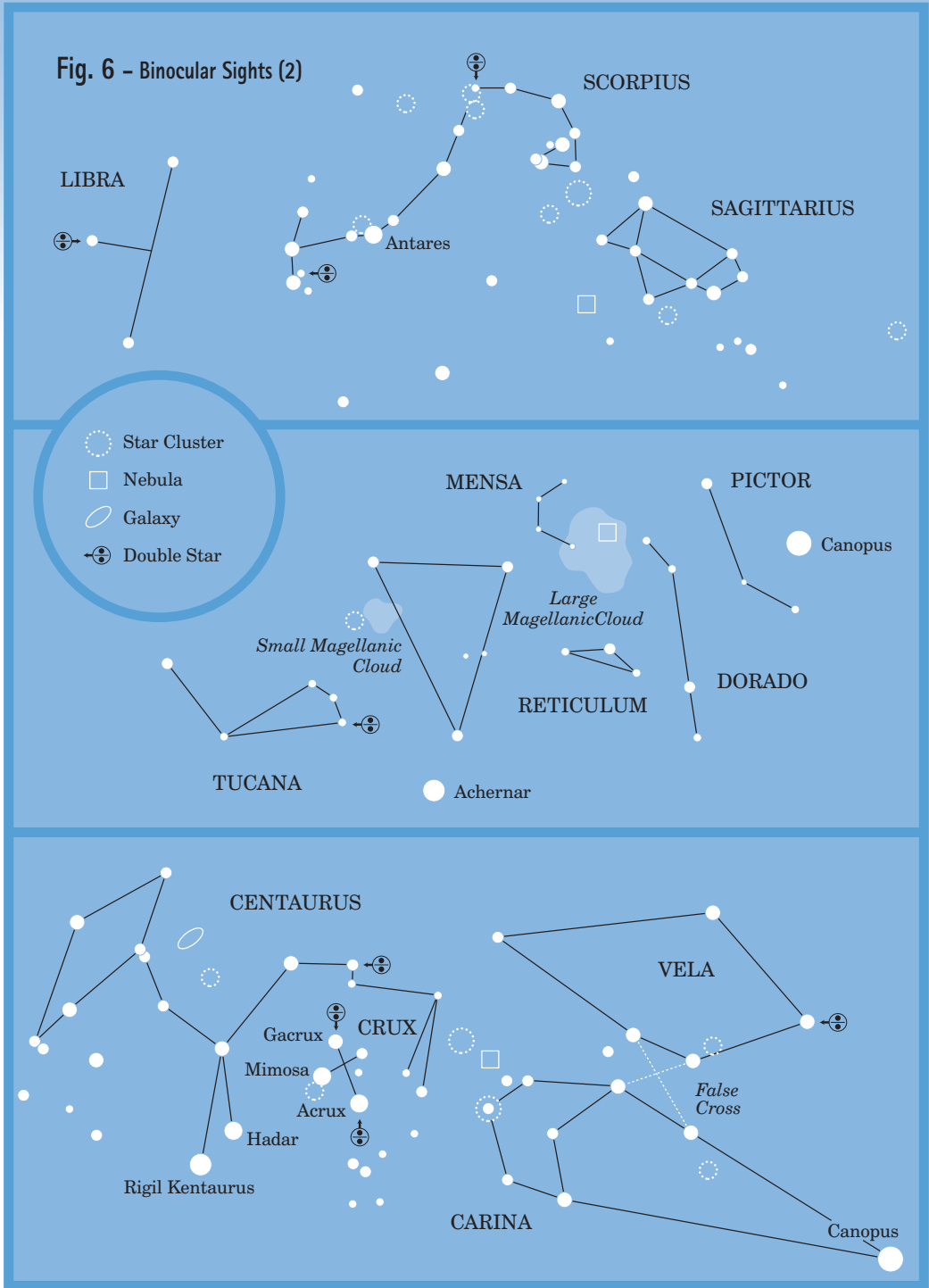


Fig. 6 - Binocular Sights (2)

