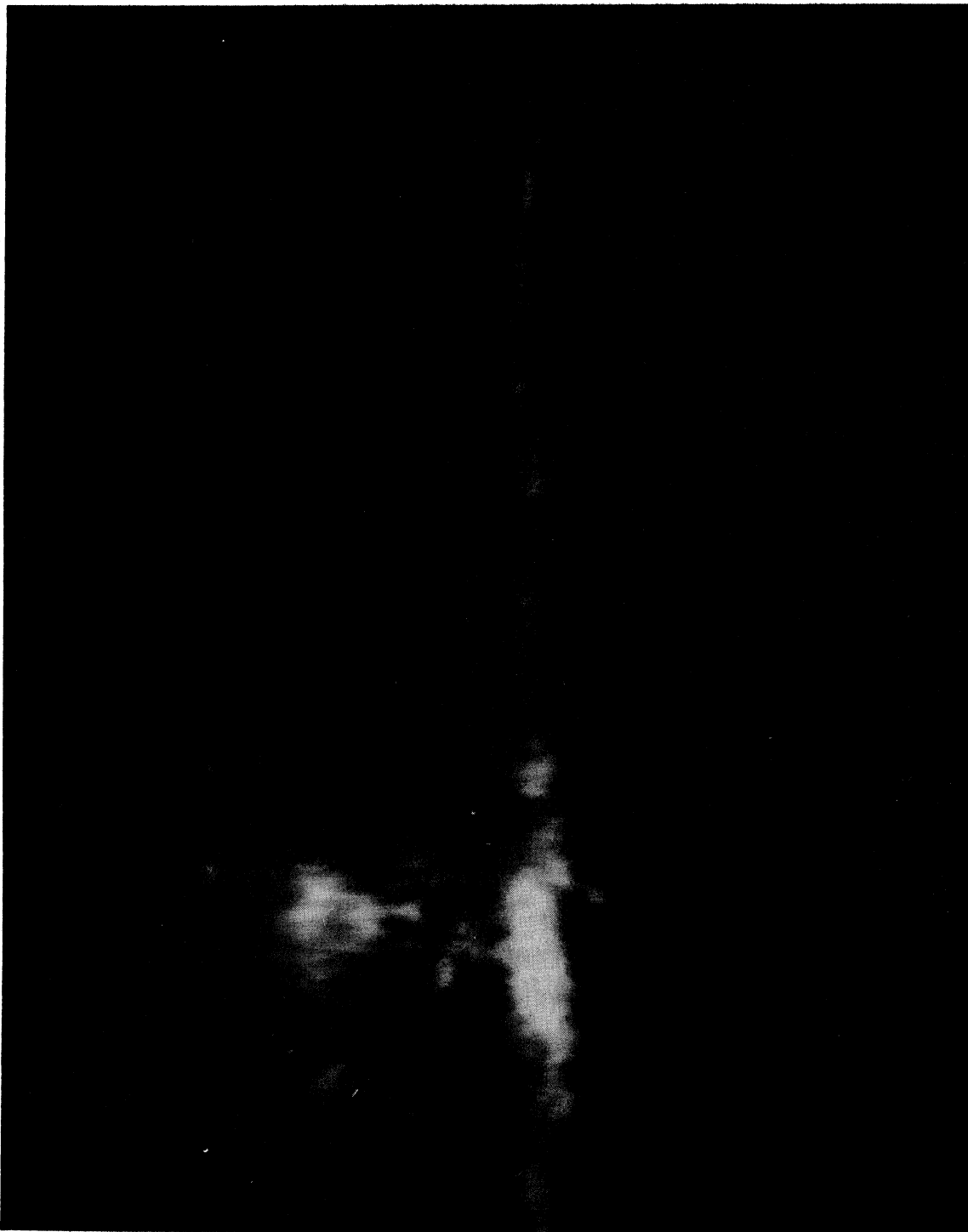


The O B S E R V E R

Vol. 14, No. 4

August 1973

Page 1



COMPUTER GRAPHICS

Story on Page 3

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A special thanks to all of those who helped assemble the OBSERVER.

COMPUTER GRAPHICS

Tom Cram

I have often heard the question asked: "What happens to the data in Charlottesville?". Answers have ranged from "mathematical games" to discussions on slow vs. fast Fourier transforms, but few talk about how the data is presented to the observer or to his reader. I would like to take a few pages here to describe some of the problems and their solutions in computer graphics.

Our tools are line printer and Calcomp plotter. The line printer is essentially a very fast typewriter (~25,000 words/min or about 250 Phyllis Jacksons). The only difference is that the one we have has only upper case and can only roll down a page. The Calcomp plotter is a motor driven pen that accepts instructions from a computer. You might say the Calcomp plotter is a mechanical Peg Weems or Tony Miano, but incredibly faster, although incapable of correcting mistakes.

The line printer is our most used - but least liked - display device. It serves us well for simple problems, like tables of numbers, but leaves much to be desired in complicated displays. For example, Figure 1 shows a picture of a graph produced by a line printer of a spectrum taken with the 140-foot. This is an

easy problem; the observation consisted of two dimensions: frequency and intensity, which were coded into position across and up the page. A harder problem is a three dimensional graph: making a map of intensity vs. frequency and position. Figure 2 is a solution of this problem using the line printer. Posi-

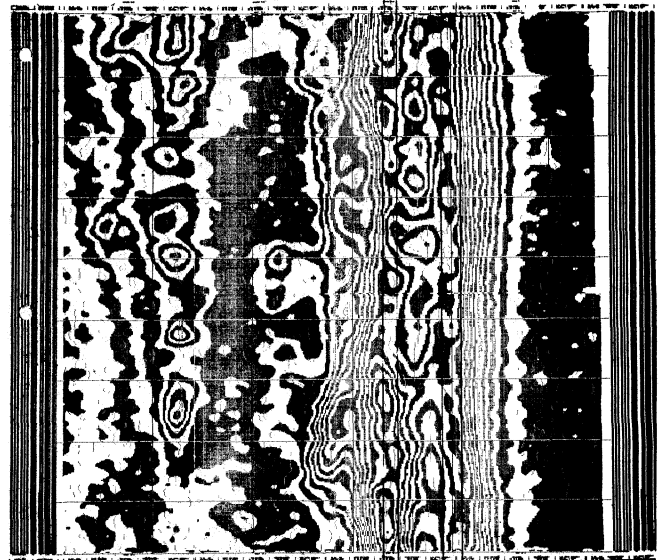


Figure 2

tion on the sky is translated to distance along the page, frequency to distance across the page, and intensity into a series of characters that change with intensity--every other character being blank to help follow the levels. Unfortunately for the observers, the problems are even more complicated: intensity and frequency vs. two positions! I have not seen a useable printer plot for a four dimensional problem.

Similar problems are solved by using the Calcomp plotter, which is more versatile, and is more often used for publication. Figure 3 (page 4) is a display of the same data as Figure 1, but on the plotter. This type of display is more easily interpreted, but takes about 100 times longer to draw. Data points are connected by straight lines and if the data is well behaved, one dimension--usually height--can be used as both intensity and position as in Figures 4 and 5 (page 4). Another type of a three dimensional display is a contour map. Figure 6 (page 4) shows

--continued, next page--

NAME: TITAN 140M SYSTEM MODEL: 2 AC RECEIVER COMPUTER DATE: 730707 TIME: 11/26/73 VPKSEIN: 4.0
Z: DISCRETION: 23100 Z: 7.190 DO TSC DEL: MILD 7. MODE 2 REC A B C Z
DATE: TIME: 15.9 12.7 24 45 10.1 11 21 13.0 43 06 21 221.00 013400 140 OFF SCAN 0
LOCAL OSCILLATOR SETTINGS: LMI 2611.900092 0.12 0.000000 0.261 0.000000 L2F2 0.000000
STEEPER: CNER: FREQ: 1421.00835 1420.40560 -1.23796 1.334 1.334 1.553 -1.23796
A 6411-193
APPARENT: 1950 GALACTIC TSYS RANGE: 1.25000
A 11 21 13.0 43 06 21 165.82 62.05 47.91

