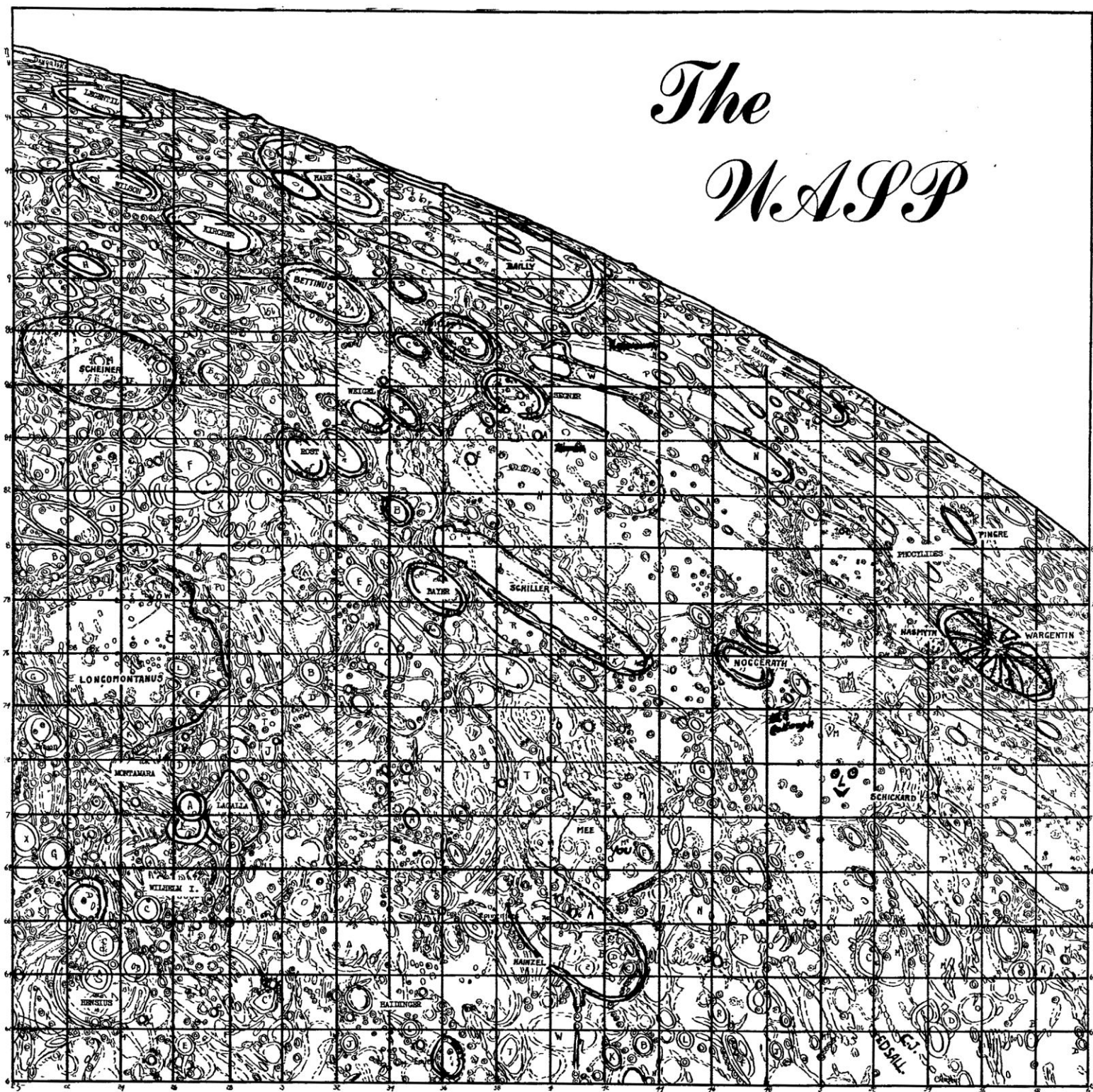


The WASP



XXII

october, 1971

Cover by---Chris Edsall

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The Warren Astronomical Society Paper is published monthly as a privilege of membership. Contributions are always welcome.

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* * * * *

SALUTE OF THE MONTH

This month, Ken Wilson should be recognized for outstanding contributions to the club.

Ken has played a key role in the work at the observatory and also in the resurrection of the club paper. While I was in New Orleans, he worked very hard to put out of good issue of the paper, which it was. Ken has showed himself to be a proven performer and with great pride, the WASP is more than happy to take on another editor. The club should know that the paper now has two editors and out of this move will come a better paper and better articles for our club, and any other club reading our paper.

Ken should also be congratulated for his repeated winning of the 1st Place contestant in the "2nd Annual Messier Contest."

NEWS ITEMS
by Kenneth Wilson

Water on the Moon

It was reported on October 15 that water clouds had been detected on the moon, erupting like geysers. This, the first detected water on the moon, was detected by instruments left there by the astronauts of Apollos 12 and 14.

Dr. John W. Freeman, Jr., of Rice University, said the instruments detected a "moon geyser" on March 7 that lasted about 14 hours. He said the cloud, which consisted of 99 percent water vapor, spread to cover an area of ten square miles near the edge of the Ocean of Storms. The geyser coincided with a series of small moonquakes that were recorded by the Apollo seismic instruments.

"This indicates there is possibly liquid water in the subsurface of the moon," Freeman said. "In my opinion, this represents a potential benefit and we could tap this source of heat energy and water if the day comes when Congress and NASA see fit to establish a permanent lunar base."

Freeman also said that the thought the clouds of water from the geysers should be visible to man. But, as he only had readings from two reference points, he could not pinpoint the source of the geyser.

* * * * *

Aurora and Heart Disease

The Soviet scientific journal Earth and the Universe, reported that deaths due to heart disease appear to increase during periods of intensified solar activity. According to the Soviet scientists, magnetic storms in the atmosphere caused by solar flares affected both healthy persons and invalids. But, healthy people quickly returned to normal after the solar storms, whereas sick persons took much longer to recover, and sometimes never completely. These are the same magnetic storms that cause the Aurora Borealis of the northern lights.

Statistics for sudden deaths due to heart disease in the city of Sverdlovsk from 1944 to 1966 closely followed the curve of solar activity during that period. Data from the same city of the period of 1960-66 showed that there were more than three times as many deaths from heart infarcts during days of high magnetic disturbance as on magnetically quiet days. (Heart infarcts are a blockage in the blood supply to a portion of the heart muscle.)

In experiments under artificially created conditions on dogs and rabbits, they found under similar magnetic fields, the animals showed marked effects on their cardiovascular systems, nervous systems, bloods, pulse rates, and the activity of certain enzymes. The animals also became more excited under the magnetic fields.

