Mr. Charles Y. Johnson, who heads the Astronomy Section of the Hubert Center for Space Research, Naval Research Laboratory, is guest speaker for our January meeting. Mr. Johnson has been with N.R.L. since 1942, when he was stationed there as a Naval officer. Following the war, he transferred to a scientific position in a civilian capacity. Mr. Johnson is a native of Washington, D.C. and was educated at the University of Virginia, where he received a B.S.E.E. degree. His interests turned skyward in 1953, when he began doing work in astronomy. His primary interest has been the ion composition of the earth's ionosphere, which is being studied primarily with rocket-borne instrumentation. An abstract of his talk follows:

Visible and radio windows in the earth's atmosphere permit astronomical measurements to be made in two narrow bands of the electromagnetic spectrum. To see ultraviolet and X-radiation from the sun and stars, instruments must be taken above the absorbing atmosphere by sounding rockets and artificial satellites. Some of the new rocket techniques for ultraviolet and X-ray astronomy and their results will be described.

When ultraviolet and X-radiation, primarily from the sun, interact with the tenuous upper atmosphere, dissociation and ionization occur. The discipline which studies these phenomena is called aeronomy. The basic processes which produce, sustain, and destroy the ionosphere are known. The lower ionosphere is different in both composition and structure from the atmosphere in which it is immersed, and from which it was produced. Ionic processes are responsible for this condition in our planetary atmosphere.

ROCKETS, ASTRONOMY, AND AERONOMY

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The English astronomer William Herschel discovered the planet Uranus on March 13, 1781 using a 6-inch reflector. Our December speaker, Dr. Dennis Kalina, of the College of Notre Dame in Baltimore, reminded us of this great event in astronomical history and went on to relate other fascinating facts in the annals of planetary discovery.

Uranus had been observed and its position recorded no less than 21 times over a period of nearly a century prior to Herschel's discovery. Herschel recognized Uranus as a non-stellar celestial body by using up to 1,000 power and observing its pale greenish disk. Actually at first he thought he had discovered a comet. The first to sight Uranus was John Flamsteed, the first Astronomer Royal of Britain, who recorded the planet as a star in Taurus in December 1690. Flamsteed was engaged in a 30-year program of cataloging the positions of 3,000 naked-eye stars. He observed and charted Uranus several other times later in Leo and Virgo.

Bode's Law predicted a planet with a mean distance from the sun between that of Mars and Jupiter, namely, 2.8 astronomical units. Since Uranus had a mean distance in satisfactory agreement with Bode's Law extended, credibility in this law increased after this planet's discovery, and astronomers searched for a planet beyond Mars with renewed enthusiasm.

On the first night of the nineteenth century the Sicilian astronomer, Piazzi, discovered the minor planet Ceres and observed it for two months early in 1801 until it faded in the western twilight. There was danger that Ceres would be lost because of the short period of observation, but the German mathematician Gauss developed the powerful "least squares" method of fitting data and predicted the future position of Ceres to within a quarter of a degree nearly one year in advance thus making its rediscovery possible.

Gauss discovered the second minor planet Pallas in March 1802 and the fourth, Vesta, in 1807. - Harding discovered the third, Juno, in 1804. . . . more asteroids were discovered until 1818 when Astraea was sighted. Thereafter discovery came fast and by 1868 the known minor planets numbered one hundred. By this date these bodies had become somewhat of a nuisance since astronomers had to track them all as modern space scientists now have to keep track of space junk circling the earth.

Leith Holloway

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FROM HERE & THERE... Cont'd, from p.2

The DAS bulletin has been carrying a series of articles on their trip to South America to see the eclipse last year. (DAS, Detroit Astronomical Society.) Bob Wright attended the fall meeting of the AAVSO held in Springfield, Mass. The Messenger from the Sky is the publication of the AAS (AMERICAN ASTRONOMICAL SOCIETY). This is the very active Junior group of the Lehigh Valley Astronomical Society.

Bob Bolster had a hearing with the City Fathers and they have given their blessing to his new Observatory. We hope it is clear skies from here on.