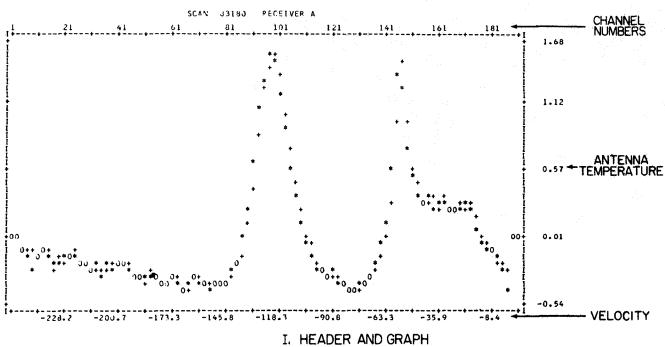


Figure 1

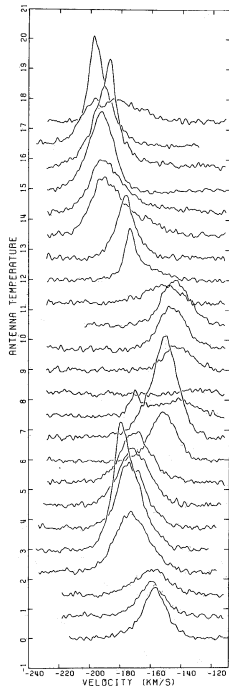


Figure 3

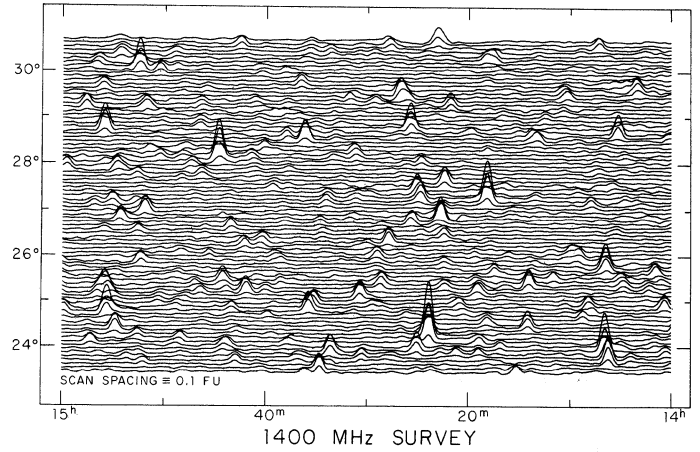


Figure 4

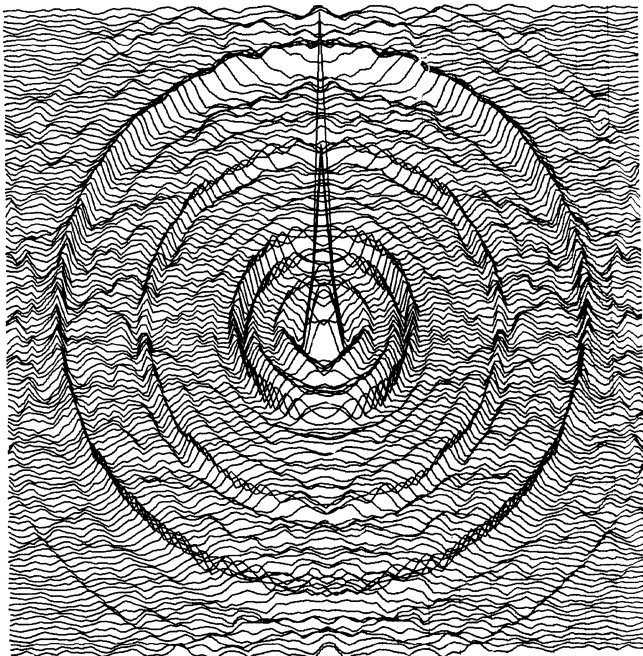


Figure 5

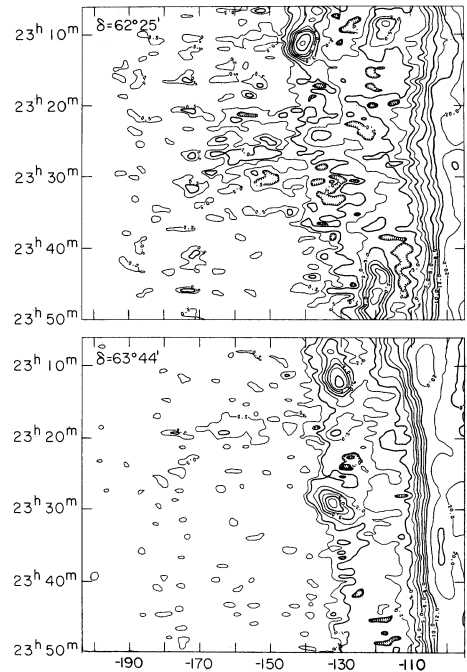


Figure 6

--continued, next page--

a typical contour map where points of equal intensity are connected by smooth straight line segments. We have software (purchased from Calcomp) that makes four dimensional views, but the computer time is so large that it is seldom used.

A new device, a storage Cathode Ray Tube (CRT) has been added recently to the computer. This allows the computer to make a picture like many of the drawings here, but in only seconds. The user has a keyboard so he can communicate with the machine. The advantage of this machine is that the user can interact with the program, and see how different data reduction methods change his data in minutes, not hours or days. Figure 7 shows three pictures drawn on the CRT. A similar CRT display device will be installed at the 140-foot late this year.

The best information display device that I know of is a motion picture. We don't have such a device, but we are planning to purchase a device that can construct pictures from the data collected from the Green Bank telescopes. An example appears on the front and back covers. The front cover is a picture of a thin slice of 21 cm gas looking at longitude 75°. The displacement being positioned above and below the planes. The original negative has over 200 different levels of gray corresponding to intensity.

The back cover is the same data broken up into 16 equal steps and displayed with every other level black. This is similar to the printer plot shown in Figure 2.

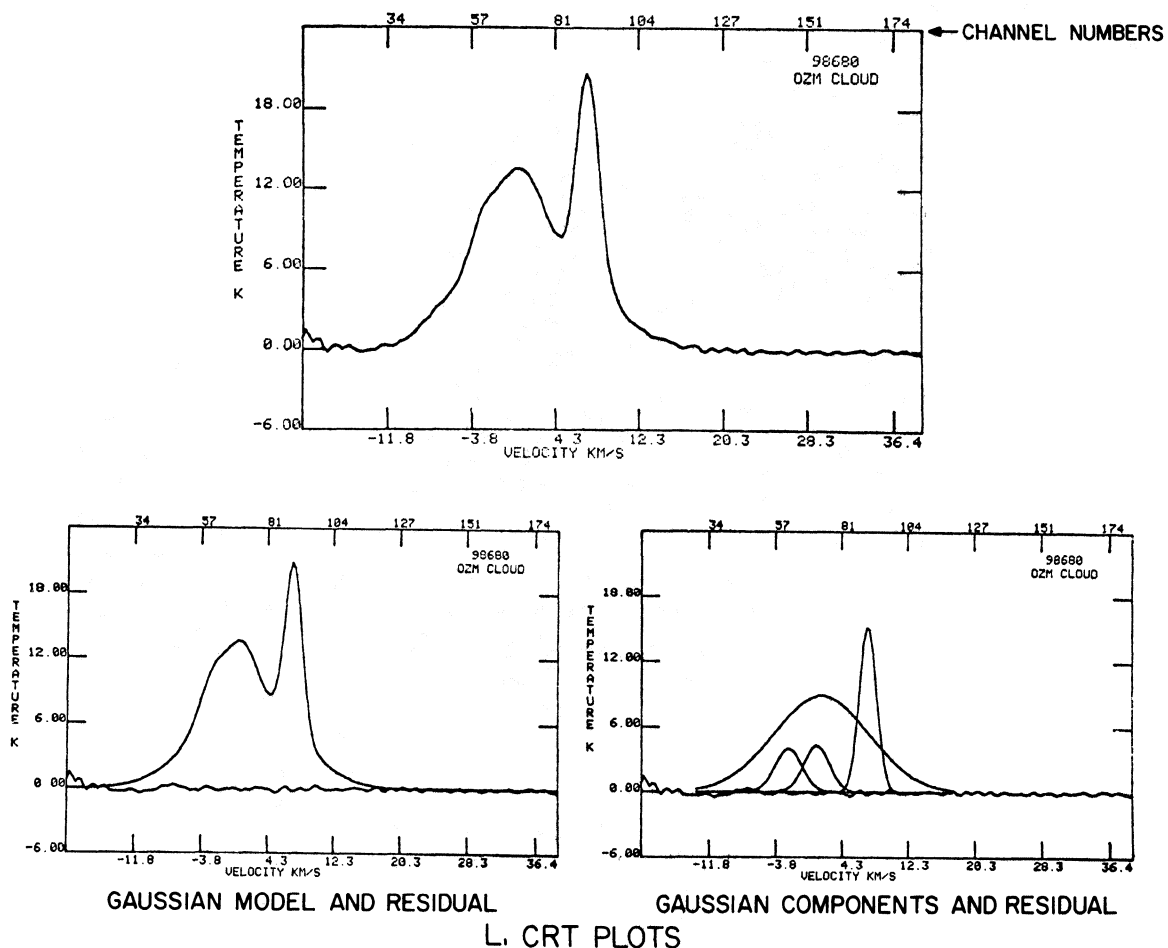


Figure 7

AS THE WORLD TURNS

Connie Philipot*

While countless housewives are concentrating on the CBS afternoon drama, AS THE WORLD TURNS, many are unaware that they are part of another turning world, which may or may not transcend the pettiness of the soap opera. Unlike the T.V. show world, the real world cannot be defined and analyzed, and when it becomes boring, it can't be switched to another program.