* * * * *

WASHINGTON--(UPI)--a meteorite which fell in Australia last year was found to contain amino acids, the building blocks of life which suggests the possibility of life elsewhere in the universe, the National Aeronautics and Space Administration reported Tuesday.

The first positive identification of amino acids originating outside earth was claimed by scientists at NASA's Ames Research Center at Mountain View, California.

Dr. Cyril Ponnampereuma, the chief scientist, said it probably was the first conclusive proof of extra-terrestrial chemical evolution, the chemical processes that precede the beginning of life.

A year ago, another scientist, Dr. Sidney W. Fox of the University of Miami finding amino acids in soil samples returned from the moon by Apollo astronauts.

At that time, Ponnampereuma challenged Fox's findings, insisting they were due to earthly contamination. Since then, however, further evidence has been gained to support Fox's claim. Ponnampereuma, however, continues to discount Fox's research.

NASA noted that amino acids and other complex organic molecules, or hydrocarbons, have been found in meteorites before, but these might have been the result of contamination after impact with earth.

The AMES research team, using "the most precise methods known for exact identifications of complex chemicals," reported strong evidence that the

Australian meteorite's amino acids were chemical rather than biological in origin.

The meteorite from which samples were taken fell near Murchison, Australia, on Sept. 28, 1969, and is believed to have originated in the belt of asteroids or small planets which orbit mostly between Mars and Jupiter.

Ponnamperuma, according to NASA, said the discovery provides strong new evidence for the theory of chemical evolution, the process by which complex chemical molecules evolve to the point they can reproduce themselves.

The find also "suggests the possible existence of life elsewhere in the universe, resulting from chemical evolution," and "may provide a new time sequence for the origin of life on earth and elsewhere in the universe" NASA said.

NEW LIGHT IS SHED ON MYSTERY OF LIFE

At some point in grammar school science courses, children are taught that there are two kinds of matter--living and non-living--and that there is a clear-cut difference between them.

They are taught that life is some kind of miraculous quality conferred by a god or other mysterious source.

From then on, the idea sticks and any other way of thinking about the nature of biological life seems hard to believe, sometimes even heretical.

That's going to have to change. Research in many laboratories over the last 10 or 15 years is leading closer and closer to the understanding that "life" and "non-life" can't be thought of as black and white.

It now appears that, when conditions are right, molecules will combine into forms that take on more and more of the characteristics of life. Even if the conditions are not completely right, they will go as far toward life as they can.

Perhaps the most dramatic experiments that demonstrate this are carried out in the lab of Dr. Sidney W. Fox, director of the Institute of Molecular Evolution at the University of Miami. Most of Fox's research is financed by NASA.

Fox's goal is to learn how life arose. His method is to take the raw materials that were available billions of years ago and subject them to environmental factors, such as heat and water, which were available then.

Starting with methane, ammonia, and water--simple compounds that form spontaneously--Fox can apply heating and cooling procedures that transform the molecules, step by step, into things that look more like life as we know it at every step.

Here is what has been done:

When mixed and heated, the raw chemicals combined to form amino acids, the building blocks of protein. The amino acids were identical to many of those found in living tissue.

When the amino acids were heated, they linked together in long chains that fit the definition of Protein. Fox prefers to call the chains proteinoids.

When a blob of hot proteinoid was splashed with cooler water, the proteinoids organized themselves into millions of microscopic, hollow, fluid-filled spheres that look like empty cell walls. Fox didn't plan it that way. That's just what proteinoid always does under those conditions.

When the microspheres are put into water of a certain temperature with the right chemicals dissolved in it, they form tiny buds that break off and grow to the size of the "parent microsphere."

Each of these steps pushes the laboratory product closer to looking like a "naturally living" cell. All of this has been reported before.

Now Fox has taken his experiments another step.

In a general current, microspheres bump into each other and slowly form hollow tubes connecting them.

"Under the microscope, we can then see particles move from one microsphere, through the connection, and into the other," Fox said, "We

believe those particles are proteins and that the microspheres are, in a way, communicating.”

He said the process looks like conjugation, a sex-like activity in which certain one-celled animals form connecting tubes and exchange chromosomes. The difference is that the animals trade DNA, the molecule that contains the genetic code, and the microspheres trade proteins that have structures containing coded information of a different sort.

Are the microspheres alive?

They have some attributes of living cells and they lack others. Undoubtedly, future experiments will try to cause the microspheres to become even more lifelike.

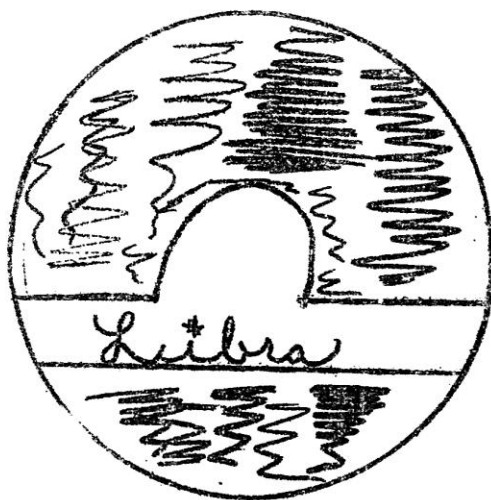
In recent years, scientists have found that the original raw materials can be found drifting around as independent molecules between the stars of our galaxy. Presumably, they have been there for billions of years.

Last year, Fox found that lunar dust contains amino acids. This week, as NASA in-house scientist reported finding amino acids in a meteorite.

Nobody is claiming that the amino acids from space were created by living creatures elsewhere in the universe . . .

