

ASTRONOMY

# Three Planets Visible

The new year, beginning with the appearance of Jupiter, Mars and Saturn, will include a total eclipse of the sun as one highlight.

By JAMES STOKLEY

►THREE BRIGHT PLANETS—Jupiter, Mars and Saturn—will appear in the January evening sky, joining the bright stars normally visible.

Only Jupiter, however, is shown on the accompanying maps, which depict the skies as they look about 10 p.m., your own variety of standard time, at the beginning of the month. Their appearance is similar at nine in mid-January, and at eight as the month ends.

Jupiter shines so brilliantly, high in the southwest, that it is not difficult to locate. On the astronomical brightness scale, it is of magnitude minus 2.1.

In early January, Saturn sets about 8:00 p.m., which is why it is not shown on the maps. Although only about a 20th as bright as Jupiter, it equals a first magnitude star. Thus it is easy to locate in the west in the early evening.

Mars, on the other hand, rises just too late to get on the maps. It comes up in the east, at the first of the month, about an hour and a half before midnight, and earlier in the following weeks. Standing in Virgo, the virgin, which is just below Leo, the lion, its magnitude is 0.2, even brighter than Saturn.

The brightest star shown is Sirius, also known as the "dog star," because it marks the constellation of Canis Major, the great dog, now in the southeast. Above and toward the right is the magnificent figure of Orion, the warrior, with the two first magnitude stars, Betelgeuse and Rigel. Between them is the row of three stars that form Orion's belt.

## Taurus Stands Higher

Still higher and farther right stands Taurus, the bull, with brilliant and reddish Aldebaran. And just to the right of Taurus, in the next-door constellation of Aries, the ram, is Jupiter.

Above and to the left of Sirius is the lesser dog, Canis Minor, with the brilliant star called Procyon. And right above this group are the twins, Gemini, with Castor and Pollux. The latter is another first magnitude star. Auriga, the charioteer, is almost directly overhead, with Capella (shown on the map of the northern half of the sky) as its brightest star.

In the northeast you can see Ursa Major, the great bear. Part of the group forms the familiar "Great Dipper," with the handle extending almost down to the horizon. The "pointers" indicate the direction

of Polaris, the pole star, in Ursa Minor, the little bear, to the left.

Near the horizon and toward the east is part of Leo, the lion, with Regulus. Although this is a star of the first magnitude, its low altitude, with increased atmospheric absorption of its light, makes it look much fainter. This is also true—to an even greater degree—of Deneb, in Cygnus, the swan, just above the northwestern horizon.

Looking ahead to see what 1965 has in store for us in the skies, we find that one of the features is an approach of the planet Mars. Now rising late in the evening, it will come up earlier and earlier until March 9 when it will be directly opposite the sun. Then, of course, it will be visible all night, rising at sunset and setting at sunrise.

About the same time it will make its closest approach to the earth of this trip around the sun. Its minimum distance, on March 12, will be 62.1 million miles. Such approaches of Mars, which come about every two years and two months, vary considerably in distance and this will be a poor one. In the future each approach will be closer than its predecessor, until August 1971. Then Mars will be only 35 million

miles away—offering astronauts a good opportunity for inspection.

Jupiter will continue to be prominent in the evening sky until May. On the 30th it will pass behind the sun and after that it will become prominent in the east just before sunrise. By autumn it will be visible in the evening and on Dec. 18 it will be opposite the sun, shining all night.

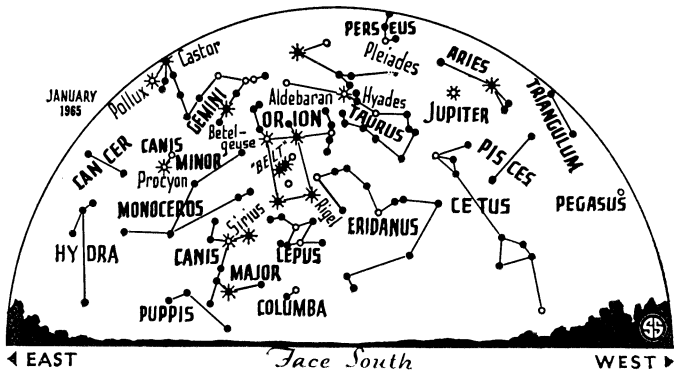
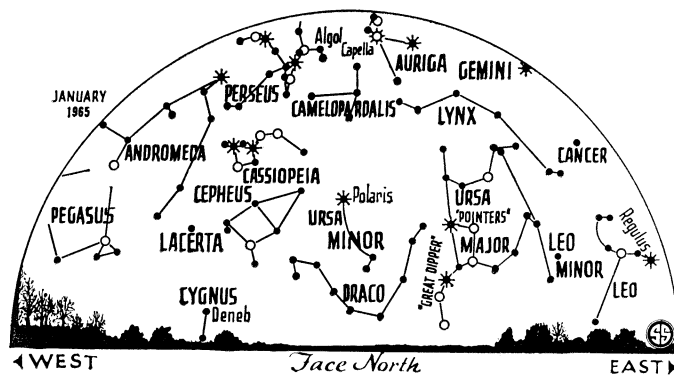
## Saturn to Disappear

Saturn will soon disappear from view, for it passes behind the sun on Feb. 26. Then it will become a morning star, shining in the east before sunrise. By summer, it will again be prominent in the evening.

