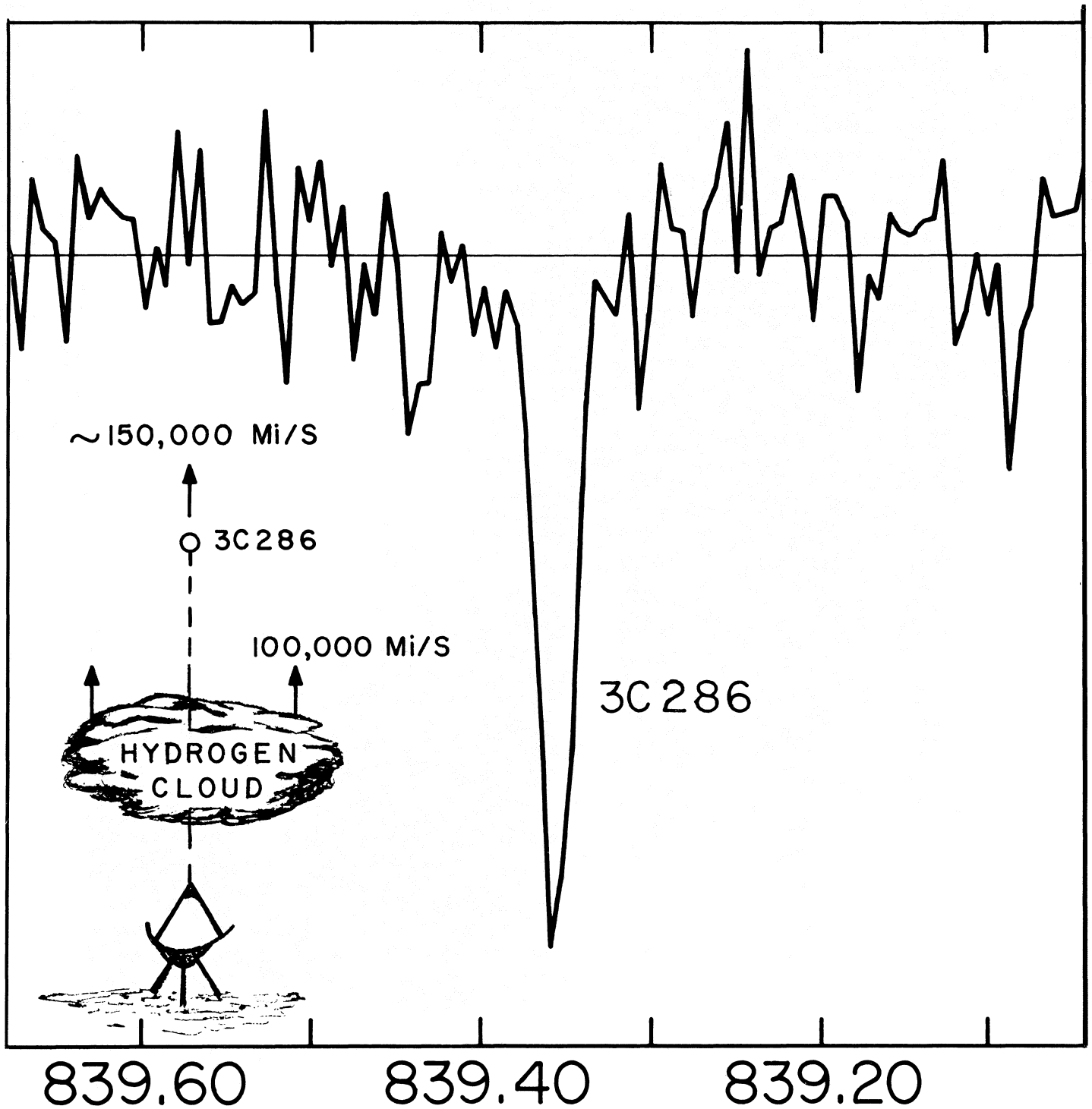


# The OBSERVER



FIRST LARGE RADIO REDSHIFT

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THE FIRST LARGE RADIO REDSHIFT

Morton S. Roberts

Today, a decade after the discovery of quasars, astronomers still differ on the fundamental question of their distance. Are they "far" or "near"; are they only millions of light-years away or are they at the "edge of the Universe" at billions of light-years distance?

The short history of quasars starts with the identification of star-like images with radio sources. The first such identification was made by Tom Matthews and Allan Sandage for the radio source 3C48 and was announced at the December 1960 meeting of the American Astronomical Society. The optical spectrum of this quasi-stellar radio source was unlike any previously seen and its interpretation could only be guessed at. The solution to this problem was remarkably simple, once it was recognized (hind sight is wonderful). Maarten Schmidt found that the spectrum was peculiar because of the high redshift displayed by the spectral lines--the characteristic lines of the various elements were all shifted from their usual position to the red part of the spectrum.

This exciting discovery was convincing because all of the spectral lines showed the same relative redshift. Several years ago I asked Schmidt what would have happened if he had examples such as those so common today--where several different sets of redshifts have to be evoked to identify the spectral lines. Some quasars have over half a dozen different redshifts associated with their spectral lines and even then not all the lines are identified. He shook his head and said he would never have gone the way of large redshifts. The spectra would have remained peculiar and the quasars would be just strange radio sources.

Another important discovery was the measurement of a change in the brightness of a quasar. Variations on the scale of years and months were found. When first announced, it was met with disbelief and even derision. It meant that these intensely bright objects are only light months or light years in size. For comparison our galaxy is over 100,000 light years across. Today we accept and almost expect such variation, at times on even

shorter time scales. This variation occurs at both optical and radio wavelengths.

More elusive aspects of quasar research have involved their distribution on the sky. When there were only a handful known, they lay on a great circle--it was strictly due to selection effects. Then the highest redshift objects were thought to cluster near the poles of our galaxy. But as the sample grew larger this went too. Others have argued that they are associated with radio sources, peculiar galaxies and even normal galaxies.

As the sample grew, the numbers of different redshifts also came (and are still) under scrutiny. Do the redshifts tend to occur at special, discrete values? Was it random or, as some suggested, did they cluster at specific values. After much discussion, the former case, randomness, seems to be winning.

There are other problems both observational and theoretical. But the net result of all of this research is that there is no unanimity in the interpretation of the redshift.

For almost half a century we have recognized "large" redshifts for normal galaxies (here large means a tenth of those of quasars). These redshifts have been interpreted as a Doppler Effect. The change in wavelength being due to the relative motion of the source of light (the galaxy) and the observer (us). The same thing occurs with sound waves when a car with horn blowing or train with whistle blowing moves away (or towards) us--we hear the pitch of the sound change. So with light. And the interpretation has been an expanding Universe. All the galaxies are moving away from one another.

But the important aspect for this discussion is that the amount of redshift is related to the distance of the galaxy. The greater the distance the greater the redshift. The extension of the quasars was obvious; they have high redshifts they must be at great distances. Such great redshifts that they must be at the edge of the Universe.

Given these great distances together with their apparent properties we end up with intrinsically small objects, some a millionth the size of a galaxy; but intensely bright, up to a million times brighter

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than an entire galaxy! Where does the necessary energy come from? Do we need new physics to explain these sources?

Alternatively, is the Doppler interpretation of the redshift of quasars incorrect and hence our method of estimating their distance? This would explain some of the positional correlations and associations (although many astronomers do not accept the reality of any of these). But again we face the question of a new physics to account for the observed redshifts.

In either case invoking a "new" physics need not be necessary. A deeper understanding of contemporary physics may well be adequate.

But let me return to a point made earlier and how it led to an interesting and ongoing experiment with the 300-foot telescope. Multiple redshifts for many quasars have been recognized for some time. In such cases we have two types of spectral lines, those seen in emission and arising from a hot gas, and those seen in absorption, i.e. they appear darker than the surrounding part of the spectrum. In the latter case intervening gas has absorbed some of the light coming from the hotter background source. In nearly all cases the absorption-line redshifts are at or less than the emission-line redshifts. This is consistent with the absorbing, cooler gas lying between us and the hot source of continuum radiation. Now is this intervening gas associated with the quasar, perhaps thrown off of it, or is a chance line-of-sight coincidence; light from the quasar passing through an intergalactic cloud or a galaxy too faint to be seen? When there were quasars with one or two absorption line redshifts either possibility was viable. But when quasars with half a dozen or more absorption redshifts are found it strains the chance coincidence possibility unless there are many more intergalactic clouds than presently thought. In fact we don't really know of any isolated intergalactic clouds (or is this circularity, and the multiple redshifts prove the existence of such clouds).

As in so much of quasar studies a clear-cut answer is not available. But there are other parameters in this argument. An important one is the width of the line. This width measures the upper bound to the motions within the absorbing cloud. A wide line indicates that the internal cloud motions are large.

Conversely, a narrow line tells us that the absorbing cloud is quiescent.