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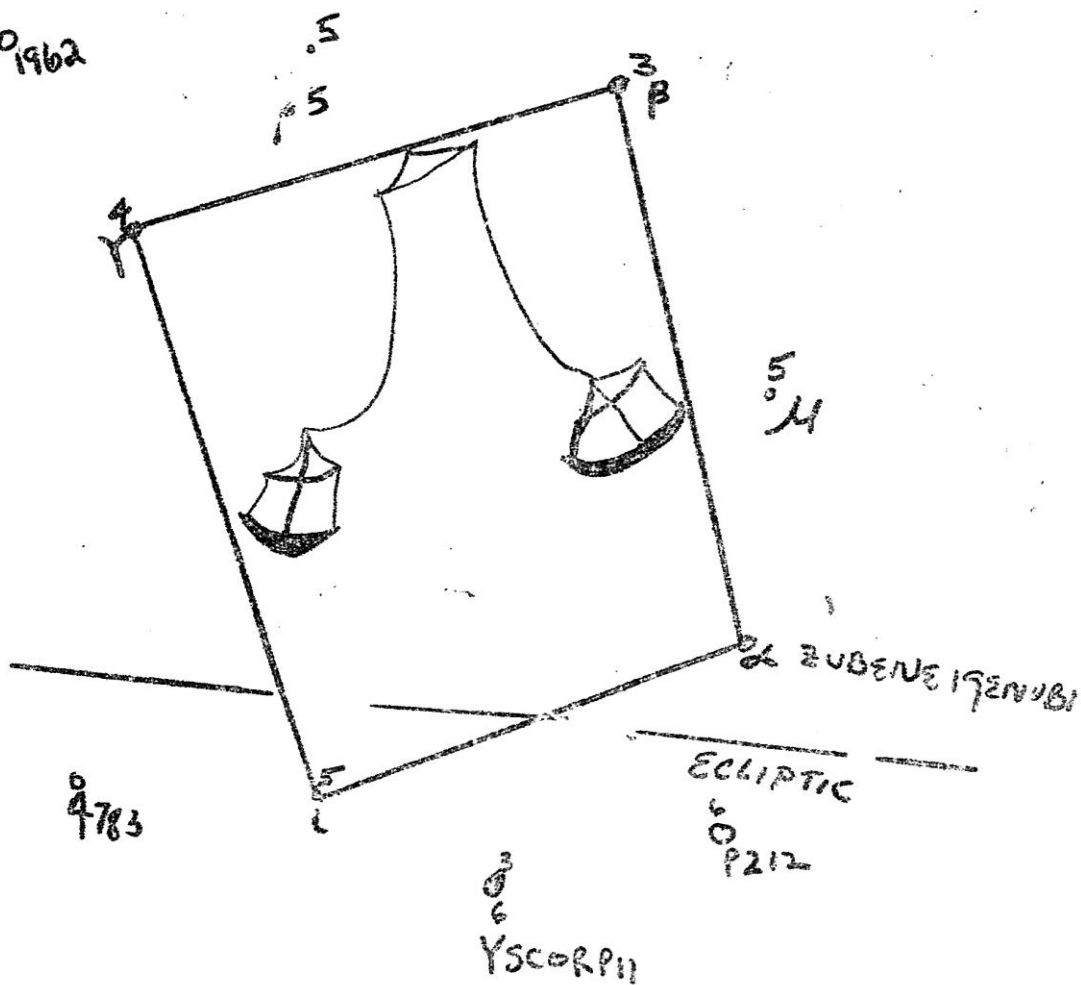
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LIBRA

151015

1962



59 HYDRAE

Location: Libra is located between the constellations Virgo and Scorpius. Its principal stars, Alpha and Beta Librae, are of the third magnitude. Tau Librae, a star of the fifth magnitude, is situated about twenty degrees northwest of Antares, the brilliant red star in the heart of Scorpion.

Alpha Librae has a 5.3 magnitude companion.

Beta Librae is green in color. It is a wide double for field glasses, and is approaching our system at the rate of 23 miles per second.

Ptolemy gives it as equal to Antares. One of the two stars has possibly varied in light since ancient times.

Iota is a yellow-purple double star with a magnitude of 4.7 to 9.7.

1962 is a good object, with a magnitude of 6.3 to 6.4.

Libra, the flower child, the listener, derives her name from the Romans, when she was regarded as the balance of Astraea, the goddess of Justice, upon which the fate of morals was weighed. The iron fist swathed in velvet, strong are the Librans, yet wily in their ways of obtaining them. We let others come to see our way as being THE way--the way of the world, the universe. For the eyes of Libra can see through the swirling haze of her planet, Venus, as well as the wool of the sheep being pulled over her eyes.

Six times the chimes of karma, free in turn the eternal harmony. Libra listens and quietly sings, pealing each yellow note.

The autumnal equinox shuffles in under encouraging aspects for a change, implementing enthusiastic projects and organization, as we all intended to do months earlier. Mad plots, romantic schemes end of first week may work out if after-thoughts of second week are taken seriously. Pluto enters Libra mid-sign, signaling overdue and radical changes in legislature, contractual agreements.

ZPS (Zodiacal Post Script): With all our fine ideas, and well-meaning projects, someone should mind the store and sweep up after the party. Attention to detail and a broad view should solve most problems, and some mass jollity around the mid-point should brighten up our old autumn world.

BORN UNDER LIBRA

Poet	T.S. Eliot
Painter:	Watteau
Author:	Thomas Wolfe
Star:	Sarah Bernhardt
Composer:	Franz Liszt
Philosopher:	Nietzsche
Head of State:	Mahatma Gandhi (same birthday as mine!)
Wit:	Groucho Marx

We Librans are generally good-natured with a strong sense of justice; the restless Libran can be just as gracious and charming as well as stubborn and quarrelsome. Gullibility and laziness are traits to guard against. The Sun enters September 24.




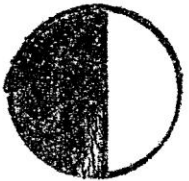

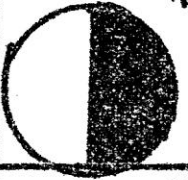
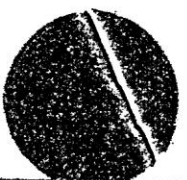
A short note--Libra is a hard constellation to find, so the author traced it down in Olcott's Field Book of the Skies. The rest comes from books, records, and friends who are into astrology and witchcraft.

There is not a great deal to be found astronomically about this constellation, so please overlook the overdose of astrology.

SAVE FOR FUTURE
REFERENCE WHEN LIBRA
IS UP!

MARY RILEY
✓ MFR

LIBRAN CALENDAR - SEPT. 24 - OCT. 23

S	M	T	W	T	F	S
 1971 - YEAR OF AIR					SEPT. 24 GATHER WOLF BANE	25
26 BATHE IN PINE WATER	27 	28	29	30 BURY OFFERING IN EARTH	OCT. 1	collect 2 THE LEAVES OF AUTUMN HERB
3	4 	5 WANING	6	7 COME TOGETHER AT CAIRN	8 UNLUCKY DAY	9 SLEEP UNTIL NOON
10 SPEAK LITTLE	11 	12	13 WEAR THE COLOUR THAT IS YOUR OWN	14	15 DO NOT MARRY	16
17	18 AVOID STRANGERS	19 	20 WAXING	21 ENJOY SENSUAL PLEASURES	22	23 ABANDON CARES

Bell, Book, and Candle

Ring the bell, light the candle and open the book of shadows; the ancient preface to an act of magic. Enter this simple ceremony would become distorted into a right of exorcism. But in the beginning, it belonged to the cult of the wise, the witches.

If you would learn to cast an enchantment or work a spell, remember the prime requisite is complete confidence in your ability to do so. The words and actions are mere formalities. The magic lies in the strength of your will and the power of your mind. These are fire charms and must be performed alone.

