

ASTRONOMY

Pinwheels in the Heavens

Pinwheels of stars and shining nebulae glow in the night skies, so enormous they take hundreds of millions of years to complete a single turn.

By MARTHA G. MORROW

► THERE ARE fireworks in the heavens. Pinwheels of stars and shining nebulae glow in the night skies. Long arms of stars, bright dust and gas spiral outward from their fiery centers.

These permanent pinwheels of the heavens take hundreds of millions of years to make a single turn. Yet they are so enormous that individual stars racing around the center travel hundreds of miles each second.

Some of these heavenly fireworks are so distant that you can see them only with the world's best telescopes. A few can be picked up with a home-made model. One or two you can see with the unaided eye if your eyesight is good.

There is one starry pinwheel, however, that everyone can see, at least in part. Just go far from city lights on a clear, moonless night during late summer, and you will see the Milky Way glowing faintly across the heavens. This band of soft, misty light encircling the sky comes from millions of stars too faint to be seen without a telescope. They outline the pinwheel galaxy to which our earth and sun belong.

We are riding on a cosmic carousel. The Milky Way is our celestial merry-go-round. This gives us the disadvantage, however, of being on the inside, looking out. It is difficult to visualize how our galaxy looks and just where we are in relation to the myriad of other stars.

Pocket-Watch Shape

All spiral galaxies are shaped like a pocket watch. Spinning has flattened them out. The Milky Way galaxy to which we belong has this same shape. It is about ten times as broad as it is thick.

The center of our galactic system is located in the direction of the constellation of Sagittarius, the archer, visible low in the south these September evenings. It would take light, traveling some 186,000 miles a second, 25,000 to 30,000 years to reach its center. This estimate was made by Dr. Harlow Shapley, director of Harvard College Observatory, some 20 years ago and his figures are still accepted.

It takes about 200,000,000 years for our spiral galaxy to make one complete revolution. Yet we, the sun and other stars in our neighborhood, are racing around the center of our universe at a speed of some 150 miles a second.

We actually are located in an outer spiral

arm of our pinwheel galaxy. People in the United States cannot see this luminous arm, nor even stars marking the direction in which it lies. The constellation of Carina, the ship's keel, is visible only in the southern hemisphere. Dr. Bart J. Bok, associate director of Harvard College Observatory, has recently demonstrated that the Eta Carina Nebula is really a luminous knot in

one of the spiray arms of our Milky Way.

The Milky Way is enormous, even for a galaxy. Light would take 100,000 years to cross it. Yet it is only 10,000 light-years thick at the central bulge.

But stars belonging to our system are found much farther out from the center than this. A thin haze or corona of stars encircles the main discoid system. This atmosphere of stars, tens of thousands of light-years thick, envelops our galaxy.

Fully a hundred billion stars belong to our celestial pinwheel. Some 6,000 of these are near enough and bright enough to be seen with the unaided eye. Our galaxy



GREAT NEBULA OF ANDROMEDA—This spiral nebula is believed to be much like our own Milky Way galaxy, both in size and shape. By studying our neighbor, astronomers are learning much about the universe to which our solar system belongs.

also contains vast clouds of gas and dust. Some of these are quite luminous and shine in our night sky; others are dark and cut off some of the light of stars beyond them.

We fail to see many nearby stars because of these dark clouds. Others are just faintly seen when in reality they are quite bright objects. Much of this dark material lies between us and the hub around which our galaxy rotates, cutting off our view of the millions of bright stars clustered together there.

An enormous cloud of obscuring dust and gas, shaped like a slightly-bent cigar, divides the Milky Way at places into two branches. You can easily see these two branches on a clear, dark night in the late summer. Look toward that part of the Milky Way which extends from the constellation of Cygnus, the swan, in which you will find bright Deneb high in the evening sky, down between Altair in Aquila, the eagle, and the serpent's tail, and on down to the southern horizon.