For seventeen or eighteen years, we have been living in the large world, but our lives may have been more like those in the soap opera, concerned only with what is immediately around us. We may not have bothered to notice the events, changes and trends in our total far-reaching environment. Now at graduation we have been pushed out of our old delusions and high school daydreams into a world about which we may know little. We might pause and wonder what we are entering into: what place is this where we will have to work and support ourselves; what kind of time is this to develop as an individual?

These questions can be foreboding, especially when we realize how fast this world is turning. New inventions can almost completely revolutionize our economic system. Only one modern device is needed to create new industries and make others outdated. An example in the past thirty years is the television, which has grown from a luxury to a near necessity and has led to the decline of a once booming industry--motion picture production. Technological advances made in this decade will probably be obsolete methods in the next, and persons whose training does not keep pace will be left behind. As an illustration of the power of change, think about the lifestyle of the turn-of-the-century--about which you may have read--before the plane, automobile and space travel. In seventy years, there has been much change, more change than has been made in any preceding seventy-year period. Just in the field of transportation there have been amazing developments. From the Wright Brothers' twelve-second flight has come airplane travel faster than the speed of sound. Less than two decades after Sputnik, the first space vehicle, man has walked on the moon. One only has to look at the congested highways to realize the rapid growth of the automobile.

To make adjusting to this fast world even more difficult, are the rising questions about the merit of quick progress. Until this time, man has heralded progress as the sole goal of life and has not doubted whether it was worth all the sacrifices involved. Today, people are pointing to the environmental disruption, generation gap, educational problems and poor race relations and verbally announcing their distrust of a new system which can launch men to the moon but can't solve sociological ills.

A major problem of a technological society is something which sociologists refer to as cultural lag. The part of life which is apart from - but definitely dependent on - business, science, and industry, has not kept up the progress made in those fields. People are finding that many of their values, morals, and goals are obsolete in the new world. To solve this, there is a trend towards totally different lifestyles. The liberation of different groups in our society, communal living, the liberal acceptance of previously taboo subjects and radical cults are new ways of living which are often too much of a change for the bewildered public. As we approach the point where we will have to make decisions about how we want to live, we will have to decide which factors of the old society, and which of the new, we want to incorporate into our own individual lifestyle.

Some of us may decide that we must tackle the job of social reform. The reformers will be confronted with an obstacle that is a growing element in America today--apathy. A lack of caring, of concern with what is happening in the world seems to have stricken Americans. They may have realized that their lives should be better, that perhaps the media and the government aren't telling them everything, that money is being wasted and people are in need, but they aren't doing anything about it. Content to simply sit and complain, they refuse to improve.

The saddest part about this is that it is occurring in a country where there should be no reason for apathy. In a dictatorship, an unwillingness to work could be understood because all efforts would be futile. In America, however, our governmental system allows us to work for change, but Americans are ignoring this right. If our democracy is destroyed, the cause will not be facism, communism, hippies, or pot, but apathy.

--continued, next page--

To listen, learn and evaluate is our job. We must listen to all sides, learn the most about this turning world, consider what will produce the best results, then act. Now, is our only opportunity to prepare ourselves for how we will live in the world of tomorrow.

*Speech given by Miss Phlipot to 1973 graduating class of Midview High School, Elyria, Ohio.

A SCIENCE CAMP FOR GIRLS

Wally Oref

Through the walls I've heard rumors that a girls' science camp might be started. The purpose of the camp would be to honor outstanding female high school science graduates. This camp would be patterned after the existing boys' camp but with some modifications to suit girls.

The girls would assemble at Camp Pocahontas shortly after the boys' camp ends, and the girls' camp would run for the same length of time. Science lectures would be similar to the boys' with probably the same lecturers. Extracurricular activities would be modified to suit females. Some upgrading of the premises would be in order with maybe a new building and some repairs and modifications to some of the others.

As they now do for the boys, the governors of each state would select their two most outstanding female science students. Presumably every state already has a fair and equitable mechanism for selecting their most outstanding science graduates.

How much chance of success would a girls' science camp have? I'd say as much as the first boys' science camp had. One favorite argument against a girls' camp is the one that says females are much too city oriented and too convenience happy to withstand the rigors and inconveniences of a rural science camp. And we could go on and on from there.

Personally, I think the idea of a girls' science camp similar to the present NYSC is a good one and warrants serious consideration. Furthermore, I feel certain that the county, the NRAO, the state of West Virginia, and the girls would all benefit from such a camp. Other states have made minor overtures in this direction but West Virginia is in the best position to make it a reality. Establishing the present

boys' camp back in 1963 was a big step but a girls' camp would be even a bigger one.

I'm taking names for lecturers and tour guides for the first girls' science camp. One stipulation though: the lecturers and guides for the girls' camp also must be the lecturers and guides for the boys' camp.

TENDING THE GRAPEVINE

Employers who hope to conceal such impending changes as layoffs, work cutbacks and personnel shifts might just as well give up: the word will get to their employees on the company grapevine. So concludes Keith Davis, a professor of management at Arizona State University, who has been studying office and factory rumors for 20 years. "With the rapidity of a burning powder train," Davis asserts, "information flows out of the woodwork, past the manager's door and the janitor's mop closet, through steel walls or construction-glass partitions." Moreover, rumors are accurate.

According to Davis, people underestimate the reliability of the grapevine because its misses are more dramatic than its hits. That was the case, Davis says, when a factory grapevine reported that a worker had lost his hand in a machine-shop accident: in fact he had suffered only minor cuts on two fingers. But even inaccurate scuttlebutt may convey a psychological truth, because many rumors are "symbolic expressions of feelings." If rumor says that Joe is quitting, this may mean that his associates wish he would quit, or it may reflect a general--but sometimes unconscious--awareness that Joe desperately wishes he could quit.

Whether it spreads truth or falsehood, whether it transmits "smoke signals, jungle tom-toms, taps on the prison wall or ordinary conversation," a grapevine is bound to develop wherever people congregate. But employers can keep false rumormongering at a minimum by telling the truth and telling it early. Increasingly, Davis reports, wise managers are trying "to feed, water and cultivate the grapevine" themselves. They may as well, Davis concludes, because the grapevine "cannot be abolished, rubbed out, hidden under a basket, chopped down, tied up or stopped. It

--continued, next page--

is as hard to kill as the mythical glass snake which, when struck, broke into fragments and grew a new snake out of each piece."

FIRST FRINGES FROM HUNTERSVILLE

Bruce Balick

Green Bank, W. Va. July 10. The first fringes were obtained last night (July 9, 1973) using the new long baseline radio link interferometer. The fringes were first found at about 10 PM while a very intense source, 3C 273, was being observed. Soon afterward, fringes from other less intense sources such as BL Lacertae, 3C 345, and 3C 454.3 were also seen.

The long baseline used, 35 km (about 21 miles), will enable the study of sources on the 2.7 km (1.6 mile) interferometer on site. The size of details which can now be studied, that is, the resolution, is approximately $0''.2$, or the apparent size of a quarter at a distance of 16 miles. This resolution is approximately 15 times greater than that possible on the 3-element interferometer ($3''$), and about 1000 times greater than the 140' or 300'.

Observations on this baseline will aid in the interpretation of very long baseline observations (whose resolutions are much higher) by filling in gaps of information obtained by VLB and more conventional instruments. In addition, the radio link system has much better sensitivity than VLB observations so that moderately high resolution studies of very faint sources will be possible. Another advantage of this interferometer system over VLB systems is the relative ease with which accurate positions of sources can be determined.

The system has been 3 years in design and construction. The movable 45' telescope arrived in Green Bank early last fall, and was assembled and tested through the winter. At first it was situated near the gate near the Works Area, and fringes on this short baseline were obtained late in the winter. The telescope was moved to its present site near Huntersville in early June. Because of the length of the baseline, a radio communications link rather than cable is used to send control instructions to the remote site and astronomical radio signals back to the control room in Green Bank.

Several technical problems still exist.

The worst is a rather unexpected hill near Dunmore which is situated in the path of the radio link. This hill causes 99.9% of the link power to be lost. Plans are underway to raise or move the 150' tower near the interferometer control room to alleviate the loss of power. In spite of this problem, sufficient signal is received at both sites to operate the link and obtain the fringes.

Proposals to use the link have been submitted, dating back 3 years or more, by various astronomers. According to Dave Hogg, who is responsible for scheduling the interferometer, at least 3 months of time have been requested amongst the various proposals, and more can be expected. The first experiment is scheduled in late July by Bruce Balick and Bob Brown to search for unexpected hot sources of emission found in the galaxy on the old and much weaker 42' radio link system by George Miley and collaborators. Other experiments are scheduled through the fall.