TO ATTRACT A LOVER --Crumple the dried leaves of laurel and scatter them over live coals. As they burn, firm your will and bring the face of your beloved to your mind's eye. Chant:

Laurel leaves,
Burn in fire,
Draw to me
My heart's desire.

TO RID ONESELF OF THE PAIN OF UNREQUITED LOVE--Kneel before a roaring fire, as you hold a handful of dried vervain leaves, concentrate upon your intention.

Throw the herb, all at once, on the flame and repeat

Here is my pain,
Take it and soar,
Depart from me now,
Offend me no more.

TO GAIN CONTROL OF ANOTHER'S WILL--Take the dried leaves of St. John Wort, enough to make a generous handful. Strew them over the fire as you say aloud:

It's not the herb that I now burn, but _____'s heart I mean to turn,
May he no peace nor comfort find, ere he bend to me in soul and mind.

From the
Witches almanac
MFR
MARY RILEY

TELESCOPIC RESOLUTION AND DOUBLE STARS

by

KENNETH WILSON

One criteria for the judgment of telescopic performance is its resolution. Resolution is the ability of a telescope to see fine detail. Theoretically, the larger the aperture of a telescope, the better the resolution. The better the resolution, the finer the detail that may be seen on objects such as the planets. One method of testing the resolution of a telescope is by examining its ability to separate close double stars.

The English astronomer, Rev. William Rutter Dawes (1799--1868) calculated, from his observations, a formula for the distance between the components of a double star necessary before it can be separated. According to Dawes, this distance (in seconds of arc) is equal to 4.56 divided by the diameter of the telescope objective in inches (Fig. 1). Dawes' limit was formulated for two 6th magnitude, yellow stars. A double with stars of unequal brightness is more difficult to resolve, because the brighter one tends to wash-out the dimmer one. For most telescopes, the resolving power for blue stars is greater than for yellow ones. And, yellow ones are more easily resolved than red stars. According to Dawes' limit, a double at the limit of a telescope will be resolved into two overlapping diffraction discs; the center of one touching the circumference of the other.

Dawes' limit can be reached, if you have reasonably good optics, good observing conditions and a trained eye. But if these conditions are not present, Dawes limit may not be achieved. In this case, a more practical limit may be used. Dividing 7.8 by the telescope's diameter of aperture in inches gives this in seconds of arc (Fig. 2). Under good conditions, a double within this limit should be cleanly resolved into two, non-touching diffraction discs. Most telescopes should reach this limit easily.

Diffraction
discsIntersecting diffraction
discs under Dawes limit.

Resolution

$$\text{(in secs. of arc)} = \frac{4.56}{\text{Diameter of Objective}}$$

fig. 1-Dawes limit

Diffraction
discsSeparated diffraction discs
under practical limit.

Resolution

$$\text{(in secs. of arc)} = \frac{7.8}{\text{Diameter of Objective}}$$

fig. 2-practical limit

Despite the severity of Dawes' limit, there are many reports of exceeding it. Perhaps telescopes of today are better than the Alvin Clark refractors used by Dawes. A limit of 2.8 divided by the telescopic objective diameter in inches, has been successfully by some amateurs. Therefore, if you try, you may be able to exceed Dawes' limit.

Below is a list of test double stars, their magnitudes and separations. Test the limit of your telescope and see how far it will go.

DOUBLE STAR	/MAGITUDES	/ SEPARATION (IN SECONDS OF ARC)
1. Gamma Leonis	2.6, 3.6	4.0
2. Rho Herculis	4.0, 5.1	4.0
3. Eta Draconis	4.0, 7.6	3.3
4. Alpha Scorpi	1.2, 6.5	3
5. Mu Boötes	7.2, 7.8	2
6. Zeta Orionis	2.0, 4.2	2
7. Delta Cygni	3.0, 7.9	1.9
8. Xi Ursae Majoris	4.4, 4.9	1.9
9. Zeta Herculis	3.0, 6.5	1.6
10. Alpha Gemini	2.0, 2.8	1.7
11. Epsilon Arietis	6.0, 6.4	1.5
12. Pl Aquilae	6.0, 6.8	1.4
13. Eta Gemini	3.2, 7.3	1.4
14. Eta Orionis	3.8, 4.8	1.4
15. Mu Cygni	4.7, 6.1	1.2
16. Beta Hydrae	4.4, 4.8	1.2
17. Zeta Boötes	4.3, 4.8	1.2
18. Zeta Cancr	5.0, 5.7	1.1
19. Nu Scorpii	4.2, 6.7	1.0
20. Eta Coronae Borealis	5.2, 5.7	.7
21. Gamma Coronae Borealis	4.0, 7.0	.7
22. Iota Leonis	3.9, 7.1	.7
23. Lambda.Serpens	4.0, 6.1	.7
24. Eta Equuleus	5.8, 6.3	.656
25. Gamma Andromedae	3.0, 5.0	.65
26. Zeta Sagitari	3.4, 3.6	.565
27. Beta Delphini	4.1, 5.1	.480
28. Pi ² Ursae Minors	7.2, 8.2	.42
29. Delta Serpentis	3.0, 4.0	.38

THE BOY WHO REDEEMED HIS FATHER'S NAME

As she had done many times, Mrs. Shoichi Ikeya woke when her son Kaoru did, and unnoticed by him, saw him preparing to watch the sky. She saw him draw on his leather windbreaker, heavy work pants, wool scarf and gloves (winter nights are cold in Japan), then carry a blanket with him as he left the house to climb a ladder to the rooftop perch beside his telescope. He was her eldest son, the mainstay of her home, and he looked so thin and haggard from lack of sleep that she had to struggle to stifle her protest against his going.

By this night of January 2, 1963, 19 year-old Kaoru Ikeya had been observing the sky for a long time. Whenever he peered through the telescope that he had made with his own hands, his pulse quickened in expectation. Kaoru had set himself a goal: more than anything else, he wanted to be the discoverer of a new comet--and this was the 109th of his logged search.

Now, after studying the eastern sky for an hour, he shifted his telescope toward the southeast. There he sighted a misty object he had never noticed before. He consulted his sky maps. They showed nothing in that location. He rechecked the position meticulously, and then remained glued to his telescope, half-convinced that what he was seeing must be an illusion. But the small, diffuse glow remained in the sky, and as he observed its gradual movement among the stars, Kaoru positively identified it not as a faint star cluster, but as a coma, the head of a comet.

But was it "his" comet? Or was he witnessing the return of a comet already recorded?