Venus, now a brilliant morning star, will be in superior conjunction with the sun on April 11. By midsummer it will be visible easily in the evening, and will increase in brightness until it reaches its maximum on Dec. 21. This will make it a conspicuous Christmas star.

Mercury, which is seldom seen, will be at its best position for evening viewing about March 21 as spring commences. The end of September will be a good time to see it in the morning sky at dawn.

The sun's apparent annual movement around the sky, which is really due to the earth's motion around the sun, will bring it directly over the earth's equator on March 20 at 3:05 p.m., EST. This is the vernal equinox, the beginning of spring in



\* \* \* • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

the Northern Hemisphere, and of autumn in the Southern Hemisphere. The solstice, when the sun is farthest north and summer begins for us, will come June 21 at 10:56 a.m., EDT. Autumn will start Sept. 23, at 2:06 a.m., EDT, when the sun will again be over the equator. On Dec. 21, at 8:41 p.m. EST, it will be farthest south. Then winter will start here—and summer in southern lands.

There will be four eclipses in 1965, the most important a total eclipse of the sun on May 30. The path of visibility, about 150 miles wide, starts west of Auckland, New Zealand, then passes over the Pacific Ocean in a northeasterly direction toward the equator. It ends at the coast of Peru. At the middle of the path, the moon will obscure the sun for the unusually long time of 5 minutes 15.9 seconds. The islands along the path will be well populated with astronomers on that date. In Mexico, Central America and the northwestern part of South America, a partial eclipse will be visible.

A partial eclipse of the moon, on the night of June 13, will be visible in South America and the eastern part of North America. Nov. 23 will bring an annular eclipse of the sun, visible from southeastern Asia and many Pacific islands. Although the moon will pass in front of the sun, it will not entirely cover it. A ring of the solar surface will be visible around the dark lunar disc.

The year's last eclipse will come Dec. 8 but even where it will be visible, in Europe and Asia, you would hardly be able to see anything unusual. This will be a "penumbral" eclipse. That is, the full moon will enter the outer part of the earth's shadow—the penumbra—where our planet partially hides the sun. The moon will be a little dimmer than usual when full, but so much sunlight will still shine on it that the effect will hardly be noticeable.

## Celestial Timetable for January

JAN.	EST	
2		Earth nearest sun, distance 91,350,000 miles
	9:00 a.m.	Moon farthest, distance 252,600 miles
	4:07 p.m.	New moon
4	11:20 p.m.	Algol (variable star in Perseus) at minimum brightness
6	5:00 p.m.	Saturn passes north of moon
7	2:00 a.m.	Mercury passes north of Venus
	8:10 p.m.	Algol at minimum
10	4:00 p.m.	Moon in first quarter
12	noon	Jupiter passes north of moon
16	8:00 p.m.	moon nearest, distance 221,900 miles
17	8:38 a.m.	Full moon
21	10:00 a.m.	Mars passes south of moon
24	6:07 a.m.	Moon in last quarter
25	1:00 a.m.	Algol at minimum
27	9:50 p.m.	Algol at minimum
29	1:00 p.m.	Moon farthest, distance 252,400 miles
30	6:40 p.m.	Algol at minimum
	8:00 p.m.	Venus passes north of moon

Subtract one hour for CST, two hours for MST, and three hours for PST.

• Science News Letter, 86:406 December 26, 1964

# Books of the Week

Listing is for readers' information, not advertising. For convenient purchase of any book listed or any U.S. book in print, remit retail price (we pay postage) plus 25¢ handling charge if price is less than \$2 to Book Department, Science Service, 1719 N St., N.W., Washington, D. C. 20036.

**ALKYLATION WITH OLEFINS**—A. V. Topchiev, S. V. Zavgorodnii and V. G. Kryuchkova, transl. from Russian—Elsevier Pub. Co. (N.Y.), 306 p., illus., \$16. Monograph on Soviet petrochemical research addressed to specialists in organic synthesis.