Participating in last night's efforts to obtain fringes were Ed Fomalont, Bruce Balick, Dave Hogg, George Conant, Jim Coe, George Grove, Bill Meredith, and operators Don Nelson and Duane Sizemore.



First Fringes From 45' Telescope

ECLIPSE '73

written on board S.S. Canberra
July, 1973

G. L. Verschuur

I

TRIPODS
HEAVY ONES, FEATHERY ONES
WOODEN, METAL
CAST IRON PIPES
ALUMINUM BARS
ELEGANT, UGLY
SOLID, DELICATE
ALL SIZES
BEARING, PROUDLY, FIRMLY
(BUT SOMETIMES SO SHAKY)
THEIR OWNER'S
TELESCOPES
INVENTIONS
CAMERAS

KEYSTONE, MINOLTA, SEARS, EXA
NIKKOR, EURIG, BELL AND HOWELL
BESSELER, OLYMPUS, GAF, ARGUS
KODAK, QUESTAR

ONE TRIPOD BEARS THREE
ANOTHER FIVE, EVEN SEVEN
UNGAINLY, ELONGATED CLUSTERS OF GLASS
AND METAL
TO GUIDE, BEND, CONTROL, FOCUS
IMAGES THAT WILL BE MOMENTARILY
REVEALED TO MAN AFLOAT

AND ON DECK
TERRITORIAL IMPERATIVES
AND INSTINCTS ACT
AS EACH STAKES CLAIM
TO A RECTANGLE, A TRIANGLE
A SQUARE OF SURFACE MARKED OFF WITH
STRING, ROPE, CHALK, MASKING TAPE

THE DAY DAWNS
THE SUN HIDING AT FIRST
WHILE RISING SLOWLY OUT OF THE GLOOM
TO IT'S PREDETERMINED RENDEZVOUS
WITH THE MOON
ELEVATION 49 DEGREES
THEY SAY

BURN SUN, BURN
DRIVE THE CLOUDS ASIDE SO WE CAN SEE
AND WE ALL HOPE AND WAIT
KNOWING THAT OUR VOYAGE WILL NOT HAVE BEEN IN
VAIN

THE DECKS LIVE WITH
OLD PEOPLE, YOUNG PEOPLE
PRETTY GIRLS, LITTLE BOYS
BERMUDAS, JEANS, SANDALS, SHOES OF
ALL SIZES
A MAN HERE, WITH WHITE GLOVES
ADJUSTING A SCREW
ANOTHER CHECKING A PLUMBLINE
DANGLING OVER AN 'X' OF TAPE

GROUPS GATHER
NO, THESE ARE TRIBES
ON DECK
EACH LIVING IN ITS OWN COPSE OF TRIPODS

"THE ELGIN SHADOW CHASERS"
"WARREN ASTRONOMICAL SOCIETY"
"OLD SCIENTISTS, VAN NUYS, CAL"
"YOUNG SCIENTISTS, N.S.I., S.U.N.Y.A."
"I.G.P. TERRA"
(I.G.P. TERRA?)

LOOK!
AN INSTAMATIC
IN AN OLD LADY'S HAND
SHE'S STANDING BESIDE THE 100 INCH TELESCOPE
OR MAYBE IT REALLY IS A 14 INCH
AS THEY CLAIM
BUILT IN A GARAGE (PERHAPS)
TRANSPORTED WITH LOVING CARE
TO WITNESS WHILE ENVIOUS FRIENDS
WAIT BACK HOME

TENSION GROWS
THE HOLE IN THE CLOUDS GROWS

BURN SUN, BURN

AND T-SHIRTS
WITH
"ECLIPSE '72"
"ECLIPSE '73"
"DAKAR"
"ANTIGONISH N.S."
(ANTIGONISH N.S.?)
FOR LUCK, NO DOUBT

--continued, next page--

BURN SUN, BURN
THE HOLE GROWS
THE CLOUDS THIN

BUT THERE IS DUST UP THERE
25 MICRON PARTICLES, NO DOUBT ABOUT IT
YESTERDAY THEY MEASURED IT, YOU SEE!

PEOPLE EVERYWHERE NOW
ATTENDING TO USELESS NECESSITIES
A PHOTOMETER CALIBRATION CHART
STUDIED CAREFULLY
AND HERE SOMEONE, SEATED
EATS BREAKFAST
OF EGG, TOMATO AND BREAD
COVERS IT TO KEEP IT WARM
WHILE HE CHECKS THE CLOUDS
AND SHE BRINGS HIS COFFEE

BURN SUN, BURN

AND HERE A RADIO CONTROLLED CAMERA--
PERHAPS A FRIEND IN THE U.S.A.
WILL DRIVE THIS ONE?--
OH NO, THERE IS THE TRANSMITTER
BESIDE IT
ON THE DECK!

WE LISTEN
SORTING OUT FROM THE HUB-BUB
A BRIEFING OF THE CLAN
"I'LL YELL OUT BAILEY'S BEADS
THEN YOU SNAP IT"
"ENOUGH STUFF HERE FOR SEVERAL PAWNSHOPS"
"CRANK IT UP ONE NOTCH AND TAKE FIVE"
"ANYBODY HAVE ANY MASKING TAPE?"
YES, LADY
IT'S ALL OVER THE DECKS
GO AHEAD, HELP YOURSELF
IT'S ONLY SOMEONE'S BOUNDARY FENCE

HERE'S A MAN WITH 16 BOXES OF FILM
36 EXP. EACH!
AND ANOTHER REPORTING
TO A TAPE RECORDER
HIS PROGRESS
CONNECTING HIMSELF
THROUGH TIME
TO THOSE IN THE FUTURE
WHO WILL LISTEN
TO THE REPORT FROM
"THE LARGEST ECLIPSE EXPEDITION EVER"

II

WE'RE AT
N 18° 48' W 21° 12'
IT'S 73° F
DID YOU KNOW

BURN SUN, BURN

THE SHIP LIES STILL NOW
LIGHTS ARE GOING OFF
WE FIND A FEW NECESSARY SWITCHES

AND THEN
WE WAIT

THE SUN HAS BURNT ALL IT COULD

EVEN A LATE PATCH THAT
THREATENED ALL
FADES AWAY

WE WAIT

A MESSAGE FROM OUR FRIENDS
1000 MILES AWAY
THEY SAW IT ALL
ON SCHEDULE!

CELESTIAL MECHANICS
PROVES ITSELF AGAIN
NO HOAX THIS TRIP
NO COMPUTER ERRORS
WE SEE IT TOO
THE MOON INTRUDING
ON SCHEDULE!

DARKNESS GATHERS
COOLS US OFF
WE'RE ALL READY
LOOKING THROUGH GLASSES
DARKENED
EYES ADAPTING

III

SUDDENLY
IT'S THERE

EYES OPEN
MASKS OFF

--continued, next page--

IT'S THERE

TOTALLY UNREAL

AT FIRST

THEN INTENSE
AN OVERWHELMING PRESCENCE
OF NATURE
LOOMS JUST ABOVE US
WE CAN ALMOST TOUCH IT

A TRANSITORY SPECTACLE
UNPARALLELED

STREAMERS OF IRREGULAR BLUE-WHITENESS
RADIATE FROM THIS PURE BLACK DISK
THAT WAS OUR MOON

A HALO
RADIATING POWER THAT FILLS US WITH AWE

HOW THE ANCIENTS MUST HAVE PROSTRATED THEMSELVES
IN FEAR
AND WORSHIPPED THE GOD THAT COULD CREATE THIS
MIRACLE
AND FOR CENTURIES AFTER
WE FOLLOWED AND FORGOT THE CAUSE

NOW WE SEE IT TOO
CAMERAS WHIRR AND CLICK
AND WE SEE VENUS, SATURN, ALDEBARAN, RIGEL

"A TOTAL PHYSICAL AND EMOTIONAL EXPERIENCE"
MIDWAY UP THE SKY
SUSPENDED
SO CLOSE
YOU CAN ALMOST FEEL ITS WARMTH
SPREADING OVER THE SKY
THE DUST HELPS TO FILL THE
HEAVENS WITH SOFTNESS

YOU ARE IN THE CATHEDRAL
OF THE SKIES AND WE UNDERSTAND MAN'S ATTEMPT
TO COMPETE WITH NATURE
WITH FLYING ARCHES
VAULTED CEILINGS
AND ILLUMINATED SCULPTURE
RADIATING DOWN ON US
OR HIS FLOCK
ALL PART OF MAN'S EFFORTS
TO COPE WITH THE ENORMITY
OF A SOLAR ECLIPSE
WHICH VISITS WITH UNEXPECTED
IRREGULARITY OVER SO MANY THOUSANDS OF YEARS