As soon as the telegraph office opened that morning, Kaoru dispatched a wire to the Tokyo Astronomical Observatory reporting the comet's position--

three degrees west-southwest of star P1 in the constellation Hydra--its tenth-magnitude brightness and the direction of its movement. Then, mounting his bicycle, he pedaled off to the huge Kawai Gakki Piano Co., where for \$35 a month, he polished the white celluloid sheaths for piano keyboards, "A steady fellow," his personnel card read. "Reliable. Quiet. Middle-school education only. Non participant in company sports or hobby clubs. Lacks ambition and initiative."

A few days later, the international news services were flashing quiet another profile: "self-taught 19-year-old amateur astronomer Kaoru Ikeya, using a reflector telescope constructed by himself at a cost of \$22.32, has discovered the new year's first comet, officially designated Comet Ikeya 1963a and now the subject of observation and tracking by astronomers in both hemispheres."

A spate of publicity greeted Kaoru's discovery. His home was invaded by news photographers; he was led before TV cameras and radio hookups; he received more than 700 letters from amateur astronomers seeking advice; he was awarded a gold medal by the Tokyo Observatory; and he watched in polite silence a professional actor portray him in melodramatic version of his life story, a 40 minute movie short called "Watching the Stars," to be shown to schoolchildren. Kaoru found this fiction distasteful. He commented wryly: "Why isn't the truth good enough?"

The true story began when Kaoru's father moved his family from the large industrial city of Nagoya to the town of Bentenjima, when Kaoru was six. Their new house overlooking Lake Hamana had a flat roof, and Kaoru climbed

up there to escape the clamor of three younger brothers and a sister. Soon he was mounting to the rooftop at night to look at the stars.

By the time he was 12, Kaoru was so enthralled with the heavens that he was reading books about the stars and tracking taps and diagrams of the skies in his notebook. At 13, he determined to build his own telescope. Although his father's fish store was prospering, Kaoru was reluctant to ask him to buy one. Already there was tension between them; the father complained that the boy was not applying himself to learning the family's business. "Sound sense should show you, my son," he insisted, "that astronomy does not belong to our station in life."

Still Kaoru continued to haunt the school library, reading texts on astronomy and studying the principles of optics, physics and chemistry involved in telescope making.

But misfortune was lurking for the Ikeya family. Mr. Ikeya's business began failing. Discouraged and embittered, he took to lounging about the pubs, drinking Saki, increasingly reluctant to face his wife and five young children.

Perhaps nowhere else in the world does a father's neglect so cruelly punish his family as in Japan, with its heritage of "on." "On" refers to the obligation each person incurs by the mere fact of his existence. A basic part of "on" is "ko," the obligation to one's parents and to one's descendants. Mr. Ikeya had failed in his duty as a parent, had placed an oppressive burden of shame on the family name, perhaps for generations. "We could not think of anything else, my mother and I," Kaoru says, "but that our family was disgraced."

Sadly, Kaoru watched his mother go to work at the hotel near the Bentenjima railroad station, cooking and cleaning for strangers. He himself took a part-time job, rising at 5 a.m. to deliver morning newspapers, returning after school to deliver the evening edition. He felt increasingly the responsibility of removing from the family the stigma his father had attached to it. And by this time, he was thinking about discovering a comet-- "his" comet. What if one day he could attach the dishonored name to tail of a new comet and write that name across the sky? "Comet Ikeya!" The name had a fine, proud ring!

In June 1959, when he graduated from middle school, Kaoru went to work at the piano factory. Since earning power is directly related to education in Japan, he was classified as an unskilled worker at base pay. Kaoru wasn't disturbed. Polishing celluloid was mechanical; he could think of other things while working.

In his spare time, Kaoru set himself to grinding the high-precision surface for the main mirror that would go into the telescope decided to build. Shopping around in secondhand stores, he obtained the other materials he needed. In August, 1961, after two years of off-work hours of labor, he was ready to begin once more to search the skies.

In Japan, the best hours for viewing are from 3 to 5 a.m., but not every sky is fit for observation. On cloudy mornings, Kaoru caught up on the sleep he lost on clear days. After many months without success, he felt deeply discouraged. The search for a new comet seemed futile. He wrote to astronomer

Minoru Honda, discover of nine comets, pleading between the lines for a word of encouragement.

At first the astronomer's reply seemed almost a rebuff. Then pondering it, Kaoru seized eagerly on its meaning: "To observe the skies solely to seek a new comet is a hopeless task which demands a great deal of time and hard labor, Minoru Honda wrote. "But to observe the brilliant heavens for their own sake without thought of a discovery may bring good luck to your comet-seeking."

Kaoru returned to his sky watches. Instead of searching for a comet, however, he concentrated on the whole sky, trying to become as familiar with its plan as he was with the streets and byways of Bantenjima.

On December 31, 1962, Mrs. Ikeya counted a total of 16 months since Kaoru had begun his vigils with his new telescope. Surely, Kaoru," she pleaded, "this night you will take your full rest. It is "Omisoka," the Grand Last Day of the year. Both of us have worked hard. We have honorably settled all our debts, and can start the new year with a clean record. Let us stay up until midnight, listening to the temple bells, and then sleep late in the morning."

To please her, Kaoru did not climb to the room that night. He remained with the family all through New Year's Day and accompanied his mother to a nearby shrine to pray for good luck in 1963.

On the following night, January 2, 1963, Kaoru discovered his comet.

At the Harvard Observatory, the Western hemisphere's clearinghouse for astronomic information, all the data on Comet Ikeya 1963a were placed on announcement cards and sent to observatories and journals of astronomy around the world. A few weeks after Kaoru sighted it, there were confirming

reports from the Yerkes Observatory in Wisconsin and the US Naval Observatory's station at Flagstaff, Ariz. Thus Kaoru kept in touch with his comet through a widening circle of fellow observers.

All this while, Kaoru quietly reported for his job at the piano factory. Only when the press requested interviews with him did the company learn of his achievement. The company's response was to initiate a collection among the workers to help Ikeya continue his sky watching. A certificate lauding his off-the-job zeal and dedication, together with a check for \$150--a lordly sum in Japan--was presented to him in a ceremony at the plant.

Since then, Kaoru has made yet other discoveries. In July 1964, working with a new, improved telescope--which he made at a cost of about \$14--he spotted a second comet: comet 1964f. And last September--along with another Japanese amateur astronomer, Tsutomu Seki, who watches the skies from the city of Kochi, 240 miles away--he co-spotted his third, the now famous Ikeya-Seki, which last autumn stirred global excitement with its unusually close approach to the sun. Still at the piano factory, Kaoru Ikeya has neither sought nor been offered advancement. For him, the richest reward has been this: in the span of his 22 years he has now made partial payment on his "ko" by taking a dishonored name and writing it across the skies.