The absorption lines seen in the optical spectra of quasars have widths that are typically several tens to several hundreds of kilometers per second. These widths are to be compared to the velocity difference given by the absorption and emission lines. On the "shells thrown off of the quasar" theory these differences indicate the velocity with which the absorbing gas has been ejected. These differences show a large range from essentially zero to over a hundred thousand kilometers per second. A major difficulty with the ejection hypothesis is this high velocity of ejection combined with the relative narrowness of the lines. How do you accelerate a cloud to, say, a 100,000 km/s and yet keep the motions within the cloud to only a 100 km/s? As we shall see below, the new radio results make this dilemma even worse.

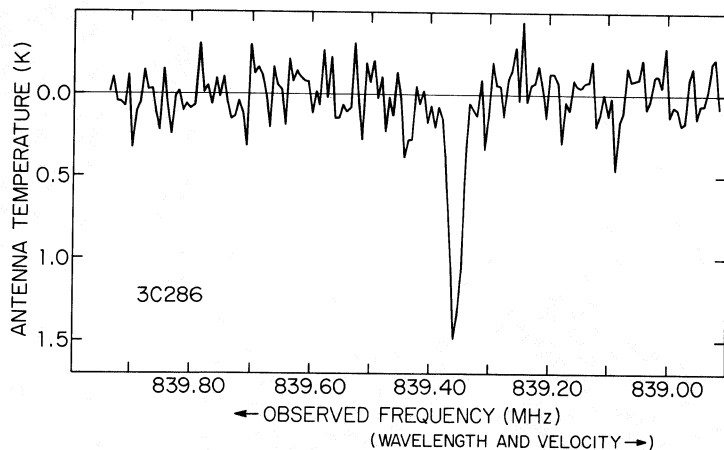
To look further into this problem Bob Brown and I decided to look for the absorption line due to neutral hydrogen, the familiar 21-cm line appropriately redshifted to a higher wavelength (or lower frequency). Many have tried this experiment before and with one exception for one quasar the search has always been restricted to either the emission-line redshift or to the redshift value for an absorption line. Our experiment is different in that we are scanning the spectrum looking for an absorption line. We have no a priori information as to its possible redshift. Our reasoning was based on the variety of absorption line redshifts showing up in the optical work. With few exceptions these occurred in high-redshift objects. Perhaps there are other redshift values which are not easily detectable in the optical studies because no strong absorption line occurs in the optical window.

The timing of the experiment was determined by the availability of a new tunable receiver built by Bill Brundage. This particular receiver covers the range 750 to 1000 MHz. This corresponds to redshifts of  $z = .4$  to  $.9$ . (The notation  $z = \Delta\lambda/\lambda_0 = \Delta\nu/\nu$  is in common usage. It measures the relative shift and  $\lambda_0$  is the rest wavelength. Correspondingly  $\Delta\nu$  is the amount of shift in frequency and  $\nu$  is the observed frequency.

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The Doppler expression relates the line-of-sight velocity to  $z$  by  $V = cz$  where  $c$  is the velocity of light. This simple form holds only for small  $z$ . For large  $z$  one must use the relativistic form of the Doppler expression.  $z$ 's greater than 3 have recently been measured.)

Our first observing run was in May of this year. We had an 8 day run and on the fourth day we saw a beautiful absorption line in the quasar 3C286 which has an optically determined redshift of  $z = 0.85$ . This is from emission lines only; the optical spectrum shows no absorption lines. The redshift of the absorption line we found corresponds to  $z = 0.69$ . And this line was unbelievably narrow - 8 km/sec.



The observed spectrum for the quasar 3C286. The large dip near 839.40 MHz is due to neutral hydrogen which, at rest, has a frequency of 1420.4 MHz. The difference in these two frequencies measures the redshift of the hydrogen.

And then the real work started. Could it be interference? Our manner of observation made this unlikely but not impossible. Bill Brundage saw no way of getting a birdie in the system. Jim Dolan checked the transmitter data in the protected zone. There is a TV relay transmitter near our detection frequency. Jim found that this is off the air during our observing time. Observations

of many other sources (and of blank sky) at this frequency did not show the line. It was only seen when the telescope was aimed at 3C286. There was one final test we could and did make to prove that it was extraterrestrial.

I mentioned earlier that a shift of a spectral line occurs when either the source or the observer is moving; and we are moving around the sun. The amount of this motion projected towards any given direction, say towards 3C286, is admittedly small, but measurable. In two weeks it would correspond to a shift of the line of 10 KHz--half the width of the line. Fortunately, the receiver was next scheduled on the 140-foot for Bob Brown's use and he was able to measure the line every day. The result had precisely the predicted shift. We were confident that the line was real and not some subtle form of interference.

There is one last possibility for the line that would make it completely unrelated to the quasar and to the goal of our experiment. Could it be some molecule? There are lines of methyl alcohol and heavy water in the vicinity of - but well away from - our measured frequency. Or perhaps it is some new molecule. If so it is a very strange one for it occurs at very high latitudes--well above the galactic plane and in a direction essentially free of dust. And its distribution is very patchy since we didn't see it towards other quasars. Further it is not seen in some of the standard molecule "factories" such as Orion. It seems very unlikely, but not impossible, that it is a molecule. Either way--redshifted hydrogen or a new molecule--we win. However, the molecule tests are so negative that we feel strongly that it is redshifted hydrogen.

This hydrogen is either in an isolated cloud or in an intervening galaxy. In the latter case the galaxy would be too faint to be seen optically. There is no reason to suppose that this hydrogen is at other than its redshift distance (as predicted from the Hubble law for an expanding Universe). Since the quasar must lie behind this hydrogen, at least 80% of its redshift must be cosmological, must reflect the expansion of the Universe, and must be at a correspondingly great distance.

The line is so narrow that we find it  
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difficult to see how it might be ejected with its high velocity of about one tenth the velocity of light and yet keep such small internal motions, 8 km/s.

The argument isn't over. The non-expansion redshift proponents feel that we don't know enough about the physics of quasars to eliminate the possibility of neutral gas being ejected from a quasar.

In the meantime we're looking for more absorption lines. The full range of this receiver (750-1000 MHz) has not yet been covered. And Bill is working on another low-noise tunable system that will go from 500-750 MHz. These two systems will cover a range of  $z$  from .4 to 1.8. Thus far we've spent about 3 times as much time as for our first detection and have seen nothing. But this negative result is just what might be expected. We know that seeing a galaxy and a quasar along the same line of sight should be rare--and it is. We were lucky to find a line so quickly. It is not at all clear if we would have kept up the tedious search otherwise. The moral of such a search may be found in Matthew, VII, 7.

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## BICYCLES

George Conant

When I was a lad I took most things for granted, and did not question their historical origins. Probably I assumed that my bicycle (and most other things I encountered) had a relatively modern origin.

The realization that there might be a history to the bicycle came as something of a revelation, when I read a passage in the autobiography of Albert Schweitzer, the late medical missionary - musician - philosopher. He mentioned the delight of first encountering bicycles in the late 1800's, apparently when they were just penetrating to the remote villages of the province of Alsace. Rather similar (I suppose) to the delight of modern youth at getting that first motorcycle or hot-rod.

Nowadays there has been a resurgence of buyer demand for bicycles. For a year or more, bicycles were in short supply; especially if you wanted a good lightweight version you could expect to be put on a waiting list by the dealer.

But now, the two-wheelers are blossoming forth in great numbers; and bicycle shops themselves are proliferating. During the past summer, it was not unusual at NRAO/CV to find a dozen or more bikes at the lower entrance.

Such widespread interest in bicycles, of course, is bound to stimulate technical discussions. To learn fine points of comparison of modern lightweight ten-speed racers, just get into a discussion with Mark Gordon or Hein Hvatum! To get a glimpse into the history of these wonderful devices, I delved into the Encyclopedia.