WE ARE ALL SUN WORSHIPPERS NOW
GATHERED TO WITNESS
AND TO MARVEL
DRAWN BY HABIT
OR BY HEARSAY

THE MINUTES HURTLE BY
TO LEAD US TO THE BRILLIANT BURST
THAT SHATTERS THE UNSUSPECTING SOUL
A DIAMOND OF UNEQUALLED BEAUTY
POURS FORTH ITS RADIANCE
WITH A SPLENDOR THAT PIERCES THE ATMOSPHERE
AN INTENSE, EMANATION THAT ROARS OUT
FROM THE SUN IN SILENCE SO TOTAL
THAT IT CHILLS THE SPINE

IT GROWS
AND GROWS
AND FINALLY
THE MASTERPIECE IS DESTROYED
AS THE SUN GROWS
TO ILLUMINATE US ONCE MORE
AND TO RETURN TO ITS CORNER
WHERE WE CANNOT SEE IT
ONLY BE AWARE OF ITS CALMING
PRESCENCE
AS LIFE GOES ON

IV

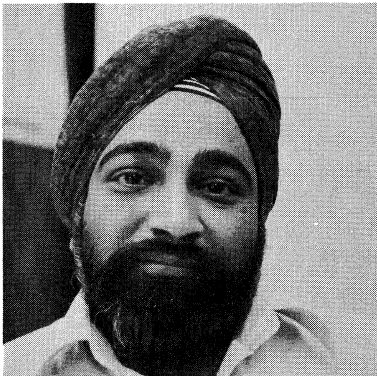
AND NOW THE MEMORY LINGERS
THE CORONA
SUSPENDED FOREVER IN OUR MIND
MIDWAY UP THE SKY

EVERYONE QUIETLY COMPARING NOTES
IN AWE
IT WAS WORTHWHILE
WASN'T IT?
TOUCH AND GO FOR A WHILE
WASN'T IT?
SUN BURNT THOSE CLOUDS AWAY
DIDN'T IT?

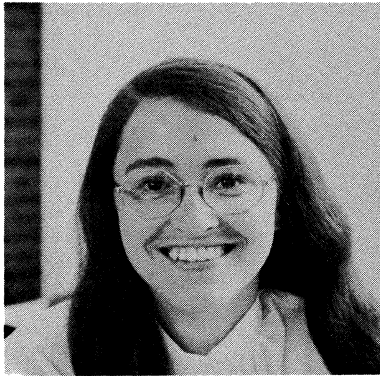
TAPE RECORDERS, REWOUND, REPLAYED
TO RELIEVE A LITTLE
WE CANNOT ALWAYS TRUST OUR MEMORIES
WITH SUCH ENORMITIES
WE NEED THOSE PHOTOS
AND TAPES
AND SLIDES
AND MOVIES

(HOW ELSE CAN WE BE SURE IT WAS REAL?)

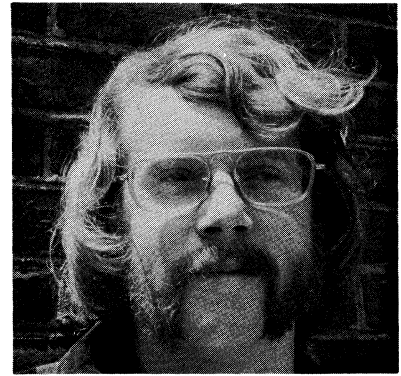
NEW EMPLOYEES



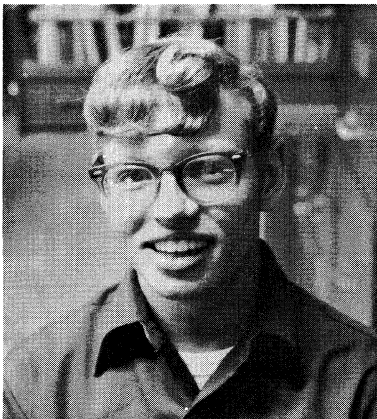
Surendra P. S. Anand
Vis. Asst. Scientist
Basic Research - CV



Mary E. Marvey
Receptionist/Tel. Operator
Business Mgr. Div. - CV



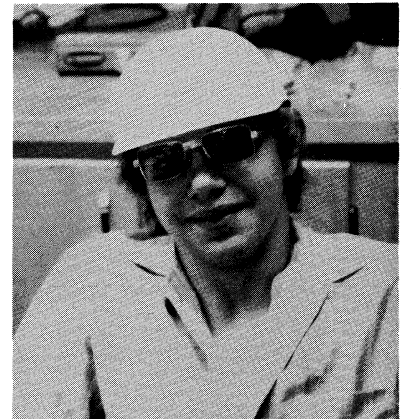
David L. Ehnebuske
Systems Analyst
Computer Division - CV



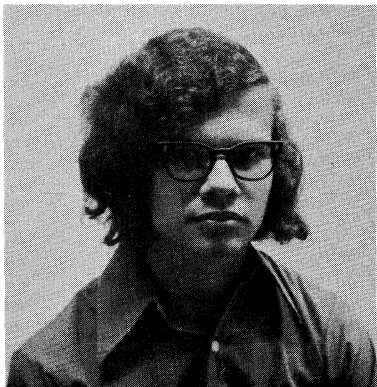
Bedford R. Taylor, II
Laborer
Plant Maintenance - GB



Dorothy J. Friend
Housekeeper
Admin. Services - GB



Mark E. Tracy
Shop Helper
Central Shop - GB



Steven M. Pasternak
Computer Operator
Computer Div. - CV

Photo Not Available

Armand C. Sperduti
Technical Specialist
Tucson

Photo Not Available

T. Maxine Thomas
Secretary
Tucson

New Employees (Cont.)

Photo Not Available



Jan M. Hollis
Scient. Program. Analyst
Tucson

Marvin L. DeJong
Visiting Scientist
Basic Research - GB

Gary A. Bonebrake
Electronics Engineer
VLA - GB

Transfers

Jamie A. Sheets	To Fiscal Division
Jack L. Daniels	To Administrative Services
French L. Beverage	To Administrative Services
Virginia I. Michael	To Administrative Services
William W. Powell	To Administrative Services
Thurmond R. Cosner	To Administrative Services
Jerry C. Shears	To Plant Maintenance
Richard A. Hiner	To Telescope Operations
Harry M. Fox	To Business Manager's Division - CV

Rehires

Daniel R. Stone	Telescope Operations
Dana L. Moyers	Administrative Services
Terry L. Richardson	Administrative Services
William R. Gillispie	Plant Maintenance
Keith H. Johnson	Tucson
Joseph H. Greenberg	Scientific Services - CV
James C. Jafolla	Scientific Services - CV
Louis J. Gross	Scientific Services - CV
David M. Berg	Scientific Services - CV
Timothy S. Waybright	Plant Maintenance