Written by: Terry Morris
Taken from Reader's Digest
1966 Issue

Submitted by: Diane Bargiel

OBSERVATIONAL ASTRONOMY

M-77 and M-71

(M-77)

In the last issue of the WASP, I told the story of how I found M-33 and M-78. On August 23, that same night, I found another galaxy, M77, at Camp Rotary. It was very small and the nucleus was very distinct. It appeared as if the galaxy was tilted toward us. It is a very nice miniature galaxy, which gives the observer the impression of being very distant in space.

The coordinates are as follows: R.A. 2^h 40^m; DEC. 00° 14'; Magnitude 9th.

If you are not familiar with Cetus in which M-77 is located, start with the Hyades in Taurus. The V-shaped appearance of the “bull” will point to α Cetus, the brightest star in Cetus. This distance is approximately 25° to the southwest. Look west and slightly south of α , and you will come to γ Cetus. Now look south and slightly west and you will come to ξ Cetus. This is your guide star. In your finder you should see ξ Cetus' companion 84. M-77 forms a perfect triangle with those two stars.

(M-71)

On the night of September 24th, the night of the 2nd Annual Messier Contest, I found one of the easiest objects, M-71. It is easily located in the constellation Sagitta the Arrow. It is a very nice globular with a nice spray of stars in the background, being it is so close to the Milky Way. It appeared as if

I could resolve pretty much of its oblong nucleus. It is well worth the time, which shouldn't be very long.

The coordinates of M-71 are as follows: R.A. $19^{\text{h}} 51^{\text{m}}$; DEC. $+18^{\circ} 39'$, and is of the 9th magnitude.

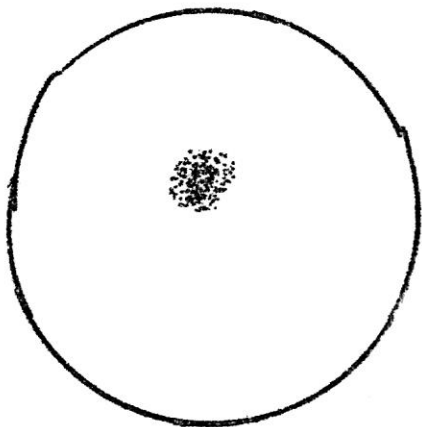
To find this globular, look between γ and ξ in Sagitta. You will find a 6th magnitude star. M-71 is north of east of that star, near the front portion of the arrow.

Take advantage of the clear autumn sky to find your objects. This season offers one of the biggest selections for the amateur astronomer. There are open clusters, globular clusters, planetary nebula, diffused nebula, and galaxies.

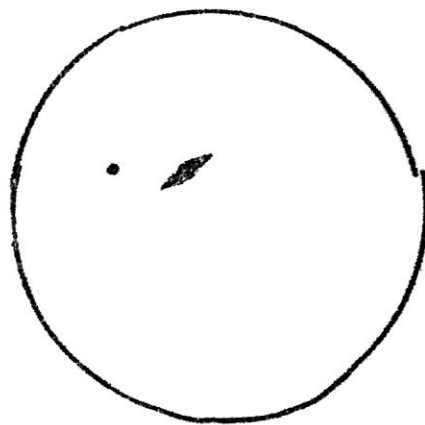
Frank McCullough

(maps on next page)

M-71

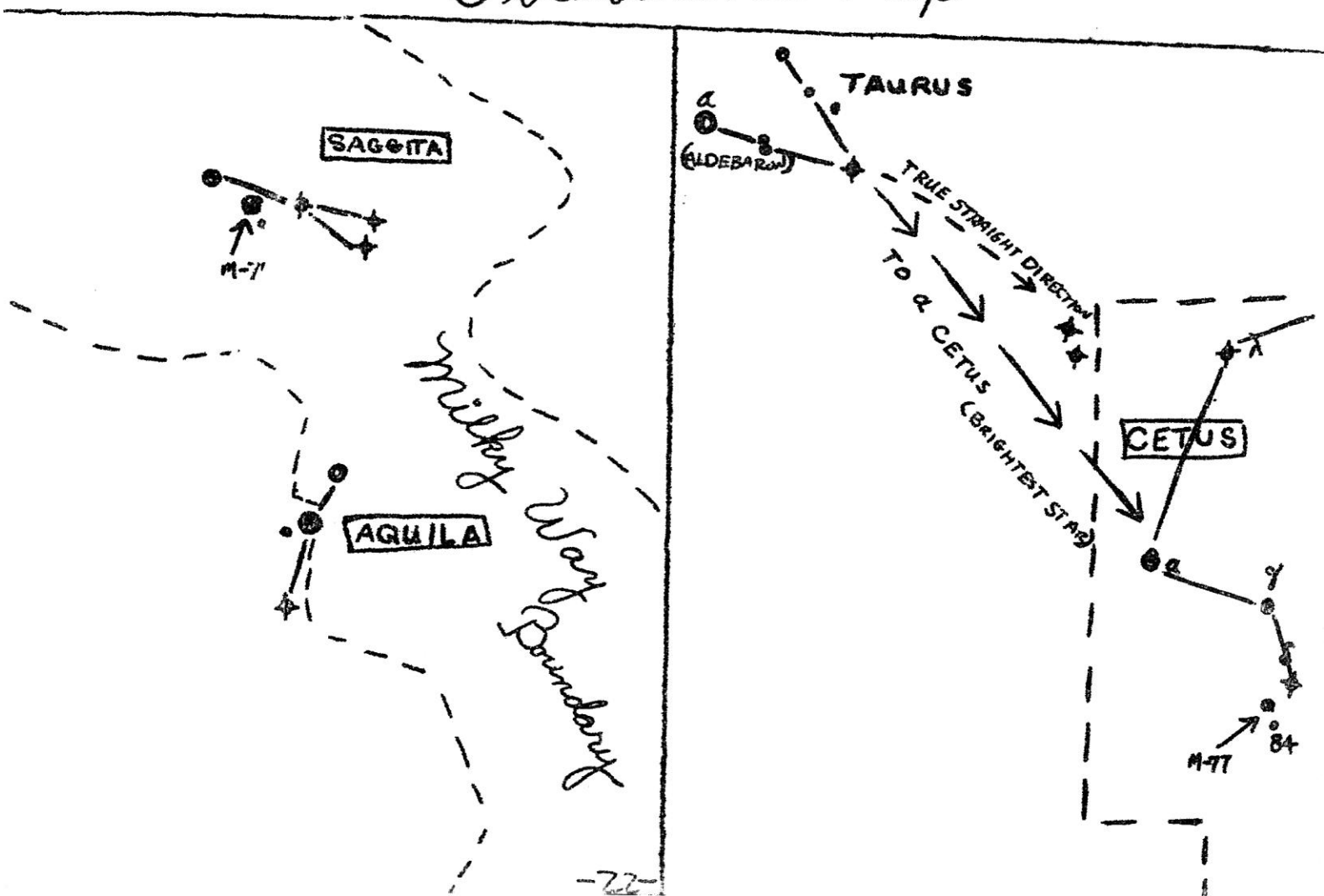


M-77



6" REFLECTOR
70X

"Observational Map"





SPIRIT
of
AUTUMN

by
FRANK McCULLON

by Vincent J. Schaefer

OBSERVATIONS OF AN EARLY MORNING CUP OF COFFEE

Through keen observation of an everyday item, one can learn much about the nature of convection and other physical phenomena.