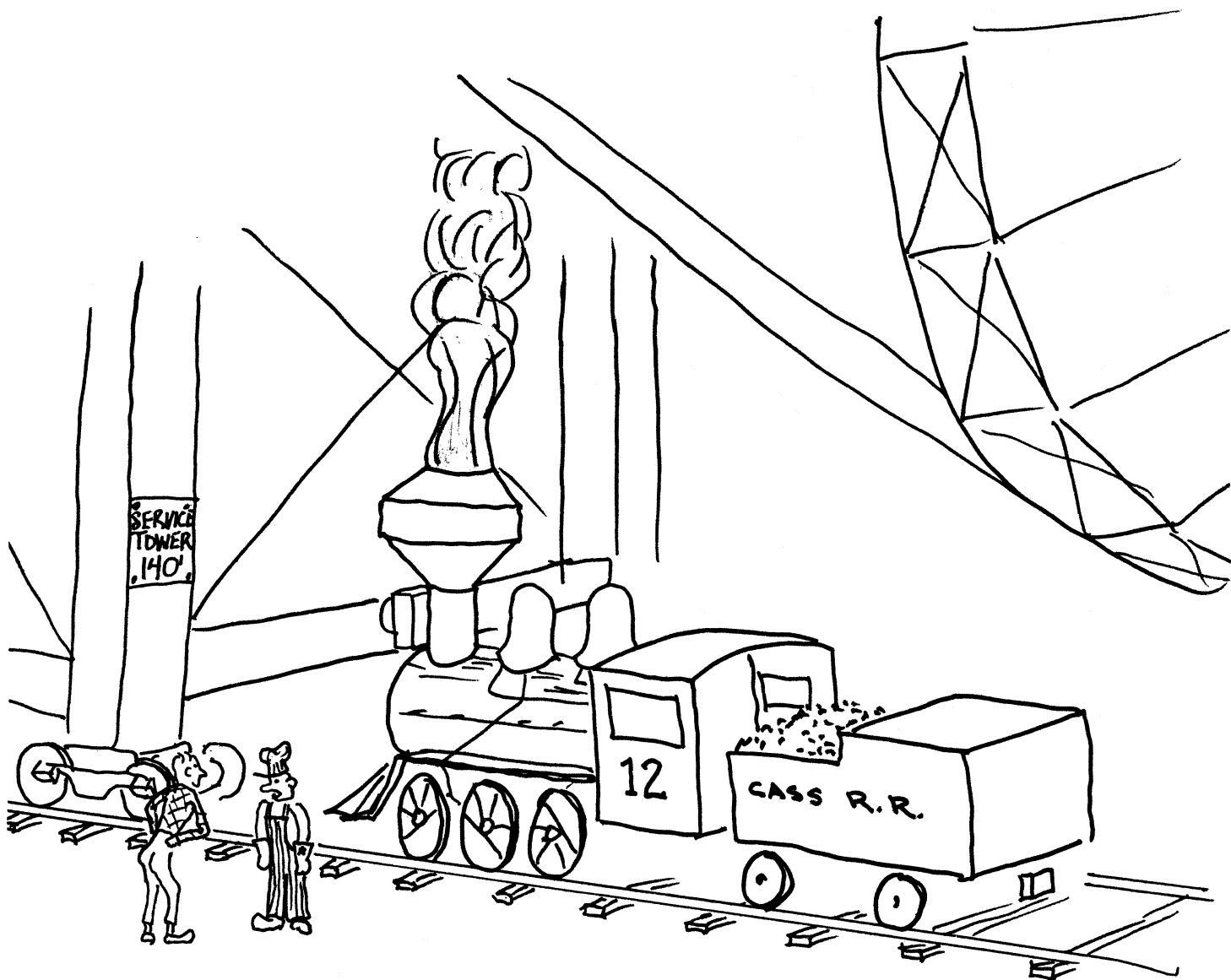
Imagine a device like a child's scooter, but with the rider sitting on the platform so that he can use both feet upon the ground for propulsion. Now enlarge the wheels greatly and raise the platform to make it a saddle, nearly at the height of the handlebars, for comfort. The date was 1816 and the place was Paris, France. This contraption was called the "celeripede". It sounds so clumsy that it is a wonder that it became popular, as apparently it did, not only on the continent but also in London and then in America.

Not until 1840 did a version with pedals appear. Made in Scotland, it transmitted foot power from swinging pedals, via rods, to cranks on the rear wheel axle. The inventor even got himself arrested for speeding! Various improvements soon followed; and names such as "velocipede" came into use.

In 1865, back in France, there was invented the version which simply had pedal cranks affixed to the front wheel axle. One adaptation, entitled the "ordinary", had an enormous front wheel and a small rear wheel. The bigger the driven wheel (relative to the pedal cranks) the greater the speed advantage. The general shape carried over into a three-wheeled version, which was popular for a while, and which still comes down to us today in smaller form as the modern child's tricycle.

By the year 1890 pneumatic tires had arrived, and also the modern method of transmitting the pedal power via sprocket wheels and chain back to the rear wheel axle. The modern bicycle had been born--only a little in advance of the first workable airplane. An amusing touch, since the first man-carrying aeronautical device (the Montgolfier balloon of 1783) predated the first bicycle by some 33 years.

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"GEE, I DON'T KNOW MR. BROWN, BUT IT WAS FOGGY WHEN WE LEFT CASS."

## HOME GARDENING

Eric Greisen

I've been asked to write an article on my "first year of gardening". Since that year is not yet over, such an article would be a bit premature. However, since vegetable gardening is mostly a story of good eating, I thought I could pass on a few recipes we particularly like.

To use fresh round or string beans (or frozen string beans):

### GREEN BEAN BAKE

In a 1-quart casserole, stir 1 can condensed cream of mushroom soup, 1/3 cup milk, 1 teaspoon soy sauce, and a dash of pepper until smooth. Mix in about 18 oz. cooked green beans and 1/2 of a 3-oz. can of French fried onions. Bake at 350° F for about 25 minutes. Top with remaining 1/2 of 3-oz. can of French fried onions and bake another 5 minutes.

### BEANS ORIENTAL

Drain and combine roughly 2 1/2 cups cooked green beans, 1 1/4 cups bean sprouts and a can of sliced water chestnuts. Add 4 slices of crisp, crumbled bacon and a can of condensed cream of mushroom soup. Place in a 1-quart casserole and, if you like, top with crushed potato chips. Bake at 350° F for 35 minutes.

### HOT SWEET-SOUR GREEN BEAN SALAD

Cook about 24 oz. of green beans and drain, reserving 1/2 cup liquid. In a large frying pan, cook 4 diced slices bacon. Add to the pan 1 cup chopped onions and cook for 3 minutes. Then add 4 teaspoons sugar, 2 tablespoons vinegar, 1 teaspoon salt, 1/4 teaspoon pepper, the cooked green beans and the reserved green bean liquid. Cook for 5 minutes. Serve hot. (It is also good cold, but isn't so pretty to look at because of the bacon fat.)

To use lima beans in an unusual way, try:

### LIMA BEANS WITH MUSHROOMS

In a pot cook 1/2 cup finely chopped onions and 3/4 cup sliced mushrooms in 3 tablespoons melted butter until tender. Add 3 tablespoons water, 1/2 teaspoon salt, 1/4 teaspoon garlic salt, and about 10 oz. lima beans (steam fresh beans about 15 minutes first). Cover and cook

slowly until beans are tender. Stir or shake mixture and pour into serving bowl. Garnish, if you like, with 1/4 cup finely chopped pimento.

Summer squash can be cooked in a wide variety of ways. A simple method we like is:

### SAUTEED SUMMER SQUASH

Saute until golden 1 cup minced onion in 3 tablespoons butter. Add 4 cups sliced (or diced) summer squash of any variety and 1/2 teaspoon salt and 1/4 teaspoon pepper. Cover and cook until tender (about 10 minutes), stirring to prevent sticking. Stir in about 1/4 - 1/2 cup spaghetti sauce (we use a meatless sauce with mushrooms) and warm. Serve straight or sprinkled with grated Parmesan cheese.

Swiss chard is easy to grow in large quantities as a spinach substitute, both cooked and in salads. We particularly like the following salad recipe:

### SPINACH SALAD

Combine 1/4 cup of crisp, crumbled bacon, 1/4 cup diced blue cheese and 2 tablespoons diced onions with about 2/3 - 3/4 of a head of lettuce and 1 bunch of fresh spinach. Prepare a sauce of 1 tablespoon sugar, 1/4 - 1/2 teaspoon worcestershire sauce, 1/4 cup apple cider vinegar and 1/4 cup hot bacon fat. Serve salad garnished with chopped hard boiled egg and topped with warm sauce. Hint: put the sauce only over individual servings since the salad mixture gets soggy if stored with the sauce on it. This salad is good with young swiss chard replacing the spinach and, if you like, also replacing the lettuce.

Two sweet pickle recipes have come our way which are easy and very good:

### MARY ANN STARR'S PICKLES

Place 1 gallon sliced cucumbers and 6-8 sliced onions in a large container. Pour 1/4 cup of salt over them and let stand 3 hours. Bring to boil: 1 quart white vinegar, 2 tablespoons mustard seed, 1 teaspoon celery seed, 4 1/2 cups sugar, and 1/2 teaspoon tumeric. Drain cucumbers and onions, add to mixture, and bring to boil again. Place in jars and seal.

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### BREAD AND BUTTER PICKLES

Slice 4 cucumbers and 1 - 2 onions and soak in ice water for 2 hours. Bring to boil 1 cup vinegar, 1 1/2 cups sugar, 1 teaspoon tumeric and 2 tablespoons mixed pickling spices. Drain cucumbers and onions, add to mixture, and bring to boil again. Place in jars and seal. Yield: 2 pints if cucumbers are small. If cucumbers are large, increase amount of spices and liquid and expect about 5 pints.

Growing your own vegetables, at least on a modest scale, is quite easy. The vegetables are best eaten straight from the garden with as little preparation as possible. Recipes, such as those given above, are just to provide variety in your menus or to disguise the lower quality of store-bought fresh and frozen vegetables. GOOD EATING!

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SIOASDS
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Bill Meridith

The nearest thing to an American folk dance is square dancing. There are several variations; the most popular and best organized is western square dancing. A somewhat successful attempt has been made in recent years to standardize this type of dancing, so it is now practically the same everywhere, even overseas.