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Leave of Absence

Billie Jo Kinnison
R. Jane Gordon

Fiscal Division
Administrative Services

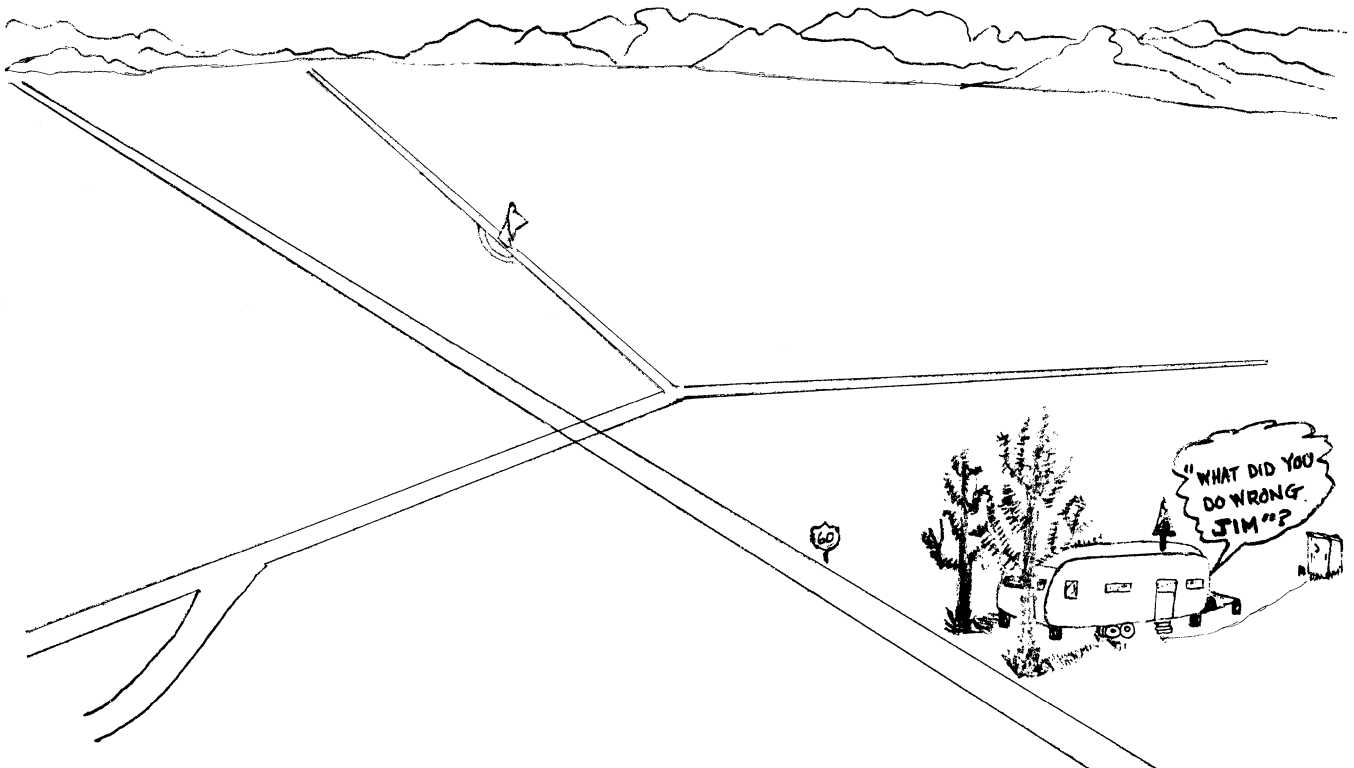
Terminations

Ernest Schuetz	Tucson
Margaret L. Halliday	Tucson
Virginia A. Hull	Business Manager's Division - CV
Leroy G. Moyers	Plant Maintenance
John M. Matheny	Administrative Services
James E. Finks, Jr.	Business Manager - VLA - CV
Stephen J. Hirsch	Scientific Services - CV
Donald Sauter	Scientific Services - CV
Edward B. Davis	Scientific Services - CV
David G. Steigerwald	Scientific Services - CV

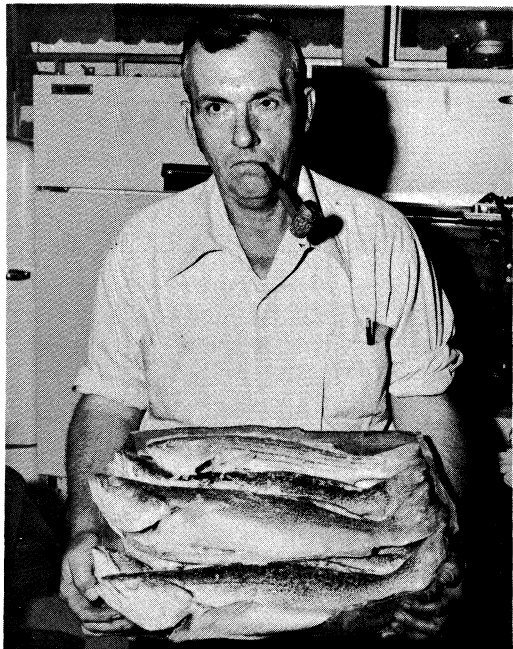
Retirement

Maudie M. Wenger

Administrative Services



LAKE'S FISH



Gene Crist took this picture and Lake Sipe was supposed to write a little something to go with it. Somehow the story was misplaced and failed to reach us at the OBSERVER so I had to call Lake for a few details so we could write a little story to go along with the excellent picture.

Lake told me he and June Colaw (Kane's in Durbin) went on a fishing trip near Lively, Virginia on July 14 and had a pretty good catch--35 Grey Trout averaging 18-26 inches long (4-5 pounds) and 18 Rock Fish, 15-20 inches long. Lake said that their Rock Fish were on the small side because some Rocks go to 20 pounds or more.

They used salt water tackle, 20 pound test line and soft-shelled crabs for bait (\$2.50 per doz.). Best fishing is from a boat but waders can get you out to good fishing. In any case, it helps tremendously to be with someone who knows where the fish are likely to be.

Exactly where were all these fish caught? Here're the details Lake Sipes gave me: near the mouth of the Rappahannock River about 70 miles from Richmond near Lively, Virginia.

"Mom, pack me a lunch and a sixpak; I know exactly the place."

NRAO PARTICIPATES IN ELEVENTH NYSC

What literally started out as a one-shot Centennial promotion has now become an outstanding, yearly science camp. The National Youth Science Camp, born in 1963, recently completed its eleventh successful summer camp. Again, as has happened on ten previous occasions, one hundred youths of outstanding scientific ability assembled in Pocahontas County and learned about the latest in science. This science is taught them in a rural setting of unusual country beauty. Science is the theme -- it's what these boys excel in -- but science is not permitted to become dominant. Plenty of socializing, native crafts, and nature activities are thrown in, too. "Science is great," many campers will say, but many will also say, "West Virginia is almost heaven."

Each year NRAO does its bit. NRAO mostly contributes radio astronomy to the youth camp. It's what NRAO excels in. To that end NRAO again sent three of its top speakers to lecture at the camp. And in between the lectures the one hundred campers were given a special three-hour tour.

On June 25, Sebastian von Hoerner spoke to the campers on life in space. Two nights later Mark Gordon lectured to them on the Milky Way. On Thursday, June 28, the entire camp came to NRAO for a three hour tour. The tough job of guiding the campers around and through the site was done by Marvin DeJong, Rick Fisher and Dave Hogg. They were ably assisted by the many NRAO employees throughout the site who acted as experts in residence. The NRAO lectures were topped off by Mr. "Sandpile" Peery who talked about the construction of the 140-foot radio telescope.

So another NYSC is over. Before you know it, the campers of 1974 will be here ogling the telescopes with one eye and the girls with the other. Don't worry about our science oriented youth. They still have many thoughts about the normal things.

A pessimist is one who feels bad when he feels good for fear he'll feel worse when he feels better.

--Anonymous

GOLD IN VIRGINIA

Wally Oref

The mention of gold generally brings visions of the West and of a grizzly-looking prospector with a mule, climbing some scrub-covered mountain or going up some forlorn canyon. For most people, gold is synonymous with the rugged West and anyone who would say there is gold in the East would probably raise eyebrows. Right here - now - I'm going to make such a statement: There is gold in the East. In fact, pretty close to some of us.

Gold was discovered in Virginia a long time before the gold-rush took place out West. As early as 1782 Thomas Jefferson reported on a gold-bearing rock found in Virginia (near the Rappahannock River) and several Virginia placer mines were reportedly worked as early as 1825. A recent Bureau of Mines report stated at one time there were 165 placer and lode gold mines in Virginia. This report goes on to say there might be as much as 300,000 ounces of recoverable gold in Virginia and even more than this to be recovered in the Carolinas, Georgia, and Alabama. It's a fact: there is a gold-bearing belt east of the Blue Ridge, extending from Virginia down into Alabama. In Virginia - Fauquier, Fluvanna, Goochland, Orange, and Spotsylvania counties contain the most important deposits.

There is still gold in these counties and probably elsewhere in Virginia. The old timers never found all the gold nor were they very efficient in extracting the gold they did find. Mining and milling methods back then were very crude. Placer deposits were panned or sluiced, Lode deposits were pick-and-shovel operations, and milling was limited to stamp mills (essentially big hammers that pulverized the gold rock so the native gold could be separated from the worthless rock). Stamp mills were very inefficient--they lost more gold than they recovered.

If you want to prospect for gold on weekends, during vacations, or in your spare time, you can--and you can do it close to home (a short ride from CV puts you in gold country). While gold prospecting requires relatively little equipment, it does, however, require some know-how. You have to know where to look and how to pan for gold. Various reports and publications will tell you where to look

(geographical locations and in which rocks) and how to pan for gold; but the best way to learn gold prospecting is to latch onto someone who has had gold prospecting experience.

Where, one might ask, around here is there such a person? Well, there happens to be a couple of fellows who can help you! Marvin Wimer and I both have had experience prospecting. Not only for gold, but for many other minerals as well. Marvin started prospecting back in the thirties and has prospected throughout the United States and Canada. I got my experience as a mining geologist in Idaho back in the late fifties. Mine came from routine geological work on mining properties. In the course of investigating and evaluating mining properties, I had to become rather adept at panning for heavy minerals which included gold. A veteran gold prospector, over seventy years old, taught me the ins-and-outs of gold panning. Eventually, I spent much of my spare time hunting for gold and showing Eastern dude relatives how it was done. I came by "mucho" gold panning experience this way. I learned about lode deposits, mapping and sampling copper, cobalt, and silver mines whose ores generally carried gold values. I still have some placer gold and a piece of ore containing visible gold.

I wrote this article for two reasons: (1) I felt a lot of people were unaware they could prospect for gold in the East, and (2) I was hoping this article might evoke interest in some people to go out and prospect for this exotic, yellow metal.

There is no thrill quite like the one of finding GOLD. Perhaps if enough people are interested in weekend prospecting, we can form a prospecting club or group. About the most you need is enthusiasm. If you are interested, why not give me a call. Remember though...all that glitters is not gold.

Relations are simply a tedious pack of people who haven't got the remotest knowledge of how to live, nor the smallest instinct about when to die.