If a cup of very hot black coffee is illuminated with a strong beam of light parallel to the surface, a number of extremely interesting chemical, physical, and optical phenomena can be observed. I first noticed these effects ten years ago along the edge of boiling hot pools at Yellowstone Park in the wintertime. A few years later I encountered them again while having coffee with my wife shortly after sunrise at the Research Center of the Museum of Northern Arizona, near Flagstaff.

At Yellowstone, the effects were often hard to see because moisture from the hot water condensing in the air obscured the surface of the pool much of the time. At Flagstaff, on the other hand, the clean air of the early morning and the brilliance of the rising sun provided ideal conditions for viewing the multiple effects which I will now describe.

When a cup is filled to the brim with black coffee (instant or otherwise) which is close to boiling and is viewed with good illumination, the first thing noticed is that the surface of the steaming coffee displays an irregular cellular pattern. The cells, in polygonal array, show cross sections of approximately 1 to 3 cm and appear to consist of dusty white areas outlined by narrow dark lines. These visible cells mark areas of rising columns of hot water, and the dark lines mark the region where the spreading, slightly cooled liquid is descending into the body of the coffee to form what are called Bénard cells.

These convection cells are present in all liquids and gases that are unstable because they are hotter at the bottom than at the top. It doesn't matter whether the air or liquid is heated at the bottom or cooled at the top, so long as the temperature decreases toward the top. Related phenomena range in size from the microscopic dimensions first observed by the Frenchman Henri Bénard in 1900 under his microscope to certain cloud patterns of the earth, water patterns in the sea, and even the granular structures of the sun.

On the surface of the hot water, the Bénard cells are observable because of the phenomenon called Stefan flow. In fact, this is one of the most elegant ways to see the elusive phenomenon named after Joseph Stefan (1835-1893). The intense flux of water molecules rising from the hot surface of the coffee exerts a positive upward force on the collar atmosphere immediately above the surface of the liquid. Most of the water droplets that condense in the saturated air tend either to fall back into the liquid or to drift away into the air above and evaporate.

However, there is a certain size of droplet that is too large to escape from the micro-environment but too small for gravity to overcome the positive force of the upward thrust of vapor molecules arising from the surface of the hot liquid. These condensed particles are thus balanced between the field of gravity fall and the upward molecular thrust in such a way that they are literally balanced or levitated above the surface of the hot coffee. At the boundaries of the cells, however, there is a negative vapor flux that prevents the balance of droplets and thus reveals the black surface of the coffee.

If observed under a low-powered binocular microscope, the dust-like patches of tiny water droplets over the rising current of hot coffee will be seen to consist of arrays of highly uniform, densely packed water droplets. Their size and height above the hot liquid is controlled by the combination of upward force, the number of effective nuclei in the region, and gravity fall.

That they are highly charged and thus stabilized can be shown by moving a charged object, such as a hard rubber comb, above the surface. Under these conditions all the suspended droplets suddenly disappear.

That their size and number are controlled by the presence of ambient condensation nuclei is shown by generating a larger number of nuclei by holding a lighted match below the edge of the coffee cup. When this is done, the concentration of particles suddenly increases, but they are noticeably smaller and are suspended closer to the surface of the hot liquid.

When illuminated with a strong beam of parallel light, such as the rising sun, a slide projector, or a strong flashlight, beautiful colors will be observed over the surface of the dark liquid when viewed in the direction of the illumination and close to the axis of the light beam. This phenomenon called the High Order Tyndall Spectra, also produces the color in the corona surrounding the sun or moon when seen through a cloud composed of nearly uniform droplets and the so-called mother-of-pearl clouds occasionally seen when lenticular and other wave clouds, made up of small, uniform droplet size that appear red, blue, and green, are viewed in the direction of the sun.

Close observation of the surface of the hot, black coffee showing a nice array of Bénard cells will often disclose another phenomenon. With the cells delineated by the dark lines that mark the descending current of liquid, a dark line will suddenly cut across the grayish zones of levitated droplets. This is caused by a tiny whirlwind that develops in the rising hot, moist air, which locally possesses a super-adiabatic lapse rate. The transient vortex is generally of very short duration, having a lifetime of milliseconds.

A very special and quite fascinating electrical phenomenon can be seen by the careful and adept experimenter. With a stable zone of balanced particles in equilibrium with the hot liquid and its surroundings, a charged object such as an electrified hard rubber comb, if not too highly charged, will produce a very dense stream of droplets that originate in an electric wind generated by the proximity of the charged object. Depending on the geometry of the charged object, this strange effect may consist of one or more streams of small droplets