**THE AMBIDEXTROUS UNIVERSE**—Martin Gardner—Basic Bks., 294 p., illus. by John MacKey, \$5.95. An exploration of symmetry and asymmetry in the human, animal and plant kingdoms, in the biological and physical sciences, and the "fall of parity."

**ANCIENT SCIENCE AND MODERN CIVILIZATION**—George Sarton—Univ. of Neb. Press, 111 p., paper, \$1. Reprint (1954).

**ANIMAL COMMUNICATION**—Hubert and Mabel Frings—Blaisdell Pub. Co., 218 p., illus., paper, \$2.50. Presents some of the concepts that are emerging from the scientific study of animals communicating with the aid of chemical, acoustical, tactile and optical signals.

**ANIMAL LANGUAGE**—Julian Huxley and Ludwig Koch—Grosset, 64 p., photographs by Ylla, 33 1/2 rpm record by Ludwig Koch, \$5.95. About the uses of animal sound, methods and evolution of sound production with record of actual sounds, and a description of their meaning.

**ANTHROPOLOGICAL PAPERS**: Numbers 68-74—Leo P. Biese and others—Smithsonian Inst., Bur. of Am. Ethnol. (GPO), 425 p., illus., 104 plates, \$2.25. Monographs range from prehistory of Panama Viejo to Iroquois mask making at Onondaga.

**ATOMIC MIGRATION IN CRYSTALS**—L. A. Girfalco—Blaisdell Pub. Co., 162 p., diagrams, \$3.75. Gives a descriptive account of diffusion processes in simple solids, in elementary terms.

**BENEFICIAL INSECTS**: Nature's Alternatives to Chemical Insecticides—Lester A. Swan—Harper, 429 p., photographs, illus., \$7.95. Describes how animal predators, parasites and insect diseases can be manipulated to give man control of civilization's pests.

**BENJAMIN RUSH**: Physician, Patriot, Founding Father—Sarah R. Riedman and Clarence C. Green—Abelard-Schuman, 253 p., photographs, \$4.50. Biography for young adults.

**BEYOND AUTOMATION**: Managerial Problem of the Exploding Technology—John Diebold—McGraw, 220 p., \$7.50. An analysis of the far-reaching implications of automation for the U.S. economy as a whole and for business managers in particular. Author projects advances in automation for the next decade and views social change as its most important by-product.

**BIBLIOGRAPHY ON COMPRESSION IGNITION ENGINE LOW TEMPERATURE PROBLEMS**—W. E. Meyer—Pa. State Univ., College of Engineering, 109 p., paper, \$3. Citations with abstracts.

**BIOLOGICAL EFFECTS OF MAGNETIC FIELDS**—Madeleine F. Barnothy, Ed.—Plenum Press, 324 p., illus., \$16. Brings together in one volume present-day knowledge gained in all the active fields of biomagnetic research.

**BIOLOGY OF TERMITES**: BSCS Pamphlet No. 17—E. Norton Miller—AIBS (Heath), 36 p., illus., paper, one of eight pamphlets per school year, \$4 annually. Curriculum enrichment reading in high school biology.

**BIRDS OF PREY OF THE WORLD**—Mary Louise Grossman and John Hamlet—Potter, Clarkson N., 496 p., 70 color photographs, 283 halftones, 646 drawings, 425 range maps, \$25. Authoritative text on hawklike birds and owls, both historical and scientific, with beautiful photography by Shelly Grossman.

**BRAIN-THYROID RELATIONSHIPS** with Special Reference to Thyroid Disorders—Margaret P. Cameron and Maeve O'Connor, Eds.—Little, 117 p., illus., \$1.95. A Ciba Foundation summary and discussion of recent research.

**CAN PSYCHOPATHOLOGY BE MEASURED?**—Joseph Zubin and others—N.Y. Acad. of Sciences, Annals, Vol. 105, Art. 15, 110 p., paper, \$4. Symposium papers focus attention on areas where measurement has been attempted, and discuss the problems and prospects of the biometric method.

**CANADA**: A Studio Book—Photographed by Peter Varley, introd. by Kildare Dobbs—Viking Press, 60 p., 176 photogravure plates, 8 color plates, \$12.50. Handsome portrait of contemporary Canada.

**CHEMICAL TECHNOLOGY**: A Suggested 2-Year Post High School Curriculum—Walter J. Brooking, Ed.—OE (GPO), 119 p., illus., paper, 70¢. Curriculum guide with course outlines, laboratory layouts and lists of textbooks and references.

**THE CHEMISTRY OF COMPLEX CYANIDES**: A Literature Survey—M. H. Ford-Smith—HMSO (Brit. Information Services, N.Y.), 93 p., \$5.50. A concise account of both less recent and the new work in this field, including chemical and physico-

chemical properties of complex cyanides and mixed complex cyanides, each element being treated separately.