--Wilde

MY NEW JOB
THE HOWS, WHYS, AND WHEREFORES

G. L. Verschuur¹

Your editor has asked me several times to write about my new job. The main reason is probably because various stories exist as to what exactly I will be doing after leaving the NRAO. Well, the job is Director of the Fiske Planetarium at the University of Colorado in Boulder. First, I should note that the planetarium hasn't been built yet. So directing is made easier, isn't it?, except that I have to make sure it gets built and operational in the right way. But what does a research radio astronomer know of planetariums? Very little! But with the right assistance from an experienced staff, it should work out okay.

What is a planetarium? Don't confuse it with an observatory. A planetarium is one of those dome-like buildings which houses a spherical screen suspended over your head as you sit in the middle of the sky theater (as it is called) and projects the stars visible to the naked eye on the dome overhead. The very best planetarium projectors in large domes simulate the sky very well. So what?, you might ask. Why not simply look at the sky at night? True, except that in the planetarium you can move the stars around and speed up the passage of time. You can show the motions of the planets through the stars at will, you can see the sky as it appears to someone in Australia or someone 2000 years ago, all at the flick of a switch.

In the good, modern planetariums it is the auxiliary equipment that helps make the facility such a popular attraction for the public. Most planetariums do astronomy shows that are aimed at informing and entertaining the man and woman who have little knowledge of astronomy; only a curiosity about the Universe. The auxiliary projectors (up to 200 carousel slide projectors are used in some places) show a variety of pictures and are used together with movie projectors and sophisticated four (or more) channel sound systems during a show. The slides are usually projected across the dome from one end to the other and if well done leaves the audience wondering where the projectors are. In Boulder we will have a 65 foot diameter dome and the auxiliary projectors will be invisible from the audience. We will also have the world's best star projector (a

Zeiss model VI which cost \$265,000 but if ordered now would cost nearly \$400,000).

The Boulder facility will cost 1.6 million dollars altogether, all from a bequest to the University from a Mr. Fiske. We will buy about 300 projectors of various sorts for arranging around the dome and a horizon projection system is being built which will allow us to project any of 10 horizon scenes (going all around the dome) at the flick of a switch. All the projectors will be controlled by a simple programable relay system operated from a tape recorder which also contains the sound track for the programs.

Planetariums don't only do astronomy programs. We will use the planetarium for rock concerts, chamber music, modern dance, plays and anything else that takes our fancy. The projector in the middle of the theater will be on an elevator so when lowered we will use the center area as a stage. Many experimental programs, including light shows, have been done in planetariums. A recent program done in East Lansing was a "Sleep-In" It started at 11 PM, lasted till 7 AM. The program consisted of 12 movie projectors showing old movies simultaneously around the dome. Only one sound track was used. The idea was to try to fall asleep with these 12 images hurtling on around you, like so many dreams. It was a big success apparently

Why did I decide to get into this business? Well, I have always been interested in communicating astronomy to the public. I discovered planetariums about 3 years ago after Dave Heeschen asked me to go to a planetarium meeting in East Lansing. Since then I have visited many, met many of the people in the field and have been very impressed with what some are doing and the enormous potential that the planetarium has for entertaining, while educating. The planetarium community is divided on the latter point, i.e., how far should you go toward entertainment? I think we should make astronomy as entertaining as possible, and when the opportunity of setting up what will be a major planetarium in a place like Boulder was presented to me I took it. For the sake of the record the choice was actually made at a time when I had been offered an equally good position at another university to start a radio astronomy research group and teach graduate courses. All things between the two jobs were virtually

--continued, next page--

equal. Salary, position, even the geographical locations were both favorable. So here I am, soon to be a planetarium director. I will have a staff to help me, and technical supervisor and administrative assistant are two positions which were already filled in April, and they are hard at work on some basic design work and general planning of the workings of the planetarium.

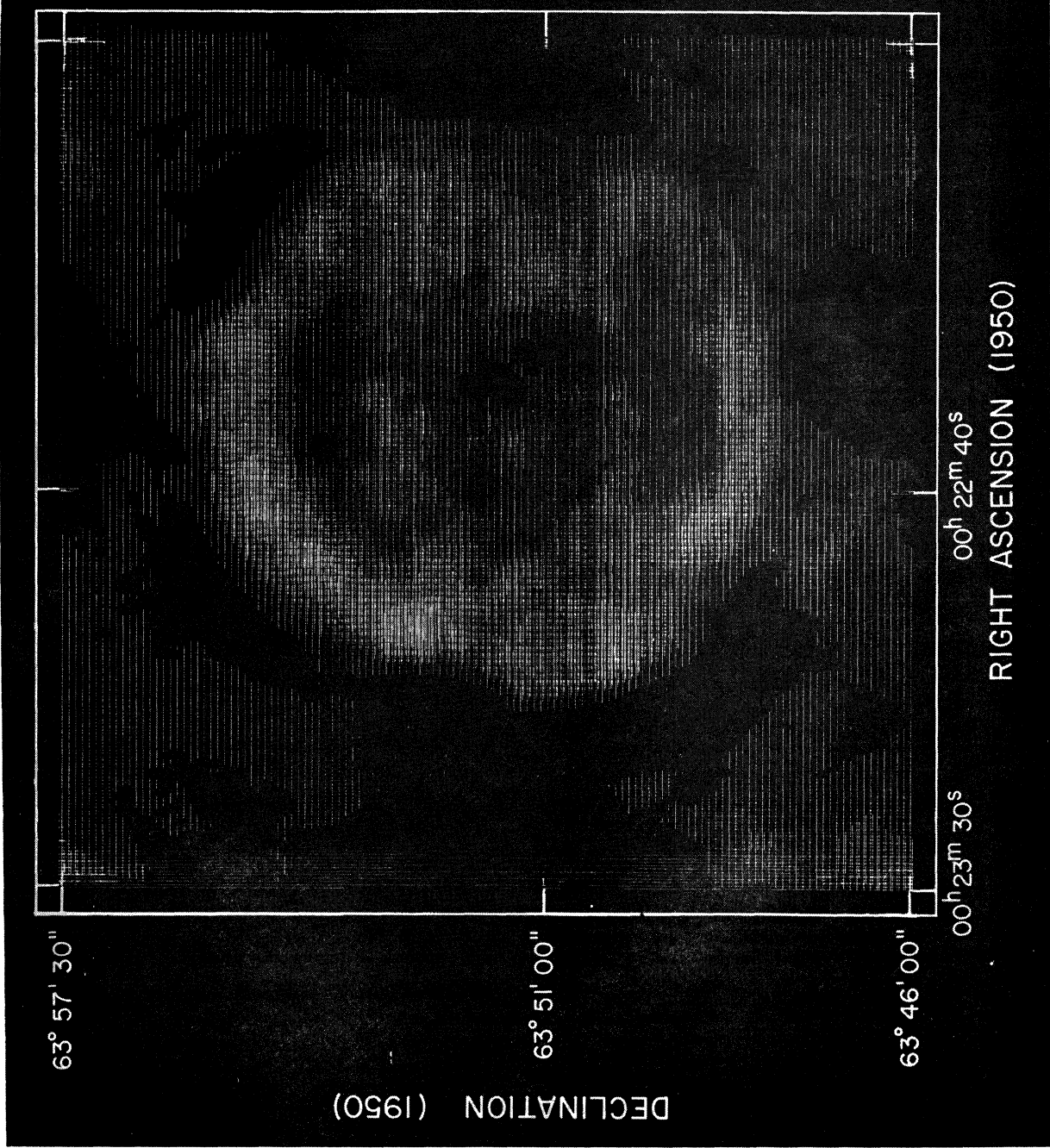
The University of Colorado expects me to direct the Fiske Planetarium and I have a joint appointment as Professor in the Department of Astro-geophysics and will continue to be active in research work. Indeed, I feel there is a great need for more people in the planetarium world to be actively engaged in research of some sort. It helps keep oneself in contact with modern astronomy and I have found that the public like to hear about astronomy from those actively engaged in research. I have no doubt that in the future the gap between the planetarium world and the research scientist's work will narrow as more people bridge this gap in their own way. I would encourage young astronomers to consider this combined career both as being very stimulating and challenging, but also of benefit to those who want to learn about astronomy at their planetariums. There are many excellent planetariums already which bridge this gap well, but there are 750 in the country and the majority are very out of contact with the current scene in astronomy. Those are particularly the school facilities. I would hope that even at that level contact with active astronomers will be enormously increased. In fact, it is essential that more astronomers concern themselves with public education than heretofore. Perhaps one day most research workers and university staff will also be actively involved with communicating astronomy to others than just graduate students. This is of course done at some of the major universities already, but in order for this to happen on a larger scale the enormous emphasis on producing papers, and doing little else, will have to lessen. The NRAO, for example, as well as the other national observatories, will in the future have to take a more active role in informing the public (as well as entertaining them at the same time incidentally, since we do have to compete with films and T.V. at all levels of interaction with the public). On this topic the most modern planetarium, and no doubt a forerunner of things to come, is the one in Balboa Park in San Diego,

recently opened. Visit it, if you can. They use movies on an enormous curved screen with the picture covering as much as your eye can encompass. The screen bends around you and in their space films it is as if you float in space yourself. A great trip! Such planetarium-like theaters are probably the movie theaters of the future.