A square consists of 4 couples with the lady on the man's right, and each side of the square parallel to a side of the hall. The couple with its back to the caller is the number 1 couple. The couples are numbered counterclockwise from there - 1 through 4. Couples 1 and 3 are head couples, 2 and 4 are sides. Usually sides or heads work together or all 4 couples are active.

The caller, accompanied by music (usually records) is continually giving instructions to the dancers. There are 50 basic calls, plus 25 extended basics, and literally hundreds of variations. The basics usually describe a single movement. An allemande left, for example, requires the corners, the lady to the man's left (also the man to the lady's right) to face each other, grasp left forearms and pivot 180 degrees about each other. This is

the most frequently called movement in square dancing. Another popular call is a do sa do, where the dancers walk around each other, back to back.

It takes many hours of practice to even begin to learn to square dance. One of the more difficult things to remember is which is right and which is left. Gracefulness is not required, although it is very helpful. My wife and I took lessons, once a week, from October 1971 through March 1972. We were then invited to join the Virginia Reelers square Dance Club of Charlottesville, one of the oldest clubs in Virginia. We've been dancing ever since and really love it. On September 15, we danced in Franklin, W. Va. at the Treasure Mountain Festival.

The western influence on square dancing is manifest in the costumes. The men wear western style shirts, pants, ties, and often cowboy boots. The gals wear dresses with wide, flared skirts, many crinolines, and ballet slippers. All the dancers are quite colorful. Courtesy and friendliness abound, even though the dancers vary in age from teen-agers to retired couples. Drinking is always prohibited, both before and during the dance.

Most fairly large towns have a square dance club. Along with Charlottesville, there are clubs in Staunton, Waynesboro, Greenwood, Stuarts Draft, Goochland, and Richmond. During the square dance season there will be at least 1 dance somewhere in the vicinity any night of the week. The season begins in September and continues through May, although there are dances every week or so, all summer.

By the way, SIOASDS stands for Sets In Order American Square Dance Society.

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A good laugh is sunshine in any house, but a silly, simpering laugh is only a tallow-candle imitation of the sunlight.

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Leave growling to dogs; they do it better, no matter how hard you try.

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INTERFERENCE ON CHEAT MOUNTAIN
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Chuck Brockway

A few evenings ago I was tuning a radio-meter in the lab when I noticed some strong interference. Quite by accident, the feed horn was pointed to the West - in the direction of Cheat Mountain. To my amazement, I heard voices from the audio monitor of the standard receiver. At first I thought that the grunts and snarls I heard were just some kids fooling around with walkie-talkies. Then I suddenly realized that I was picking up the radio transmissions from two black bears, Watergate and Alice, to which the Department of Natural Resources had attached collar transmitters in order to determine the range of their habitat. Their conversation went something like this:

"Say, Watergate, have you heard about that proposed recreational development on Cheat Mountain in Pocahontas County?"

"No, tell me more."

"Well, if you can believe what the promoters are saying, there's things like housing for twenty-five hundred people, two hotels, shopping facilities, twenty-four tennis courts, twelve ski lifts, a one hundred and fifty acre lake, a million paying customers a year..."

"Whoa! Wait a minute. What are they going to call this place? Fun City of the South?"

"No, but you're close. They say it'll be the Ski Capital of the South. Actually, they're going to call it "Snowshoe" because the promoters say there's an abundance of Snowshoe hares in the area."

"Grrr. I wonder how abundant they'll be after these guys move in."

"Hey! It sounds to me like you're not too happy about this thing. You some kind of nut or something? Think of all those garbage cans! And think of the lucky people in Pocahontas County and the affluence that this will bring, the money, the jobs, the growth, the..."

"The congestion, the pollution, the noise, the people -- a million a year you say! You know what I think, Alice? I think that the people of Pocahontas County might be headed for a big up off."

"I don't follow you, Watergate."

"Well, look at it this way. A lot of the people in Pocahontas County are there because they like things like forests, serenity, clean air and a host of other goodies that are only possible with a low population density.

People that place a higher priority on shopping centers, an abundance of fancy restaurants and cultural activities and the like have moved away and found these things elsewhere. I mean it's just a matter of personal taste and there's nothing wrong with that. But the truth is that the people of Pocahontas County stand to lose a lot of what they hold dear if this Snowjob thing gets off the ground."

"That's 'Snowshoe', Watergate, but I guess I see your point. You're saying that there's a lot of places where they can get the Snowshoe treatment but in making just one more Snowshoe they'll be losing the one and only Pocahontas County as they know it."

"Exactly. And they'll be losing the one thing that, in a few years, even J. Paul Getty couldn't buy and that's a piece of the wilderness. By the way, just where on Cheat Mountain are they planning on building Snowjob?"

"At the headwaters of Shavers Fork. Seven thousand acres in that bowl up in back of Cass."

"You've got to be kidding! Why, those are my old stomping grounds. Did I ever tell you about that fisherman I ran up a tree along Shavers Fork? I didn't know humans could climb by just digging in their fingers and toes, but this guy..."

"Never mind the sea stories, Watergate. Anyway, what about progress?"

"Well, it all depends on how you define it Alice. It could be argued that progress is when people have obtained enough experience and foresight to realize that there are some things that you just can't put a price tag on and are better off left alone. And untouched, natural beauty is one of them."

"Maybe so. But it could also be argued that your standpoint on this thing is, well, selfish. After all, it's only a handful of people who use that area now compared to thousands, maybe millions, who will be using it as a developed recreational area."

"I look at it this way, Alice. The people who take advantage of the Upper Shavers Fork area now care enough about it to at least go through a moderate amount of trouble to get in there considering the condition of the roads that are there. But the main point is that anyone -- hunters, fishermen, campers, hikers, nature lovers, city people wanting to

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see natural beauty -- regardless of income or position, Upper Shavers Fork is equally open to all of them and they're all equal when they get in there. But when Snowshoe takes over, you'll only get what you're able to pay for. After all, don't forget, Snowshoe, Inc. is a business and out to make money."

"But surely a case can be made for Snowshoe."

"Of course it can. There's two sides to every coin. You've just got to look at it from all angles and consider the advantages and disadvantages. And I say that Snowjob will result in a lot more being lost than is gained, particularly in the long run."

"Well, anyway, it's only seven thousand acres of typical wilderness and what with the National Forest and State Parks, there's still plenty left."

"Wrong, Alice. The Upper Shavers Fork is anything but typical. For one thing, you've got that majestic isolation -- unmatched hardly anywhere in the East. And with that isolation you've got animal and plant life more representative of eastern Canada than the southern United States making it really unique in that respect. You've got that beautiful big highland valley at an average elevation of 4000 feet enclosed on three sides by ridges of over 4800 feet. And you've got Shavers Fork itself -- a magnificent natural stream of unparalleled beauty. Why, you can safely drink the water out of Upper Shavers Fork, and Snowjob wants to dam it so they can give their customers a lake. Who will want to drink the water coming out of that lake? No, Upper Shavers Fork is not typical and neither are the people and the way of life in Pocahontas County. But the effects of Snowjob can typicalize everything, heaven forbid, and furthermore..."

"Hold on, Watergate, or you'll bust your boiler. But I must admit, you've got me worried now. Where do we go if this thing really shapes up?"

"Well, if they like the color of your money you can always stay at one of the hotels."

"Be serious, will you? This is no joking matter."

"Tell me, Alice, how did this Snowjob, Inc. ever get ahold of seven thousand acres of beautiful highlands including one of the best trout streams in the state anyway?"

"Most of it was purchased from the Mower Lumber Company; which makes me wonder.

If Mower wanted to sell, why didn't they sell to the government so the land could become part of the Monongahela National Forest?"

"Who knows? But Randolph Road, alias the Highland Scenic Highway, may figure in there some way."

"Well, maybe the whole thing will blow over anyway. Maybe they're just talking it up to pull in lots of money and they're really not all that serious."

"I don't know about that, Alice. Why they paid a million and a quarter just for the land. Heck, the girls at the deed office in Marlinton got dry tongues just by licking all those revenue stamps. And some of the guys running Snowjob were part of an outfit that pumped forty million into a similar project in North Carolina. It sounds to me like Snowjob means business in a big way. By the way, how does that radio astronomy outfit down in Deer Creek Valley feel about this?"

"I've heard that the folks at NRAO are divided pro and con although a lot don't seem to care one way or the other. There's supposed to be a handful though whose noses are really out of joint."

"Probably some of them are that same bunch who don't kill rattlesnakes."

"Probably. But that's another story. Assuming enough people feel strongly enough about stopping Snowjob from ever materializing, do they have a prayer?"

"Well, a good showing of public opinion involving action as well as talk has reversed things like this before. But just to be safe, I'd recommend they go heavy on the praying!"

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#### OBSERVATORY TOURS

Daily public tours ended on Labor Day and weekend tours will continue through October 28.

Through October 7, 22,599 people toured the Observatory. They came from every state and 29 foreign countries. This number of visitors through October 7 is 2,092 more than in 1972, but 2,948 less than in 1971.