NEXT MONTH...We will be fortunate in having as a guest speaker for February Dr. Joseph Weber from the University of Maryland, who will describe experiments now in progress for detection of gravity waves.

NEW MEMBERS...

Applications Received at the December Meeting

REGULAR
Major Jimmy D. Akers
1600 7th St. N.W.
Washington, D.C. 20001

PETER FIECKOWSKY
545-39th St. N.W.
Washington, D.C. 20015

ROBERT HICKS
3200 21st Road S. #1125
Arlington, Virginia 22206

John Spiegel
21-62 Evans Corner Road
Falls Church, Virginia

A Bulletin from the Midland Empire Astronomy Club of St. Joseph, Mo., tells of their recent participation in a successful Grazing Oscillation in Kansas. Several members of the Naval Observatory team drove to Missouri for this event. Mr. Russ Maag, President of the group attended the National Convention in Washington this past summer and was appointed to chair a committee to make plans for the Astronomical League's participation in the 1970 eclipse of the sun in Florida in 1970.

--- Continued p. 7
POLISHING...

Two ideas are presented here for making polishing laps which are certainly not new, but perhaps have not come to the attention of our local mirror makers.

Anyone who has read Everest's (Amateur Telescope-making, XII), and has attempted to construct one of his hard pitch laps has no doubt found that initially attaining contact can be a bit of a struggle, especially with a deeply curved surface. A really hard lap seemingly resists cold-press, although it will flow enough to keep contact once it has been correctly formed.

One way to ensure contact from the very start is to pour the pitch onto the face of the mirror. To keep the pitch from sticking, the mirror is first smeared with glycerin and then covered with a sheet of waxed paper. A paper ring about 3/8 of an inch high, and just larger than the mirror, is centered on the mirror to keep the melted pitch from running off. The tool is treated with turpentine, for the opposite effect, and is pressed down onto the melted pitch immediately after pouring. As soon as the pitch hardens, the mirror is slid off the waxed paper, and the waxed paper peeled from the face of the lap. There may be a few shallow wrinkles and bubbles in the lap surface; these do no harm. The irregular edge of the lap is then chipped away and channels formed with a sharp, single-edged razor blade.

The job of channeling, though messy, is not difficult so long as a sharp, clean blade is used. The blade is firmly pushed into the pitch at about a 60° angle (see diagram) to the surface, and is moved slowly over the chip to be dug out. By working on opposite sides of the channel, with ever-deepening cuts, one can completely avoid the chips in facets so characteristic of hard laps. The job may require two or three new blades, since wearing is rapid.

"HCF," which is telescope-cut language for honeycomb foundation used by bee keepers, finds its use in one kind of polishing lap. It has met with both high praise, because of its ease in use and freedom from contact problems, and utter condemnation, because it does have some serious drawbacks. Before going further, perhaps we should stop and enumerate some of these drawbacks.

The hexagonal pattern in the sheet of HCF leaves severe micro-ripple in the glass (see diagram). It is used to make a "gap" in the polishing lap. Criteria are the extremely rapid polishing; it has less control over the polishing action. Worse still, the rapid polishing action creates a "dog-biscuit" (over and above the fine micro-ripple) or lemon-peel effect easily seen with the Foucault test. Needless to say, it would be foolish to try finishing and parabolizing a mirror with HCF.

However, there are uses to which HCF can safely be put. I have seen a ten inch mirror which was completely polished to the edge in three hours with cerium oxide on an HCF lap. The figure was not pretty, but certainly not out of control. The edge was in fairly good shape; indeed, better than most pitch laps would achieve in all but a spell of very good polish. It is possible to shorten that dreary stretch between fine grinding and figuring.

Making an HCF lap is very simple. The tool is heated with hot tap water until it is uncomfortable to the touch. After it is dried, a plug of beeswax is rubbed on its surface, and then a sheet of HCF placed on top of it. The HCF is made to adhere by poking it in several, evenly-spaced places with the forefinger. As soon as the tool cools a bit, rouge or cerium oxide is applied in a thick cream, and polishing begins.