I have noticed that the planetarium community contains many, many fascinating characters. Many of these are the technical people who have enormously varied backgrounds. A technician or technical supervisor of a planetarium is usually a man who can do everything! A jack-of-all-trades and master of all. Electronics, mechanical and electric work, sound systems, designing fancy projectors, grinding lenses, etc. etc.; he does it all. Most of the good planetariums have truly excellent technicians who found a job that they enjoyed, a job with relatively little routine, no fixed hours, no union control on their abilities and interests, and the ones I have met seem very happy in their positions. Artists, too are used by planetariums and many of these are also unique and fascinating characters who can make an enjoyable living away from the rat race of the world of the commercial artist. Then the astronomers and directors are often from a very widely ranging set of backgrounds as well. All in all, a fascinating world to enter.

Finally, for those who have never been in one, or for those who have been put off, let me recommend some of the best planetariums. Go out of your way to visit the Strassenburgh in Rochester or the Abrams in East Lansing. The van der Bilt on Long Island is good, but I hired their director to be my technical guru, so I don't know about their future! The Griffith Observatory in L.A. and the Hayden in N.Y. do very good, straight shows. Then in 1975, visit the Fiske in Boulder! I'll let all NRAO personnel in free!

¹The editor, editorial board, and staff of the OBSERVER wish Gerrit the best of luck and success. Over the years Gerrit has been a most willing and consistent contributor to the OBSERVER. For this our special thanks. We hope this is not the last we hear from you, Gerrit.



The photo at left has evoked a lot of interested comments and might be of interest to others as well. It is a visual representation of Tycho's supernova remnant as observed with the interferometer at 11 cm. In other words if your eye were tuned to radio waves, you'd see something like that. It barely shows the shell-like motion of the expanding remains of a star which blew up 401 years ago (observed in 1572 by Tycho Brahe). Its present size is about 25 light years in diameter.--John Dickel, University of Illinois at Urbana-Champaign.

FOSSIL COLLECTING FOR FUN

Part II

Ray Escoffier

In Part I of "Fossil Collecting For Fun" historical life was presented from the time aspect. A second division of life commonly made studies life from the biological aspect.

Science has attempted to devise a logical classification for earth life past and present that will indicate the relations of one creature to another and hence to indicate the flow of evolution through the ages. This classification specifies seven divisions used to identify a given organism. Below, these divisions are given along with the classification of some common animals. Many times subdivisions and superdivisions are used to further classify and group organisms.

<u>Division</u>	<u>Clam</u>	<u>Dog</u>	<u>Man</u>
Kingdom:	Animal	Animal	Animal
Phylum:	Mollusca	Vertebrate	Vertebrate
Class:	Pelecypoda	Mammal	Mammal
Order:	Eulamellibranchia	Carnivor	Primate
Family:	Verneridea	Canidae	Hominidae
Genus:	Venus	Canis	Homo
Species:	Mercenaria	Domestica	Sapien

Generally, all life is broken down into two kingdoms - plant and animal - although occasionally the definitions of these kingdoms must be stretched somewhat to describe organisms that do not fit well. Amateur fossil collectors are generally interested mainly in the animal kingdom (although some Virginia coal deposits contain many well-preserved fossil plants of the Pennsylvanian). Following are short descriptions of some of the important animal phyla found as fossils:

PHYLUM COELENTERATA: This phylum includes jellyfish, sea anemones, and coral. Of these only the corals are important as fossils. The stony structure built by solitary or colonial coral polyps are easily preserved and have been abundant in the sea for hundreds of millions of years.

PHYLUM BRACHIOPODA: This phylum contains a large number of important fossils. Brachiopods are found abundantly as fossils in Paleozoic

rocks but were reduced in numbers thru the Mesozoic and Cenezoic eras. Brachiopods look similar to clams except that their two valves are of unequal size and have symmetrical right and left sides.

PHYLUM ARTHROPODA: The Arthropods comprise by far the largest group of animals alive today. They are characterized by having jointed legs and include crabs, shrimp, insects, spiders, and scorpions. Although as abundant in the geologic past as they are today, Arthropods are not important as fossils since thin shells prevent easy preservation. However, in early Paleozoic times an Arthropod comprising the class Trilobite (extinct since the Permian) did leave many fossils.

PHYLUM MOLLUSCA: Another very important phylum both in terms of fossil and present life. The mollusks include class Gastropoda (snails), class Pelecypoda (clams, mussels, oysters, scallops), and class Cephalopoda (squid, octopus, nautilus). Next to the Arthropods, the mollusks form the largest group of animals alive today. Most are familiar and need little comment.

PHYLUM VERTEBRATA (CHORDATA, more accurately): The vertebrates form the group most commonly thought of when one thinks of the animal world. The vertebrates include all animals with backbones--class Pisces (fish), class Amphibia (frogs, salamanders), class Reptilia (lizards, snakes, turtles, dinosaurs, crocodiles), class Aves (birds), and class Mammalia (cats, dogs, horses, whales, seals, man). Although common as fossils in places, vertebrate paleontology requires special skills not available to the amateur fossil collector. The only vertebrate fossil commonly collected by amateurs are fossil teeth, such as shark teeth, which are common in places.

PHYLUM ECHINODERMATA: The echinoderms form a diverse group that include starfish, sea lilies, sand dollars, sea urchins, and sea cucumbers. Members of this phylum are characterized by five-fold symmetry. Although usually rare, some locations yield large numbers of beautifully preserved echinoderms.

This then is a very brief description of organic classification and it's application to paleontology. Next, a look at Virginia and the fossils in it.

Virginia is divided into three geologic regions: the Coastal Region, the Piedmont, --continued, next page--

and the Appalachian Plateau. The Coastal Region contains rocks and fossils of Cenozoic age. The fossils include large numbers of mollusks, coral, fish bones, shark teeth, and sand dollars.

The Piedmont Region covers an area from the Coastal area to the Blue Ridge running roughly north-south through the center of the state. Rocks of the Piedmont are of Pre-Cambrian age and hence contain no fossils at all.

West of the Blue Ridge, Paleozoic marine sediments outcrop yielding many fossils from the Cambrian, Ordovician, Silurian, and Devonian. Many of these fossils are very well preserved and are to be found mainly in limestone, although present in shale and sandstone also.

The Paleozoic is also exposed extensively in West Virginia in and around Green Bank. However, in both Virginia and West Virginia, fossils are likely to be encased in very hard rock which makes collecting difficult.

Equipment needed for collecting fossils includes hammer and chisel (or geologic hammer), collecting bags, and some knowledge of where to look. The Virginia State Geologic Survey (on McCormick Road in Charlottesville) can provide at small cost several publications showing fossils and fossil locations in Virginia as well as geologic maps of the state. The public library also has several good books on fossils, some of which list fossil locations for all 50 states. Once one has some knowledge of the subject, some interest in it, and some locations to scout, the only hurdle left is to overcome the feeling that passing motorists will think you're a nut as you climb up and down roadside cuts looking through the rocks.

Take therefore no thought for the morrow; for the morrow shall take thought for the things of itself. Sufficient unto the day is the evil thereof.

--Matthew, VI. 34

God must have loved plain people: He made so many of them.

--Lincoln

NOW IS THE TIME TO:

Rest
Irrigate
Cool Off
Mow Weeds
Walk, not run
Pick blackberries
Paint the mailbox
Enjoy the State Fair
Think watermelons
Eat an ice cream cone
Hold a family reunion
Put silo doors in place
Buy an air-conditioner
Fertilize chrysanthemums
Plant peonies and poppies
Tell Junior what dog days are
Haul green-chop to drylot cows
Add another super to the bee hive
Think how nice it would be to have a swimming pool

FUEL SAVING HINTS

- (1) Travel at reduced speeds. Limit maximum speed to 60 miles per hour. Fuel consumption generally increases significantly above 60 miles per hour. A bright-colored sticker on the dash may be used as a reminder.
- (2) Avoid sudden bursts of speed and pumping the accelerator pedal while the vehicle is not in motion.
- (3) Avoid sudden stops; plan ahead.
- (4) Do not idle engine for long periods of time.
- (5) Refuel vehicle during the early part of the day.
- (6) Avoid over-filling the fuel tank to allow for fuel expansion.
- (7) Tune the engine, following the manufacturer's latest specifications.
- (8) Maintain tire pressures to tire manufacturer's recommendations to reduce rolling resistance.
- (9) Check and adjust wheel alignment to manufacturer's specifications. This will also reduce rolling resistance.