Stars of high surface temperature and great brilliance on the other side of this cloud particularly interest Dr. J. J. Nassau of the Warner and Swasey Observatory, Cleveland, and Dr. W. W. Morgan of the University of Chicago's Yerkes Observatory. These stars, which do not look particularly bright in our sky, are all at least 1,500 times as bright as our sun and many of them are over 10,000 times as bright.

Few Peep-Holes Available

At night when you pass over a city in an airplane, or look at it from the roof of one of the tallest buildings or from a nearby mountain, it is easy to grasp the lay-out of the city by studying the lights that shine in the dark. But if you remain in the street, or look out of a first-floor window, you have a hard time picturing the metropolis. Astronomers are in the difficult position of trying to picture the Milky Way galaxy when they have only a few peep-holes from which to view its lay-out.

There is a nearby pinwheel system of stars, however, which looks very much like our own. Astronomers are using the Great Nebula of Andromeda as a model for studying our own galaxy. This is a most direct attack on the structural problems of our system.

To the unaided eye, the Great Nebula

looks like a small luminous cloud or misty star. It is of the fifth magnitude, thus is rather difficult to spot. Its spiral shape appears in a telescope. In photographs with the world's best telescopes, dark lines of obscuring matter as well as bright stars are visible.

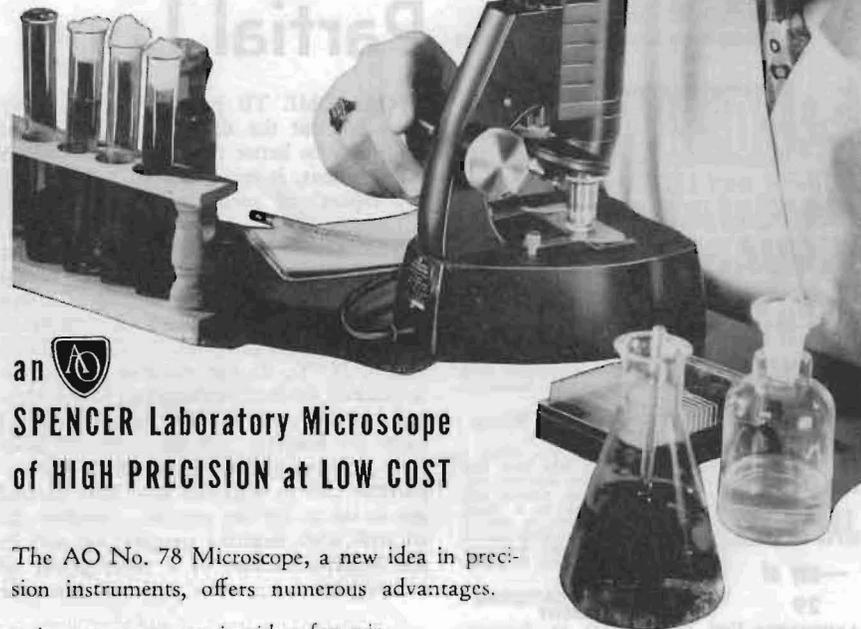
It was Dr. Walter A. Baade of Mt. Wilson and Palomar Observatories of the California Institute of Technology and the Carnegie Institution of Washington who first showed the central nucleus of the Andromeda Nebula to be a myriad of individual stars. Before that astronomers had photographed the hot blue stars in the galaxy's spiral arms, but not until World War II were the brilliant red stars in its shining

center revealed. Dr. Baade and the 100-inch telescope at Mt. Wilson "captured" them individually for the first time on photographic plates.

With the 200-inch Hale telescope atop Mt. Palomar, Dr. Baade has been exploring this neighboring nebula still further and has been examining other galaxies in detail. He has picked out the individual stars of which they are composed and confirms the work of Dr. F. H. Seares of Mt. Wilson Observatory a generation ago on the location of different types of stars. Hot blue stars are found most frequently in the spiral arms; giant cool red stars tend to concentrate in the nucleus.

Thus Milky Way astronomers have been

EASY TO LEARN SIMPLE TO MANIPULATE



an  **SPENCER Laboratory Microscope**
of HIGH PRECISION at LOW COST

The AO No. 78 Microscope, a new idea in precision instruments, offers numerous advantages.