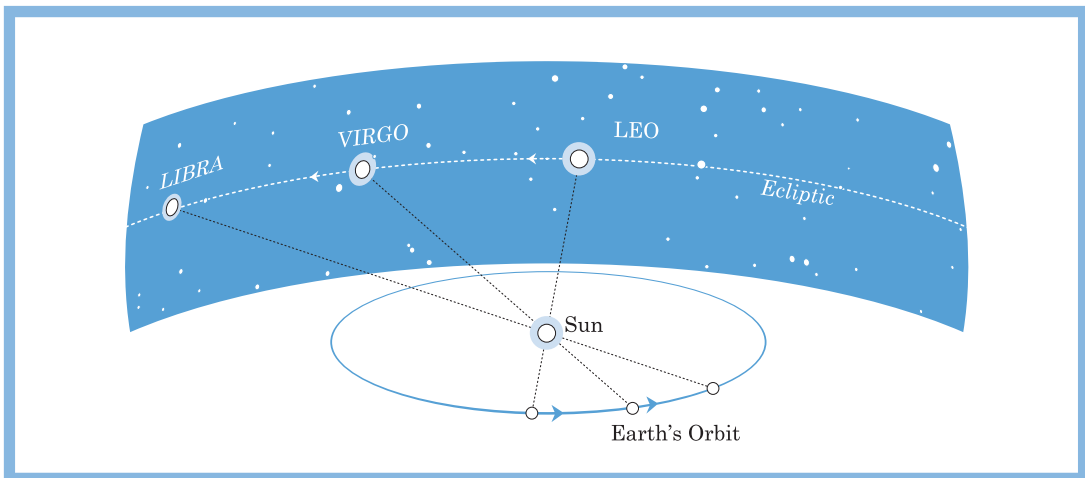


- * In the Southern Hemisphere the Sun crosses the northern part of the sky. Since our planets lie on the same plane as the Sun, they will mainly be seen in the northern part of the sky. They are never near the south polar area.
- * If there is a bright object in the northern sky it is either Jupiter, Saturn, Venus or Mars. Mercury is seen low in the horizon, before sunrise or after sunset since it is close to the Sun.
- * Venus is the 'morning star' seen in the east as the Sun comes up or the 'evening star' in the western sky after sunset.
- * Planets display minimal twinkling unless close to the horizon where the increase in the number of atmospheric particles produces a more pronounced shimmering effect.
- * Mars is the only planet whose color is quite distinct, with a reddish tint. Jupiter, the largest planet, may be very bright, but still not as bright as Venus. Some of Jupiter's moons may be seen by those with excellent vision.

The Ecliptic and the Zodiac

The ecliptic is the circular path of Earth's orbit around the Sun. During this movement classically 12 (actually 13) constellations that are in the background beyond the Sun are sequentially hidden from view by the Sun. These constellations comprise the Zodiac. They are Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Ophiuchus, Sagittarius, Capricornus, Aquarius and Pisces. This line-up of constellations was recognized in ancient times. The early Greeks visualized animals moving among the constellations of the Zodiac. Each constellation is depicted as an animal except for Libra. 'Zodiac' means animal in Greek.

Since all of our planets except Pluto orbit the Sun close to the same orbital plane as Earth they are always seen close to the ecliptic and therefore along the Zodiac highway of 13 constellations. See Fig. 7.



Planet locations

2006	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	CAP	SGR	SGR	CAP	PSC	ARI	TAU	GEM	LEO	VIR	LIB	OPH
Mars	ARI	ARI	TAU	TAU	GEM	CNC	CNC	LEO	VIR	VIR	VIR	LIB
Jupiter	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB
Saturn	CNC	CNC	CNC	CNC	CNC	CNC	CNC	CNC	LEO	LEO	LEO	LEO
2007	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	SGR	AQR	PSC	ARI	TAU	GEM	LEO	SEX	CNC	LEO	LEO	VIR
Mars	OPH	SGR	CAP	CAP	AQR	PSC	ARI	TAU	TAU	GEM	GEM	GEM
Jupiter	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH
Saturn	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO
2008	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	LIB	SGR	CAP	AQR	PSC	TAU	GEM	LEO	VIR	LIB	OPH	SGR
Mars	TAU	TAU	TAU	GEM	GEM	CNC	LEO	LEO	VIR	VIR	LIB	OPH
Jupiter	SGR	SGR	SGR	SGR	SGR	SGR	SGR	SGR	SGR	SGR	SGR	SGR
Saturn	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO
2009	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	AQR	PSC	PSC	PSC	PSC	PSC	TAU	ORI	CNC	LEO	VIR	LIB
Mars	SGR	SGR	CAP	AQR	PSC	ARI	ARI	TAU	GEM	GEM	CNC	LEO
Jupiter	SGR	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
Saturn	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	VIR	VIR	VIR
2010	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	SGR	CAP	AQR	ARI	TAU	GEM	LEO	LEO	VIR	LIB	VIR	VIR
Mars	LEO	CNC	CNC	CNC	CNC	LEO	LEO	VIR	VIR	LIB	SCO	OPH
Jupiter	CAP	AQR	AQR	AQR	AQR	PSC	PSC	PSC	PSC	PSC	AQR	AQR
Saturn	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR
2011	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	LIB	SGR	SGR	AQR	PSC	ARI	TAU	CNC	LEO	VIR	LIB	SGR
Mars	SGR	CAP	AQR	PSC	PSC	ARI	TAU	TAU	GEM	CNC	LEO	LEO
Jupiter	PSC	PSC	CET	PSC	PSC	PSC	ARI	ARI	ARI	ARI	ARI	ARI
Saturn	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR

2012	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	CAP	AQR	PSC	TAU	TAU	TAU	TAU	TAU	GEM	LEO	VIR	LIB
Mars	LEO	VIR	LEO	LEO	LEO	LEO	VIR	VIR	VIR	LIB	OPH	SGR
Jupiter	PSC	ARI	ARI	ARI	ARI	TAU	TAU	TAU	TAU	TAU	TAU	TAU
Saturn	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR
2013	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	OPH	SGR	AQR	PSC	ARI	TAU	CNC	LEO	VIR	LIB	OPH	SGR
Mars	CAP	AQR	AQR	PSC	ARI	TAU	TAU	GEM	CNC	LEO	LEO	VIR
Jupiter	TAU	TAU	TAU	TAU	TAU	TAU	GEM	GEM	GEM	GEM	GEM	GEM
Saturn	LIB	LIB	LIB	LIB	LIB	VIR	VIR	VIR	LIB	LIB	LIB	LIB
2014	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	SGR	SGR	SGR	CAP	PSC	ARI	TAU	GEM	LEO	VIR	LIB	OPH
Mars	VIR	VIR	VIR	VIR	VIR	VIR	VIR	VIR	LIB	OPH	SGR	SGR
Jupiter	GEM	GEM	GEM	GEM	GEM	GEM	GEM	CNC	CNC	CNC	LEO	LEO
Saturn	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB	LIB
2015	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	SGR	SGR	PSC	ARI	TAU	GEM	LEO	LEO	CNC	LEO	LEO	VIR
Mars	CAP	SGR	PSC	ARI	ARI	TAU	GEM	GEM	CNC	LEO	LEO	VIR
Jupiter	LEO	LEO	CNC	CNC	CNC	CNC	LEO	LEO	LEO	LEO	LEO	LEO
Saturn	LIB	SCO	SCO	SCO	SCO	LIB	LIB	LIB	LIB	LIB	SCO	OPH
2016	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Venus	LIB	SGR	CAP	AQR	ARI	TAU	GEM	LEO	VIR	LIB	OPH	SGR
Mars	VIR	LIB	LIB	SCO	OPH	LIB	LIB	LIB	SCO	SGR	SGR	CAP
Jupiter	LEO	LEO	LEO	LEO	LEO	LEO	LEO	LEO	VIR	VIR	VIR	VIR
Saturn	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH	OPH

Positions are for the first day of each month

OPH = Ophiuchus, SGR = Sagittarius, CAP = Capricornus, AQR = Aquarius, PSC = Pisces, CET = Cetus, ARI = Aries, TAU = Taurus, ORI = Orion, GEM = Gemini, CNC = Cancer, LEO = Leo, VIR = Virgo, LIB = Libra, SCO = Scorpius.

Navigational stars

Stars have guided navigators as they crossed the oceans and explored foreign lands. Fifty-seven stars have been designated as navigational stars

Star	Constellation
Acamar	Eridanus
Achernar	Eridanus
Acrux	Crux
Adhara	Canis Major
Aldebaran	Taurus
Alioth	Ursa Major
Alkaid	Ursa Major
Al Na'ir	Grus
Alnilam	Orion
Alphard	Hydra
Alphecca	Corona Borealis
Alpheratz	Andromeda-Pegasus
Altair	Aquila
Ankaa	Phoenix
Antares	Scorpius
Arcturus	Bootes
Atria	Triangulum Australe
Avior	Carina
Bellatrix	Orion
Betelgeuse	Orion
Canopus	Carina
Capella	Auriga
Deneb	Cygnus
Denebola	Leo
Diphda	Cetus
Dubhe	Ursa Major
El Nath	Taurus
Eltanin	Draco
Enif	Pegasus
Fomalhaut	Piscis Austrinis
Gacrux	Crux
Gianah	Corvus
Hadar	Centaurus
Hamal	Aries
Kaus Australis	Sagittarius
Kochab	Ursa Minor
Markab	Pegasus
Menkar	Cetus
Menkent	Centaurus
Miaplacidus	Carina
Mirfak	Perseus