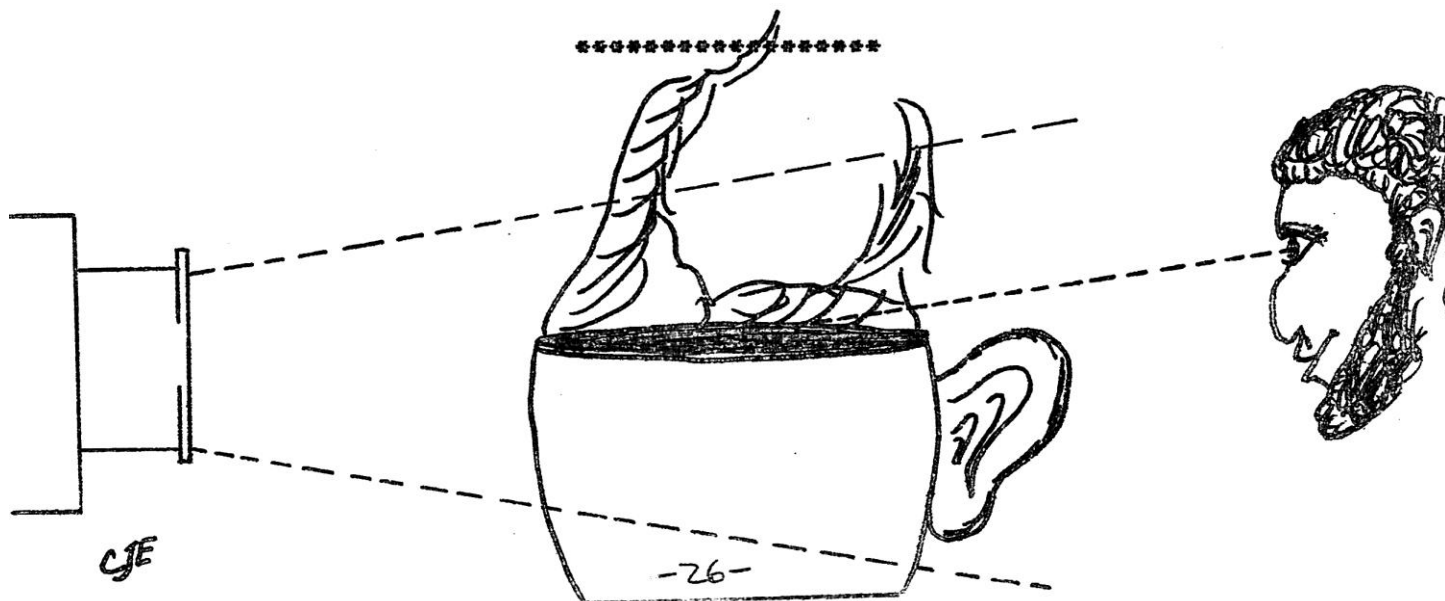
condensing on ions coming from the charged object. When I first observed this effect, it was generated by several teeth of a charged hard rubber comb.

While a cup of hot, black coffee is an ideal arrangement to see some of all of the phenomena, the effect dies away as the coffee cools. In order to study the effects for extended periods of time, I arranged the following set up. An empty sardine can was cleaned, filled with water blackened with ink, heated on a hot surface. A discarded but usable electric iron, held upside down with a clamp, was used as a hot plate. This arrangement permitted me to conduct experiments for as long as desired. A lantern projector served as an excellent light source, and binocular microscope made it possible for me to see the packing size and other features of the floating droplets. Subsequently, I found that hot glycerin provided an improved substance for extended studies. The higher refractive index and very low vapor pressure permit experiments not easily carried out with water.

When the liquid becomes sufficiently heated so that droplets appear above the surface of the liquid, they may be removed by lifting them off in a vortex induced by holding a flat, stiff card or thin sheet of metal in a vertical position near the surface of the hot liquid. A very slight drift of air curling around the vertical edge of the thin sheet will start a vortex that will continue in the highly unstable air above the hot liquid.

One word of warning: it may be desirable to use glycerin or ink-colored water from the start. A number of my friends have accused me of conspiring to prevent them from enjoying their hot cup of coffee; they tell me that the effects are not only intriguing but they last until their coffee has lost that hot tang that tastes so good early in the morning!

Vincent J. Schaefer, Atmospheric Sciences Research Center, State
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ASTRO-ALMANAC

by

Kenneth Wilson

<u>Nov.</u>	<u>Event</u>
1	Lunar perigee (21 ^h E.S.T.), Twilight begins: 4 ^h 56 ^m , ends: 6 ^h 3 ^m (L.M.T.)
2	Full moon (16 ^h 20 ^m E.S.T.)
4	Saturn 7° S of the Moon (10 ^h E.S.T.)
5	Taurid meteor shower maximum (radiant: 3 ^h 40 ^m +15°)
6	Venus 2° S of Jupiter (20 ^h E.S.T.)
8	Mercury 4° S of Jupiter (2 ^h E.S.T.)
9	Last Quarter Moon (15 ^h 51 ^m E.S.T.)
11	Venus 4° N of Antares (20 ^h E.S.T.), Twilight begins: 5 ^h 05 ^m , ends: 6 ^h 31 ^m L.M.T.
12	Mercury 2° N of Antares (11 ^h E.S.T.)
14	Venus 1.1° S of Jupiter, (8 ^h E.S.T.), Mercury 3° S of Jupiter (20 ^h E.S.T.), Uranus 6° N of Moon (20 ^h E.S.T., Lunar apogee (10 ^h).
15	Uranus at 13 ^h 01 ^m , -5° 48'; Neptune at 16 ^h 03 ^m , -19° 05'.
17	Leonid meteor shower maximum (13 ^h E.S.T.) radiant: 10 ^h 00 ^m , +22° New Moon (20 ^h 46 ^m E.S.T.)
18	Mercury at greatest. hel. latitude south, W.A.S. General Meeting.
19	Antares 0.3° S of the Moon (1 ^h E.S.T.), Jupiter 5° N of the Moon (9 ^h E.S.T.), Pallas at opposition (10 ^h E.S.T., Venus 3° N of the Moon (19 ^h E.S.T.)
21	Twilight begins: 5 ^h 16 ^m , ends: 6 ^h 15 ^m L.M.T.
23	Mercury at greatest eastern elongation (22°) at 13 ^h E.S.T.
25	First quarter (11 ^h 37 ^m E.S.T.), Neptune in conjunction with sun (13 ^h E.S.T.), Uranus at opposition (18 ^h E.S.T.) 750,000,000 miles.
26	Mars 5° S of the Moon (5 ^h E.S.T.)
30	Lunar perigee (6 ^h E.S.T.)

A MEMBERS RESPONSE"

This is in reply to the nonsense submitted by Chris Edsall in the August, 1971 issue of The W.A.S.P. concerning the title of that paper.

First, may I say that this article would not have been written except for the fact that no one else has bothered to give Christopher's article much merit. Well, I feel he should be given some attention. I admire Christ for two reasons in the writing of his article. One, for his spirit of dissent in letting his opinion be made known and secondly, for his ability to thoroughly use his Roget's Thesaurus. I am still wondering whom he was attempting to impress. But enough of that, his style of writing is not the subject here--it is the content (or lack of it).

The W.A.S.P. is far from being a scholarly publication. It is an attempt by a group of amateurs to organize and consolidate their ideas, opinions, information, etc. on paper. The intent of the paper is certainly not to "lampoon its victim in a round of sincere and meaningful ridicule and jest."

In Chris' opinion, the serious study of astronomy is absurd (actually "preposterous," according to Chris) and, I must conclude, without merit. Since he also dislikes the lighter, less serious aspects of astronomy, as is apparent in his article, why then is he pursuing it as a hobby?

The W.A.S.P. was not intended as "astronomical balderdash." The paper is obviously a failure as indicated by the last handful of issues. I

do agree, though, with Chris that a list of suitable names be drawn up and voted upon. If the club finds The W.A.S.P. as an unsuitable title, then it can be changed. Personally, I find nothing farcical in The W.A.S.P., but would welcome a more ingenious representation if decided upon.

-Walter Roudebush