- Anyone can operate it with a few minutes instruction.
- A single dual-purpose control offers quick, accurate focusing.
- The instrument is compact, lightweight, and easily portable.
- The factory-focused built-in light source eliminates time-consuming and frequently faulty substage adjustments.
- Reversed arm position gives clearer view of specimen, stage, objectives, and diaphragm openings.
- Low overall height increases comfort in operation.
- Locked-in parts prevent loss, mishandling, and excessive maintenance costs.
- "Spring-loaded" focusing mechanism prevents slide breakage.
- Magnifications available from 17.5X to 430X.

The AO No. 78 Microscope utilizes the same high quality optics and precision-built mechanical parts that have won world recognition for higher priced AO Spencer Microscopes. If you have not already studied its time and money-saving advantages, see your AO distributor or write Dept. D111.

American  Optical

INSTRUMENT DIVISION • BUFFALO 15, NEW YORK

STAR DUST COLLECTION

15 Semi-Precious Stones, polished on one side and showing the beautiful colors of our native stones. In compartment box 9 x 12 x 1". \$8.00 prepaid. Booklet, Introduction to Geology for the Layman, 50¢.

Write for free catalogue

ECKERT Mineral Research & Naturegraph Co.

Dept. SNL

110 E. Main St. Florence, Colorado

furnished another clue as to where we are located in our own galaxy. The presence of numerous hot blue stars, for instance, signals the direction to one spiral arm.

Just suppose astronomers could carry their telescopes to a planet in the Andromeda Nebula. What would our Milky Way galaxy look like from there? Calculations show it would look much like the Great Nebula does to us. Photographs would probably reveal individual giant stars in our galaxy, including most of our variable stars.

Magellanic Cloud Galaxies

Two companion galaxies could also be spotted nearby. They are the Magellanic Clouds. These Clouds are both irregular galaxies which from the earth look like faint luminous clouds broken off from the Milky Way. Unfortunately, they are too far south to be seen from the United States.

The two Magellanic Clouds and the Milky Way galaxy form a triple system. Our galaxy is nearly 30 times as bright as the Small Cloud and six times as bright as the Large Cloud. Yet these clouds are not dwarf galaxies, Dr. Shapley has shown, but are probably brighter and more massive than most galaxies. They whirl around with us in our travels through space.

Science News Letter, September 13, 1952

BIOCHEMISTRY

Nerve Gas Antidote

▶ AN ANTIDOTE to Parathion and some other nerve-gas types of insecticides, and maybe to the nerve gases themselves, has been discovered.

It is called Buscopan. In treatment of laboratory animals poisoned by Parathion, it is much more effective than atropine. Atropine has so far been considered the best drug for treating both nerve-gas and Parathion-insecticide poisoning.

Buscopan is a German drug. Chemically, it is 1-N-butylscopolanmonium bromide. It comes from scopolamine, the "twilight sleep" drug once popular as a childbirth pain-reliever.

The effectiveness of this drug as an antidote to poisoning by insecticides, Parathion, dimethyl Parathion and Systox, was reported by Dr. William B. Deichmann of Albany Medical College to the International College of Surgeons, Chicago. (See p. 168.)

Buscopan, in Dr. Deichmann's opinion, is "terrifically better" than atropine. It acts at

the ganglia, which are collections of nerve cells occurring along the chains of sympathetic and parasympathetic nerves. Atropine acts at the nerve endings rather than at the ganglia of these nerve chains. This different spot at which the new drug takes effect may be what makes it, in Dr. Deichmann's experience, so much better than atropine.

Dr. Deichmann emphasized that so far he has only tried the new drug in experimental animals and only as an antidote for the three insecticides, Parathion, dimethyl Parathion and Systox. While these are related to the nerve gases, they are not the same and their effect is somewhat different. Symptoms of Parathion poisoning develop more slowly and are not as responsive to atropine as those of the nerve gases.

Dr. Deichmann also finds that both atropine and Buscopan are more effective when given with oxygen and glucose than when given alone.