Tour receptionists/projectionists are Vicki Taylor and June Riley. Bus drivers are Paul Kesler, Nathan Fertig, and Grover Barkley.

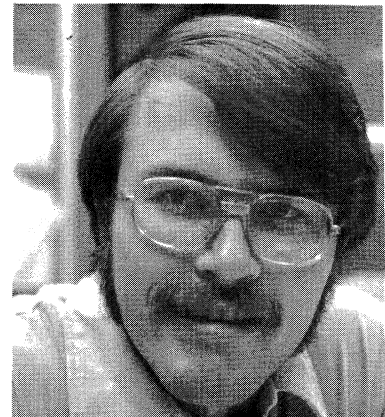
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Monroe E. Petty  
Personnel Manager  
Bus. Mgmt. - CV



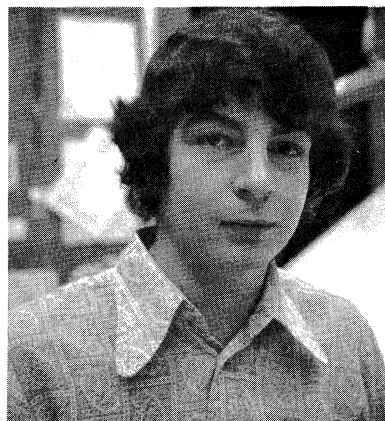
Emory G. Egler  
Construction Engineer  
VLA Project - CV



David M. Gibson  
Jr. Research Assoc.  
Scient. Services - CV



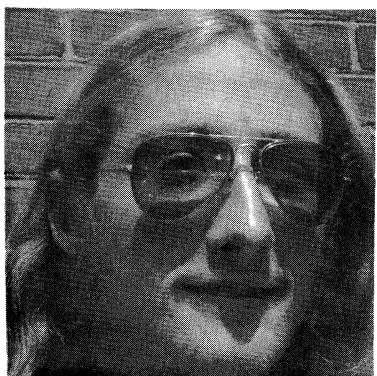
Doreen E. Morris  
Jr. Technician  
Electronics Div. - GB



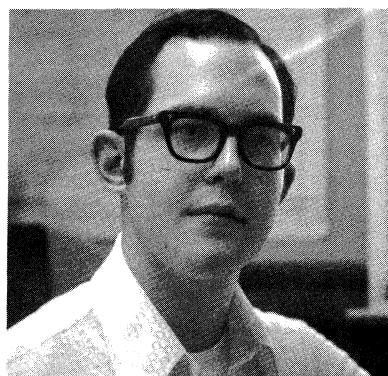
William C. LeMasters  
(Co-op)  
Scient. Services - CV



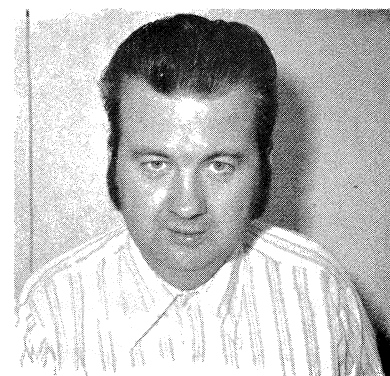
Nina B. Seaman  
Typist A  
Electronics Div. - CV



John C. Bishop  
Computer Operator  
Computer Div. - CV



Stephen D. Burgan  
(Co-op)  
Scient. Services - CV



James R. Gibb  
Accountant  
Fiscal Div. - GB



Geronimo C. Valencia  
Stores Clerk  
Adm. Services - GB



William N. Wireman  
Intermediate Tech.  
VLA Project - CV



Robert E. Dorr  
Business Manager  
VLA Project - CV



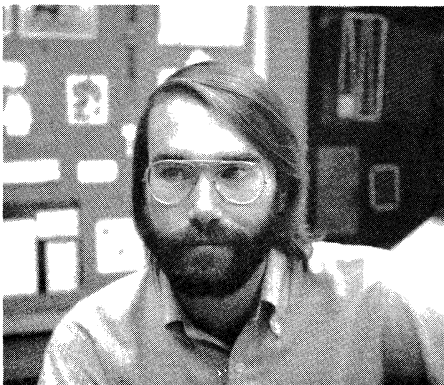
James M. Rexrode  
Plumber  
Plant Maint. - GB



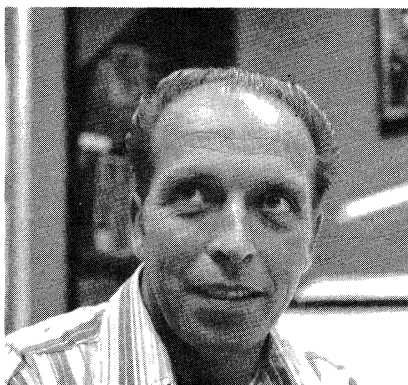
George H. Purcell, Jr.  
Research Associate  
Basic Research - CV



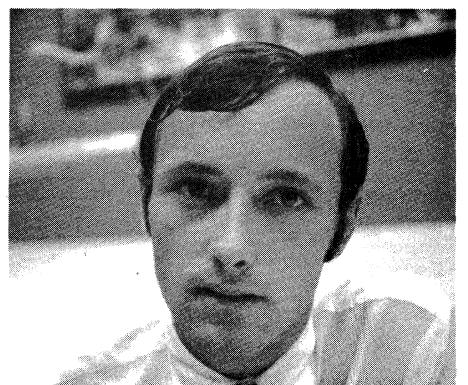
Frazer N. Owen  
Research Associate  
Basic Research - CV



John G. Lyon  
Research Associate  
Basic Research - CV

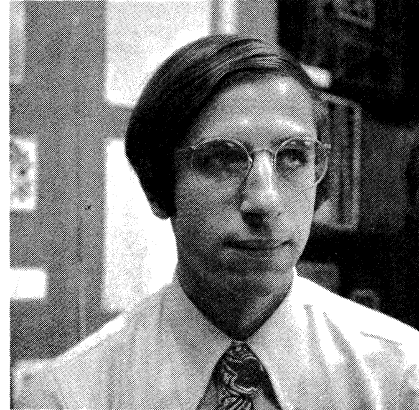


Thomas A. Royston  
Staff Shop Technician  
Central Shop - CV



Raymond B. Guthrie, III  
Computer Operator  
Electronics Div. - CV

Photo Not  
Available



Pamela W. Johnson  
Computer Operator  
Computer Div. - CV

Stuart Mufson  
Research Associate  
Basic Research - CV

REHIRES

Earl R. Herndon            VLA Project - GB  
David G. Steigerwald    Scient. Services - CV

TRANSFERS

Mark A. Gordon        Tucson Operations  
John M. Payne        Tucson Operations

TERMINATIONS

Robert H. Meehan	Computer Division - CV
C. Thomas Young	Computer Division - CV
Bruce Balick	Basic Research - CV
Gerrit L. Verschuur	Basic Research - CV
Donald C. Backer	Basic Research - CV
Henry P. Palmer	Basic Research - CV
Paul L. Baker	Basic Research - CV
Marvin L. DeJong	Basic Research - GB
*Patrick W. Coleman	Administrative Services - GB
*Daniel R. Stone	Telescope Operations - GB
*Robert L. Beverage	Plant Maintenance - GB
*Dana L. Moyers	Administrative Services - GB
*Timothy S. Waybright	Plant Maintenance - GB
*Mark E. Tracy	Central Shop - GB
*Terry L. Richardson	Administrative Services - GB
Gregory D. Athens	Computer Division - CV
Olivette P. Hasty	Electronics Division - CV
*Michael S. Hersman	Scientific Services - GB
Keith H. Johnson	Tucson Operations
*Gary C. Beverage	Electronics Division - CV

\*Temporary Employees

We are sorry to report the death of Bruce K. Nottingham who died on August 3, 1973. He had been with the Observatory for 13 years and was electrical supervisor.

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<p>HOW TO LIVE ON \$10,000 WHILE MAKING IT SEEM LIKE ONLY \$5,000</p>
---

by our Arecibo Correspondent's Wife

Helpful Hints On Spending More

Food is a major item in any family budget; with a little thoughtful effort you can make it rise to astronomical proportions. Here are some timely hints:

1) Buy the higher priced items such as prepared convenience foods. Be sure to buy only major brands; the supermarkets' own brands may cost less. Remember that certain of these types actually give you less for your money than others. Some suggestions are frozen macaroni and cheese dinners, frozen franks and beans; why stick with turkey when you can have so much less for more?

2) Always be sure to cook more than necessary for a given meal--much more than for one night's leftovers. That way, if by some mistake your family does like the meal they'll surely be sick of it by the third repeat. Never serve leftovers the night after; waiting a while gives the food a better chance to spoil so that it can be thrown out with impunity.

3) Leave foods out of the refrigerator for as long as possible; this way there's a better chance for spoiling. If it is necessary to put food into the fridge, be sure to leave it uncovered. Remember, unspoiled food may be eaten and this will defeat the purpose.

4) Fresh fruits require special attention. The best method is to fail to serve them to your family until they have gone bad. However, often this takes a long time; patience helps.