Star	Constellation
Nunki	Sagittarius
Peacock	Pavo
Pollux	Gemini
Procyon	Canis Minor
Rasalhague	Ophiuchus
Regulus	Leo
Rigel	Orion
Rigil Kentaurus	Centaurus
Sabik	Ophiuchus
Schedar	Cassiopeia
Shaula	Scorpius
Sirius	Canis Major
Spica	Virgo
Suhail	Vela
Vega	Lyra
Zubenelgenubi	Libra

Minor constellations

Constellations dimmer than 3.5 magnitude

Antlia	< 4.3
Apus	< 3.8
Caelum	< 4.5
Camelopardalis	< 4.3
Cancer	< 3.9
Coma Berenices	< 4.3
Corona Australis	< 4.1
Crater	< 3.6
Equuleus	< 3.9
Fornax	< 4.1
Horologium	< 3.9
Lacerta	< 3.8
Leo Minor	< 3.8
Mensa	< 5.0
Microscopium	< 4.7
Monoceros	< 3.9
Norma	< 4.0
Octans	< 3.8
Pisces	< 3.6
Pyxis	< 3.7
Sculptor	< 4.3
Scutum	< 3.9
Sextans	< 4.5
Volans	< 3.8
Vulpecula	< 4.4

Constellations index

Constellations marked with an asterisk contain one or more stars that are at least as bright as magnitude 3.

Scientific name	Page	Diagram
* Andromeda	65	27–35–36–37
Antila	20	13
Apus	23	14
* Aquarius	62	36
* Aquila	56	33–35
* Ara	25	15–20
* Aries	63	27–36–37
* Auriga	45	25–26–37
* Bootes	51	29
Caelum	36	22
Camelopardalis		
Cancer	55	32
* Canes Venatici	51	29
* Canis Major	43	21–25–26
* Canis Minor	43	25–32
* Capricornus	29	19–20
* Carina	19	12–13–14–21
* Cassiopeia	65	37
* Centaurus	17	10–13–15–16–23
* Cepheus		
* Cetus	47	22–27–28
Chamaeleon	23	14
Circinus	25	15–20
* Columba	47	22–25–26–27
Coma Berenices	52	30
Corona Australis	33	20
* Corona Borealis	51	29–38–40
* Corvus	19	30
Crater	53	30
* Crux	17	9–10–12–14–15– 23–30–41
* Cygnus	59	33–34–45
Delphinus	61	33–35
Dorado	23	14–22
* Draco		
Equuleus	61	33–35
* Eridanus	37	22–27–28
Fornax	37	22
* Gemini	45	25–26–32
* Grus	29	17–19–20–36–42
* Hercules	67	38–39
Horologium	23	14–22
* Hydra	53	30
* Hydrus	23	14–16–23

Scientific name	Page	Diagram
Indus	29	17–19–20
Lacerta	60	35
* Leo	55	30–31–46
* Leo Minor	54	31
* Lepus	47	22–25–26–27
* Libra	25	15–30
* Lupus	25	15–16–20
Lynx	54	31
* Lyra	57	33
Mensa	23	14
Microscopium	33	20
* Monoceros	44	26
* Musca	19	11–14–15
Norma	33	15–20
Octans	23	14
* Ophiuchus	69	33–40
* Orion	41	22–24–25–26– 27–28
* Pavo	27	16–17–18–20
* Pegasus	59	34–35–36–37
* Perseus	65	25–26–36–37
* Phoenix	31	19–22
Pictor	23	14–22
Pisces	63	36–37
* Piscis Austrinus	63	17–19–36
* Puppis	35	21
Pyxis	34	21
Reticulum	23	14
Sagitta	59	33–35
* Sagittarius	69	16–20–40
* Scorpius	69	15–16–30–33
Sculptor	30	19
Scutum	68	40
* Serpens	69	40
Sextans	52	30
* Taurus	43	25–26–27
Telescopium	33	20
* Triangulum	64	27–37
* Triangulum Australe	25	15–20
* Tucana	29	17–18
* Ursa Major	50	29–30–31
* Ursa Minor		
* Vela	21	13–21
* Virgo	53	29–30–31
Volans	23	14
Vulpecula	56	33–35
<i>Triangles</i>		
Orienting Triangles	74	48
Summer Triangle	43	25
Winter Triangle	60	33–35
Zaydeh's Triangle	60	33–35