**A CHEYENNE SKETCHBOOK**—by Cohoe with Commentary by E. Adamson Hoebel and Karen Daniel Peterson—Univ. of Okla. Press, 96 p., 12 color plates, photographs, \$5.95. Monograph printed on special paper, gives historical background to Cheyenne warrior's sketches unusually rich in detail.

**CHILD GUIDANCE**: Lawson G. Lowrey Memorial Volume—Simon H. Tulehnik, Ed.—Am. Orthopsychiatric Assn., 380 p., illus., \$8.50. Collection of representative articles devoted to children's problems, delinquency, reading disability, and treatment of behavior problems.

**CITIES AND SPACE**: The Future Use of Urban Land—Lowdon Wingo Jr., Ed.—Johns Hopkins Press, 261 p., illus., \$5.50. Essays from the 1962 Resources for the Future Forum on ways to foster policies to guide the growth and organization of cities.

**THE COMMUNICATION SYSTEMS OF THE BODY**—David F. Horrobin—Basic Bks., 214 p., diagrams, \$4.95. A specialist in neurophysiology presents in nontechnical language the principles behind the intricate network of nerves and hormones that feed perceptions to the brain which directs the body's activities.

**CONCISE DICTIONARY OF ATOMICS**—Alfred del Vecchio, introd. by Wernher von Braun—Philosophical Lib., 262 p., \$6. Intended as a simplified ready-reference for the practising engineer, student and teacher.

**THE CONQUEST OF THE MATERIAL WORLD**—John Nef—Univ. of Chicago Press, 408 p., \$8.95. Essays portraying the historical process which led the Western civilization into industrialism, focusing upon the two centuries of European history from 1450 to 1640.

**CONSERVING AMERICAN RESOURCES**—Ruben L. Parson—Prentice-Hall, 2nd ed., 521 p., illus., \$8.95. About the state of American natural resources and what the citizen can do to ensure their beneficial use.

**THE CRANBROOK ATOMARIUM**—Cranbrook Institute of Science, 29 p., photographs, paper, \$1. Following the pattern of the atomarium in Stockholm, Sweden, this booklet describes the demonstrations of the new museum displays at Cranbrook which explain some of the phenomena of atomic and nuclear physics.

**CRYOGENICS**—Richard J. Allen—Lippincott, 160 p., illus., \$3.95. An introduction to the new science and technology of very low temperatures, for the general reader.

**DANGEROUS TO MAN**: Wild Animals. A Definitive Study of Their Reputed Dangers to Man—Roger A. Caras—Chilton Bks., 433 p., photographs, \$10. Includes technical appendices on treatment of injuries, rabies, rattlesnakes, shark attacks, bibliography.

**DIET AS A FACTOR IN LENGTH OF LIFE AND IN STRUCTURE AND COMPOSITION OF TISSUES OF THE RAT WITH AGING**—Mildred Adams—GPO, 108 p., paper, 70¢. Report on results of extensive investigations.

**DIFFERENTIAL EQUATIONS**—Shepley L. Ross—Blaisdell Pub. Co., 594 p., diagrams, \$10. An introduction to the basic methods, theory and application of differential equations.

**DOG PSYCHOLOGY**: The Basis of Dog Training—Leon F. Whitney—Thomas, C. C., 327 p., photographs, \$10.50. Explains to dog owners what psychologists have learned and how to apply these findings in training dogs.

**THE EARTH BENEATH US**—Kirtley F. Mather—Random House, 320 p., 240 photographs (116 in color) by Josef Muench and others, \$15. A geologist's fascinating view of the earth, dealing with the external and internal forces that constantly change the surface, illustrated with superb photographs from the far parts of the globe.

**EFFECTIVE USE OF THE SCIENCE CITATION INDEX**: A Programmed Text—Institute for Science Information, 52 p., paper, single copies free upon request direct to publisher, 325 Chestnut St., Philadelphia, Pa. 19106. Specifically designed to facilitate maximal use of the quarterly cumulative SCIENCE CITATION INDEX.

**ELECTROMAGNETIC FIELDS AND INTERACTIONS**, Vol. I: Electromagnetic Theory and Relativity. Vol. II: Quantum Theory of Atoms and Radiation—Richard Becker; Fritz Sauter, Ed., transl. from German by Ivor de Teissier—Blaisdell Pub. Co., 439 p., 403 p., diagrams, \$9.50 each. Expanded revision of eighth edition published in 1930.

**ELECTRONIC PROCESSES IN IONIC CRYSTALS**—N. F. Mott and R. W. Gurney—Dover, 2nd ed., 275 p., diagrams, paper, \$2. Reprint (1948).