5) If you live in a humid climate, you can make great strides with such items as cereals, cookies, crackers, and bread. All you have to do is neglect to wrap them.

6) Always buy soda in large unresealable containers (12 oz. cans are ideal); this way the unused portion goes flat in a hurry.

By following these timely hints you too can spend your family into a higher income bracket in no time at all. Remember if you don't have twice as much garbage as your neighbor, you're not trying hard enough.

[Editor's note: The above article is inoperative; it was received by us dated B.P.IV, which we can only interpret as meaning Before Phase Four.]

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<p>NRAORA REPORT</p>
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Richard Fleming

The calendar of events for October thru December is as follows:

October - Nominating Committee Appointed  
Fall Concert

November - General Membership Meeting  
(nominations received from membership)  
General Elections  
Fall Dance

December - Children's Christmas Party  
Teen Christmas Party  
New Year's Dance

A nominating committee has been chosen to present to the board of directors--during the general membership meeting at 3:00 PM on Monday, November 19, in the Residence Hall lounge --names of members to be voted on in November to fill the vacancies that occur in January 1974. The six names presented to the membership during the November meeting plus names added to the list from the floor during the meeting will appear on a ballot to the general membership during the last two weeks of November. Results of the balloting will be posted and the new members will assist the old board in the very active month of December. The new members will take their place on the board in January at which time election of officers will be held.

Big plans are underway for the month of December which include a Christmas party for the children, Christmas dance for the teenagers, and the big New Year's Dance. Much has happened this year and more is to come.

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POLLUTION CONTROL
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Bill del Giudice

The earth work just north of the 140-ft scope is another pollution control project just completing its first phase. "Another?" Most people didn't even know that there was even one! But it is true.

Of course most people assume that the domestic-type waste from the various buildings on site is treated, and it is, with typical septic systems except in the primary building area where a small treatment plant west of the works area is used. But we do have "industrial" type waste as well, and in some areas it is sufficient quantity to cause concern.

We started talking about the 140-ft but let's go back three years and to the 300-ft. About that time the Engineering Division was asked to look into the problem at the 300-ft created by oil leakage which eventually found its way into Deer Creek. The drive chain (which moves the telescope) must be lubricated with oil and a portion of this oil drips and collects on the ground. More oil collects in the sump below the floor of the drive machinery pit and is pumped out, well mixed with water which also collects there. All this ends up in the rather large excavation south of the scope and is carried off by rain water and runoff from a spring in the bottom of the excavation via a culvert to a swampy area just to the west. This oil/water mixture eventually ended up in Deer Creek. But the flow path from the culvert outfall to the creek and indeed just about all of the swamp was marked by an oily coating on all of the fauna in the area.

The solution was to create a pond with enough capacity to impound the influent long enough to allow the oil to rise to the surface. A special spillway automatically drains excess water from the bottom of the pond leaving the oil trapped on the surface to be collected and properly disposed of. The effluent from the pond is clear with no trace of oil, even during high flowrates such as during a heavy spring rain. No attempt has been made to accurately measure the quantity of oil prevented from escaping into Deer Creek over the past three years, but it is on the order of 80 to 100 gallons.

Back at the 140-ft telescope we had a similar problem although apparently not as serious.

As might be expected from an operation of such size, it is inevitable that some oil should escape but, apparently, not as much as at the 300-ft. At the 140-ft the oil is carried by rain water via a culvert under the main site road and the access road to the power sub-station. When some evidence of oil in the outfall was found, it was decided to put an oil removal lagoon in this area also.

Since there is no constant water source here - such as a spring - to feed the pond, the pond is not filling rapidly and may not be full until next spring. There have been several heavy rains, however, and a very thin oil slick is beginning to form on the surface. In a year or two the disturbed earth will again be covered with grass and shrubs, but this time minus an oil coating.

\*\*\*\*\*

NOW IS THE TIME TO:

Reflect  
 Dry corn  
 Go hunting  
 Dig potatoes  
 Cook kale greens  
 Plant crocus bulbs  
 Look for hazelnuts  
 Carve pumpkin faces  
 Watch ducks fly south  
 Treasure each falling leaf  
 Finish seeding winter wheat  
 Haul apples to the cider mill  
 Set up a corn shock, just for fun  
 Roast marshmallows over a bonfire  
 Keep a fire extinguisher on the corn  
 picker  
 Stand content before a barn filled with  
 hay

\*\*\*\*\*

BNL VISITORS' DAYS

The Annual Visitors' Days at Brookhaven National Laboratory will be held this year on Saturday, October 27 for the general public, and on the following Saturday, November 3, for High School Students.

\*\*\*\*\*



ONE SHIFT IN THE LIFE OF  
A TELESCOPE OPERATOR\*

*All characters and events in this play are fictitious and any similarity to any persons living or dead is purely unintentional.*

Copyright pending 1959  
Copyright still pending 1973

*(Curtain opens as Ohm Galyer duty telescope operator is sitting at controls of telescope. The time is 2345. Enter Mango Grove, reporting aboard 15 minutes early to acquaint himself with program in progress.)*

- M.G.: "Hi there Ohm, is anything working?"  
O.G.: "Yea, the Halicrafter's been tuned to WRVA all evening. The noise from the scan motors has been coming through loud and noisy, superb reproduction."  
M.G.: "What kind of program you running?"  
O.G.: "Some more of operation sky map for Bends. Same old routine. Track on constant right ascension. Scan south at 153.5% to..."  
M.G.: "Whoa, whoa, how can you scan at 153.5%?"  
O.G.: "Well, you slew south and scan north at 88.5% at the same time and they cancel each other. As I was saying, scan at 153.5% from plus 67°2 to plus 23°7, print outs to occur every 33!5 of arc, plus or minus !2. Use an 18§39 gate, V-F converter on 10V scale, L0 1239.67 Mc. plus or minus .05 Kc, 2§5 T.C. x .1, audio on 7, 6.5 mm/m on sanborn, d.c. gain .05 V/cm. Now this is a sweep frequency scan also. The L0 sweeps from 145 Mc. to 146 Mc. at .3 Mc/s/hr. Record HA, EST, GMT, and ST every 5° of declination."  
M.G.: "Looks like Bends is getting away from those complicated programs he had at first."  
O.G.: "Yea, he ran out of control panels for the computer."  
M.G.: "Want me to take it?"  
O.G.: "If you insist."

*(O.G. begins filling out papers; telescope log, equipment log, receiver log, heat log, head log, water fountain log, etc. M.G. takes over control at console.)*

- M.G.: "Hey Ohm, how did you arrive at this indicated RA?"  
O.G.: *(Standing on tip toes to see over stack of log books.)* "The sidereal clock is 10<sup>m</sup> 37§821 fast and there is a minus 244<sup>s</sup> curve correction. You subtract the clock correction and add the curve to the true RA to get indicated."  
M.G.: "No, no, you should have added the clock and subtracted the curve."  
O.G.: "I know how to do it, you idiot."  
M.G.: "Who you calling an idiot, you imbecile."

*(They then begin to argue furiously. Enter Heinz [57 varieties] Bottom, Civil engineer from Denmark.)*

- H.B.: "Guten Morgen, Eie gehts?"  
O.G.: "How about settling an argument for us, Dr. Bottom? What is the right way to find the correct RA using clock correction and curves?"  
H.B.: "I haven't given advice since I called BD the southern hemisphere. Here's my program for tonight."

*(Note: Bottom has 15<sup>m</sup> telescope time every day, trying to find out how many carats are in the rings of Saturn.)*

- M.G.: "What are you doing up this late, Dr. Bottom?"  
H.B.: "Brake and Bends took me snipe hunting tonight, but I had read about this so while they were supposed to be off rounding up snipes and I was to be holding the bag, I ran back to the car and drove down here. I guess they are still up on Gobblers' Knob. Well, have fun."

*(Exit Bottom.)*

*(M.G. resets RA and begins program. He starts telescope, starts counter, starts frequency scan, gives a mark on sanborn, records HA, EST, ST, gets 0100 clock check all at the same time. O.G. continues writing in log books.)*

- M.G.: "What's this bucket doing here?"  
O.G.: "That's in case you have to go to the head more than once during your shift."

--continued, next page--

Bends says we're wasting too much time. He doesn't want to appear as a Simon Lagree so he has allowed one head trip per shift."

M.G.: "What'll they think of next? --- Oh damn, I've gone 20° too far south. Well, I can fix it. You know our motto - 'to err is human, to cover it up is too.'"

O.G.: "You're doing fine. I got one scan right this evening, but I fixed the rest of them so he can't tell the difference."

*(M.G. returns to north limit of scan and begins a new one.)*

M.G.: "I see you are using V-F converter #1, counter #3, and printer #2, how come?"

O.G.: "Every thing else is broke. I'm going to send them back to the factory tomorrow."

M.G.: "Good boy, you'll make technician yet."

*(Time passes - routine operation till 0230.)  
(O.G. finishes filling out logs.)*

O.G.: "See you tomorrow, good night."

M.G.: "Good night."