Science News Letter, September 13, 1952

SURGERY

Partial Lung Removal

▶ FOR SOME TB patients having a surgeon cut out the diseased portion of the lung may be better than any other method of treatment, it appears from a "preliminary report" of such an operation on 87 patients.

The operation is called segmental resection of the lung. The promising results in 87 cases were reported by Capt. Clifford F. Storey and Lieut. Bruce F. Rothmann of the U. S. Naval Hospital, St. Albans, Long Island, N. Y., at the meeting of the International College of Surgeons in Chicago.

So far, 59 patients have been discharged from the hospital. Of these, 38 are gainfully employed, and 16 are well and apparently able to work but have been advised not to do so for the present. Another 25, all well with negative sputum, are still in the hospital because of a strict policy of insisting on six months' bed rest after the

operation. This method of treatment is for "carefully selected" patients in whom the tuberculosis is confined to a single segment of the lung or in whom the primary focus occupies a segment and no more than one additional adjacent segment is involved.

The method is not a "cure-all" suitable for all types of patients with TB of the lung.

Studies of lung function shows that there is less impairment of function after removal of a segment of lung than when other surgical methods are used for similar cases.

"There is no significant change in function following segmental removal of the diseased portion of the lung," the Navy doctors reported.

Science News Letter, September 13, 1952

Eggs should be stored large-end-up to keep the yolks well-centered.

GO PLACES
LISTEN and LEARN A LANGUAGE by LINGUAPHONE IN 20 MINUTES A DAY
 World's-Standard **CONVERSATIONAL METHOD**
 You can step into a whole new world of Scientific, business and cultural opportunities — double your travel enjoyment, increase your chances for specialized work in the Armed Services—when you speak another language.
NO TEXTBOOK CAN TEACH YOU TO SPEAK
 With Linguaphone, you bring a foreign land right into your own home — you learn another language the same easy, natural way you learned English as a child, long before you went to school. You listen — you hear native voices, both men's and women's. You understand — you SPEAK! You read and write.
WORLD-WIDE EDUCATIONAL ENDORSEMENT
 Used internationally by thousands of schools, colleges, Armed Services, government agencies, and over a million home-study students.
FREE book gives fascinating facts. **STOP WISHING — START TALKING.** Mail coupon TODAY.
LINGUAPHONE INSTITUTE
 3109 Radio City New York 20, N. Y.
 Approved for **VETERANS' Training.**

SEND FOR FREE BOOKLET
 Linguaphone Institute
 3109 Radio City, N. Y. 20, N. Y.
 Send me your FREE book. I want to learn _____ language, for _____ purpose.
 Name _____
 Address _____
 City & State _____

REAL PANSY COASTERS
 Make Them at Home
 Easy - Fun - Profitable
 Now create new and truly different gift articles like the beautiful pansy coaster shown—made by embedding real pansies in Castolite—the "magic" liquid casting plastic. With our simple step-by-step method you can make hundreds of valuable articles, including smart costume jewelry, chic Hi-Style buttons, colorful key tags, Tie-clasps, cuff links, plaques, files, many other things. Send 25c for Big Castolite Creations Manual. FREE with Manual inspiring New Home-Success Plan. Write:
CASTOLITE CO.
 DEPT. K-50, WOODSTOCK, ILL.



BIOLOGY TEACHERS
 You can get better microscopic slides for less! Since comparative histology tells so much about the nature of man, this study should begin early and be enlarged on in the liberal arts and teachers colleges, and in the university. Like English, it should be a required study for all students in every school of intermediate and higher education. The result would be a better citizenry; better parents, better teachers, better preachers, better physicians, a better man, and a better society, which is the purpose of education. Premedical students should make comparative histology their biggest course, because the medical schools devote very little time to the study of this most important discipline. The medical students should realize that knowledge of cellular biology gives meaning to pathology, anatomy and physiology and is the natural and least costly approach to all medical problems. *Begin study histology in high school.*
THE AGERSBERG BIOLOGICAL LABORATORY
 Centralia, Illinois