*(Exit O.G. M.G. removes chart paper, print out paper, data tape, puts them in Bends' basket, files operation logs in appropriate log book, resets gate time, time constant, dc gain, audio gain, chart speed, and LO frequency without losing any time from Bends' or Bottom's programs. NOTE: This is expected by all observers. LO 1400 Mc. 10<sup>s</sup> gate, 1 V scale, etc. All routine settings. Runs program for 5<sup>m</sup>, resets for 10<sup>m</sup>. 0245 he stops Bottom's program, makes all usual changes that occur between programs. 0245 he begins D. Cow (named from windshield stickers) program. LO 1498.881 plus or minus 7 Kc, 8.32 gate, 100V scale, 3v/hr, 9mm/m, audio 5. Program consists of slewing east from 10<sup>h</sup> 32<sup>m</sup> 01<sup>s</sup>, corrected to 11<sup>h</sup> 48<sup>m</sup> 07<sup>s</sup> corrected. Prints every 33<sup>s</sup> of RA plus or minus ±3. Record RA, EST, ST, marks on sanborn every 59<sup>s</sup> of RA [corrected]. Each run preceeded by calibration. 0246 enter D.C.)*

D.C.: "What's the trouble, Mango?"

M.G.: "Nothing, why?"

D.C.: "I just wondered why you haven't started my program."

M.G.: "I'm just right now starting it."

*(Begins program.)*

D.C.: "This should be easy for you, it's almost like Bends'."

M.G.: "How do you mean that, everything is different."

D.C.: "Well, we both use the same telescope."

M.G.: "Oh."

*(Time passes, D.C. exists, M.G. runs program until 0500, makes 17 mistakes on digital output, covers them up well. At 0500 stops program, removes data tape, print out tape, chart tape, resets LO to 1400, TC to 1<sup>s</sup>, dc gain to .1 v/cm, chart speed to 10 mm/m, audio to 1, gate to 10<sup>s</sup>, scale to 1V. Moves telescope 10<sup>m</sup> in RA, and 90° in dec. At 0500 begins Gamble Swim's program which consists of 30<sup>m</sup> drift curves. Runs program till 0800. Makes no mistakes because of simplicity and well planned type of program. 0800 enter Turn Screws, Bert Liars, Jake Hotkins, and Pat Haslo to run 8<sup>h</sup> day shift.)*

T.S.: "We'll take it M.G. How is everything going?"

M.G.: "Same old stuff; well, it's all yours."

*(M.G. gets up from console, B.L. sets down, continues program. Curtain closes as M.G. is filling out log books.)*

\*Original manuscript found in NRAO-CV archives of Campbell Wade. Date of writing circa 1959. Author, Bill Meridith.

\*\*\*\*\*

BOWLING

Don Hovatter

The 1973-74 bowling season began on September 24. The NRAO is fielding only one team this year. I guess the weekly trip across Cheat Mountain finally became too much for some of the previous bowlers.

This year's team is as follows: Russ Poling, Howard Brown, Jon Spargo, Bill Radcliff, Don Hovatter, Wendell Monk and Bob Vance.

The team's record through the first four weeks is nine wins and seven losses.

\*\*\*\*\*

PUBLIK AUCTION*
-----------------

of antiques

Saturday, February 30, 1974  
01h 32m 07s

At the Property Commonly known as  
the Stromany Plant

On routes 92/28 1.5 miles north of  
Green Bank Post Office, 0.2 miles  
south of Arbovale Post Office,  
0.1 mile south west of telephone  
exchange building, and 3.3 miles  
east of Hosterman Crossing at the  
Greenbrier River.

- 1 odd lot of assorted lengths of co-axial cable (makes a good whip)
- 10 feet of waveguide, 4" diameter, can be converted easily into sewer pipe
- 1, 42-ft. moveable radio telescope, must be assembled
- 1, 40-ft. transit radio telescope, must be dismantled
- 1, order of magnitude and a factor of 2
- 1 or 2 odd-summer student(s) w/wo long hair
- 300 pounds packing material
- 5000 tons of reprints and preprints - useful in rural living
- 28 pounds of packing
- 1 book "Extrapolation Made Simple" -- (darts included)
- 1 research paper, never been published
- 1 hardly used polar shaft, must be excavated
- 1 copy access codes to Green Bank computer room
- 1 electronics engineer's manual "Eat Prime Steak on an Engineer's Salary"
- Odd lot assorted office and building keys
- 10 paint jobs (white) downwind of the 300-ft.
- 30 db of R.F. power somewhere between Green Bank and Huntersville in a tree
- 1, 50-cent piece - used by management for decision making
- Cessna parts franchise at NRAO airport
- NRAO tourist film (choice of 2 versions)
- All the ground hogs you can run over and eat
- 250 sq. ft. office space till December (lots of scratch paper)
- 1 record - "1001 Obscene Replies to Absurd Questions"--recorded live at  
the two-foot telescope
- 1 book "Seven Recipes for Eternity" by J. McLaughlin
- "A Lunch Conversation with W. del Giudice" (16 volume set)
- 1 portrait - Turkey Oliver holding a 300-ft. balloon
- 17 slightly chewed cigar butts a la Westerhout
- 1 moveable (Kangaroo-type) telescope (snatched from the Aussies)
- 57 Automobiles with ignition-sparks
- 1, ROM (Rough Order of Magnitude)
- 1, WAG (Wild Ass Guess)
- 1, Purple shaft (will find wide use)
- 1 bag belly button lint (from mixed belly buttons)
- 1 deer carcass (remains of collision with AUI plane)
- 10 acres of uncut hay on NRAORA golf course (includes 5 bu. golf balls)

--continued, next page--

- 1 green diesel sedan (painted white)
- 5 legal loop holes (made to be of use to high salaried individuals)
- 1 round trip ticket - GB to CV
- 1 Petty Cash voucher

And many other items too numerous to mention.  
 Lunch will be served by Green Arbor Garden Club.  
 Terms: Cash (no stamps please)  
 Owners: Mr. and Mrs. N.S.F. Associated  
 Sale by: American Astronomical Society Auction Service  
 Boris Alexandrovich, auctioneer

\*Reprinted by special permission from JOPCAS, (Journal of the Pocahontas County Astronomical Society).

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GOOSE, GROUSE and GROUND

"I knew if that dumb bird didn't quit sitting in the road someone was going to run over it." Thoughts such as this flitted through Judy Moore's mind when she hit a big, fat, white goose on her way to work the other day. Judy has the funniest car grill I've ever seen - white feathers sticking out all through it. I think, Judy, you should have called a goose plucker.

"Sure scared the hell out of us!" That's what Don Stone said when a large grouse (W. Va. pheasant) flew through their glass window and showered them with glass while they were watching pro football. The grouse landed in the living room and died - after flopping around a few times - apparently of a broken neck. The Stones had pheasant through glass.

After investigating an explosion out in the barnyard, Tony Hamed made this statement to his son, Joe: "That's going to cost me about twenty-six bucks!" Son Joe had just blown up a practically new battery in the pick-up. Joe was trying to start another truck with jumper cables. He had correctly attached cables between batteries, but when he was getting into one of the trucks the opened truck door touched the pick-up and BANG! Luckily for you, Tony, that Sheets' Garage is so close.

\*\*\*\*\*

JUST A STORY

The other day M. C. and I were having one of our high-level conversations. This particular one was about problems that can arise in the workplace. I had just finished telling M.C. about the case of an employee whose problems at the workplace resulted because of a desk. His desk had only four drawers but his equals around him had desks with five drawers. When he was given a desk with five drawers, his problems went away. Somehow this case history triggered in M. C.'s mind a story, a story he says was told by a personnel manager of a company long known for no-nonsense policies. It's about a guy named Joe who was four days late reporting back from vacation.

Joe and his family were away on a scheduled vacation. He was due back to work on the 4th of the month. However, Joe failed to show up on the 4th and didn't report in until the 8th. On the afternoon of the same day Joe showed, the personnel manager called him in and asked why he was 4 days late coming back to work. Joe looked the personnel manager straight away and said, "Sir, you're not going to believe my story why I'm four days late but I swear it's the truth. Here's the story. We, including my mother-in-law, had stopped at a campground in North Dakota for the night. Sometime during the night my mother-in-law died, apparently quietly of natural causes. We didn't discover this until the next morning, after which I went off to

--continued, next page--

the nearest town with the family to hunt up an undertaker. While we were gone, someone took my camper. This someone, not knowing my mother-in-law's body was inside, took it too. I spent four days hunting for my new camper and the body. I never found either one and than's why I was four days late reporting back to work."

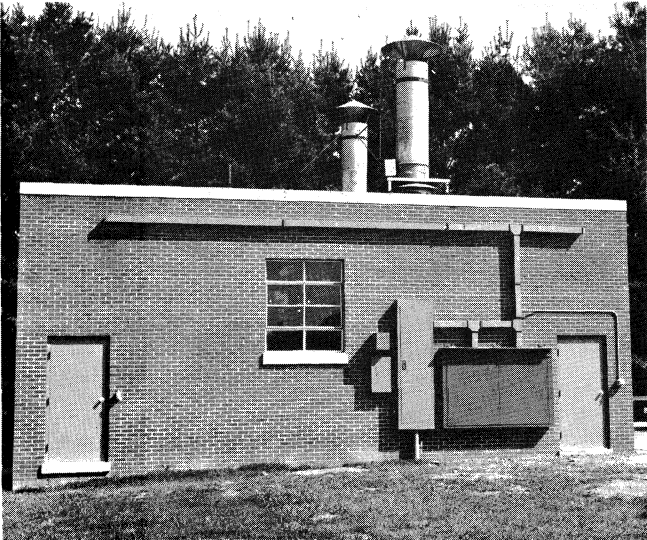
"OK, Joe, I'll check into it; you go back to work." And so the personnel manager did. Everything Joe said was checked out and found absolutely true. Neither the camper nor the body were ever found. This story is undoubtedly a classic among personnel people.

\*\*\*\*\*

#### PAINT SHOP

Bill del Giudice

The new brick building in the works area with the twin stacks is not, contrary to rumor, a Mississippi river-boat designed by a NRAO engineer, though it may look like one. It is in fact the new paint shop. The twin stacks, its most outstanding visual feature, are designed to exhaust any paint residue which may escape the filters high enough so that there will not be another rash of polka dotted vehicles as has happened in the past.



New Paint Shop In Works Area

Other features of the paint shop are: the automatic air handling system and special wiring. The paint sprayers cannot work unless the fans to remove airborne paint are turned on first, which will help prevent illness due to breathing paint and solvent fumes. The special explosion-proof wiring is designed to prevent fire or explosions caused by stray solvent fumes being ignited when a light or motor is turned on.

The new paint shop - a much safer and cleaner place to work - will replace the present paint area which did not comply with OSHA safety standards or the National Fire Codes, and was inadequate for the work to be done. The only problem we have not solved yet is where to get an explosion-proof replacement for Neil Horner's old briar pipe.

\*\*\*\*\*

#### AUI SCHOLARSHIPS

Applications for the 1974 AUI Trustee Scholarships are now available from Bill Howard's office.

Two scholarships will be awarded to children of regular employees of the National Radio Astronomy Observatory. In addition, two Affirmative Action Scholarships will be awarded to children of minority employees of BNL, NRAO, and AUI.

Each scholarship will be in the amount of \$900 per year for up to four years and will be available to students entering an accredited college or university in the United States.

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#### SNOWSHOE

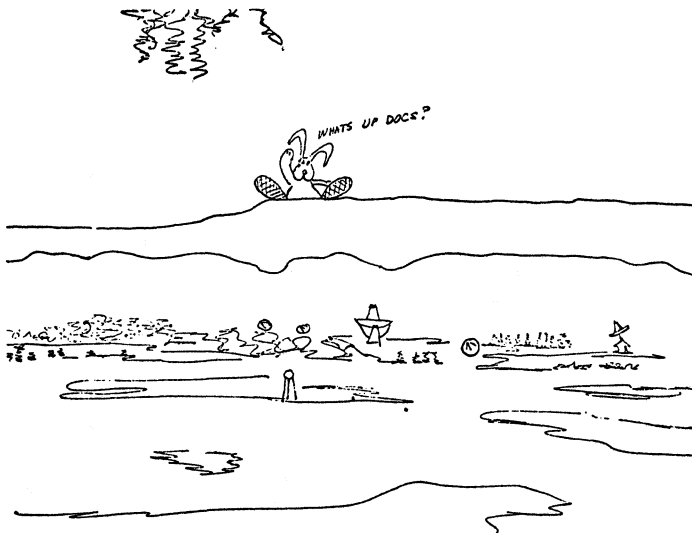
Wally Oref

For most people in Pocahontas County, Snowshoe generally brings to mind a big-footed, white rabbit that inhabits the upper reaches of Cheat Mountain. In the near future, Snowshoe may come to mean something else to Pocahontas Countians, and to people in the East. Snowshoe may come to be synonymous with "plush, plushiest, and best resort east of

--continued, next page--

the Mississippi." It may well be if recently published information in local and state papers turns out to be accurate. The newspapers have reported a multimillion dollar resort will be built in Pocahontas County.

According to newspaper accounts, "Snowshoe, Inc." will build a \$90,000,000 all-season resort in Pocahontas County on 7,000 acres lying mostly within the headwaters of Shavers Fork. 6,696 acres of land was bought from Mower Lumber Company and a 365 acre tract from Pauline Galford and family. The Mower acreage encompasses a bowl-like area between Thorny Flats on the South and Old Spruce on the North. The Galford tract runs westward from the main tract and will be used for two ski slopes, one having a 1500 foot drop. On September 13, the County Clerk's office re-recorded a deed transferring 6,696 acres from Mower Lumber Company to the Snowshoe Company.



Plans for Snowshoe call for twelve ski lifts, one or more golf courses, a 150 acre lake, 20 outdoor tennis courts, 4 indoor courts, bicycle trails and riding stables. Dwellings in the complex will include twelve-hundred hotel rooms, 1,200 condominium units, and 400 single-family dwelling units.

Brush and tree clearing have already begun and work is supposed to continue right through the winter. Major construction will begin next spring. The project is expected to be completed within seven years but parts will be in operation in December 1974. About fifty people will be employed this year, 300

in 1974 and 800 by the end of five years.

People interested in more details on the Snowshoe project should read the September 13 issue of the POCAHONTAS TIMES. A Xerox copy of this article is available from the OBSERVER office. Western Auto in Elkins has a diarama showing the Snowshoe Project.

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### LIBRARY FISH STORIES

Virginia Van Brunt

We bin fishun... but that is only part of the reason we have been so quiet lately.

If your summer fun is just about over and you feel the urge to read, we have a few suggestions.

If you doubted the interpretation of the published results of the psychological survey of NRAO scientists which appeared in JOPCAS, the library has 2 books to provide a bit of background reading: THE MAKING OF A SCIENTIST by Anna Roe, and SCIENTISTS: THEIR PSYCHOLOGICAL WORLD by Bernice Eiduson. Curious...both books were written by women.

Next time you are asked, "Do you believe in UFO's?" what will you say? We don't have the definitive answer, but we do have a title to stir up a little more controversy, THE UFO EXPERIENCE, A SCIENTIFIC INQUIRY by J. A. Hynek.

Two new books by Robert Newton are both historical in nature. ANCIENT ASTRONOMICAL OBSERVATIONS and THE ACCELERATIONS OF THE EARTH AND MOON deal with observations of solar and lunar position beginning with the days of Hipparchus, (that is 161 to 126 B.C., in case you have forgotten). The other documents MEDIEVAL CHRONICLES and THE ROTATION OF THE EARTH are attempts to synthesize observations of solar eclipses from medieval records dating from the year 400.

We now have the following volumes in the  
--continued, next page--



Sky & Telescope Library in Astronomy: 1) WANDERERS IN THE SKY, 3) ORIGIN OF THE SOLAR SYSTEM, 4) TELESCOPES, HOW TO MAKE AND USE THEM, 5) EVOLUTION OF THE STARS, and 6) STARLIGHT.

Should you be in the mood for a biography, we have THE LEGACY OF GEORGE ELLERY HALE by H. Wright. And finally if you are wondering how a Nobel Laureate thinks...we have a book about one, written by one, ENRICO FERMI, PHYSI-

CIST, written by his first student, E. Segre.

With all that you may not care about the history of HARVARD COLLEGE OBSERVATORY, by Bessie Jones, but if you do, we have that too.

Last, but not least, we still distribute our monthly "NEW BOOKS AND PREPRINTS LIST" to anyone interested enough to call extension 254.

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IF

Ruyard Kipling

If you can keep your head when all about you  
Are losing theirs and blaming it on you;  
If you can trust yourself when all men doubt you,  
But make allowance for their doubting too:  
If you can wait and not be tired by waiting,  
Or, being lied about, don't deal in lies,  
Or being hated don't give way to hating,  
And yet don't look too good, nor talk too wise;

If you can dream--and not make dreams your master;  
If you can think--and not make thoughts your aim;  
If you can meet with Triumph and Disaster  
And treat those two impostors just the same:  
If you can bear to hear the truth you've spoken  
Twisted by knaves to make a trap for fools,  
Or watch the things you gave your life to, broken,  
And stoop and build 'em up with worn-out tools;

If you can make one heap of all your winnings  
And risk it on one turn of pitch-and-toss,  
And lose, and start again at your beginnings,  
And never breathe a word about your loss:  
If you can force your heart and nerve and sinew  
To serve your turn long after they are gone,  
And so hold on when there is nothing in you  
Except the Will which says to them: "Hold on!"

If you can talk with crowds and keep your virtue,  
Or walk with Kings--nor lose the common touch,  
If neither foes nor loving friends can hurt you,  
If all men count with you, but none too much:  
If you can fill the unforgiving minute  
With sixty seconds' worth of distance run,  
Yours is the Earth and everything that's in it,  
And--which is more--you'll be a Man, my son!

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