

PROJECT 10073 RECORD CARD

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|--|---|--|--|
| 1. DATE<br>17 Dec 55   | 2. LOCATION Oklahoma City, Oklahom<br>Olathe, Kansas Lincoln, Nebr  |  | 12. CONCLUSIONS<br><input type="checkbox"/> Was Balloon<br><input type="checkbox"/> Probably Balloon<br><input type="checkbox"/> Possibly Balloon<br><br><input type="checkbox"/> Was Aircraft<br><input type="checkbox"/> Probably Aircraft<br><input type="checkbox"/> Possibly Aircraft<br><br><input checked="" type="checkbox"/> Was Astronomical Meteor<br><input type="checkbox"/> Probably Astronomical<br><input type="checkbox"/> Possibly Astronomical<br><br><input type="checkbox"/> Other _____<br><input type="checkbox"/> Insufficient Data for Evaluation<br><input type="checkbox"/> Unknown |
| 3. DATE-TIME GROUP<br>Local _____<br>GMT 18/0934Z  | 4. TYPE OF OBSERVATION<br><input checked="" type="checkbox"/> Ground-Visual <input type="checkbox"/> Ground-Radar<br><input type="checkbox"/> Air-Visual <input type="checkbox"/> Air-Intercept Radar |  |  |
| 5. PHOTOS<br><input type="checkbox"/> Yes<br><input checked="" type="checkbox"/> No  | 6. SOURCE<br>civilian   |  |  |
| 7. LENGTH OF OBSERVATION<br>unknown  | 8. NUMBER OF OBJECTS<br>many  | 9. COURSE<br>unknown                                       |  |
| 10. BRIEF SUMMARY OF SIGHTING<br>Many reports from Nebraska, Missouri & Oklahoma of strange objects - streaks in the sky and explosion of some objs that looked like red and green flares. |   | 11. COMMENTS<br>Wide area of observation indicates meteor. |  |

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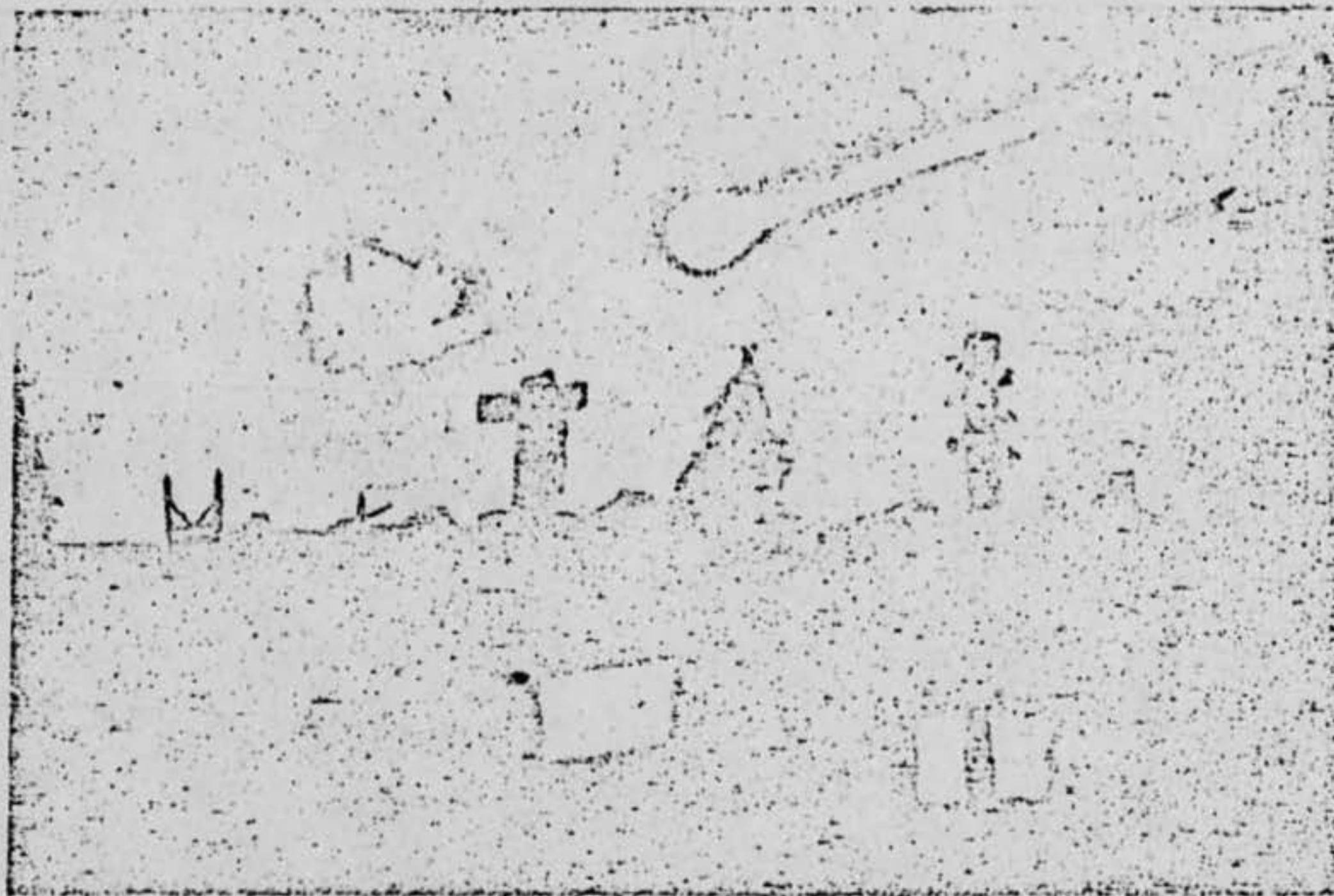
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A child's painting of the great Kansas-Oklahoma fireball of 17 December 1955. It lit the sky up as bright as day. Because fireballs this big are rare and occur without warning, scientists must depend on reports from the general public. No really great fireball has ever been photographed in flight. This is why this painting has scientific value. Two views are shown here. In one the fireball is coming across the sky. The other (left) shows the explosion at the end. Even rough sketches made on the spot are valuable to fireball study.

What does a scientist do with reports that just can't be true?  
What must he do when the reports keep coming in steadily?

## THE CASE OF THE PUZZLING SOUNDS

Today scientists at the RAND Corporation are tackling an unsolved mystery that has been bothering astronomers for 150 years. The mystery is about reports that when giant meteors flash across the sky there are noises too.

At first glance this doesn't seem to be a problem. Certainly one of these big meteorites blazing across the sky almost as bright as the sun itself must sweep up a gigantic wind. This very well might explain the hissing sound reported by many eyewitnesses.

### But It Can't Happen?

Just the same there is a violation of a major physical law involved. The disturbing part of these reports is that the sounds are heard at exactly the same time the fireball is seen.

If you stop to think that the fireball is probably a hundred miles or even more away . . . how come the sound arrives at the same time as the light?

The speed of light is 186,000 miles per second. The speed of sound is only about 1/5 of a mile per second in the

atmosphere. So if you see a fireball 100 miles away you should hear the sounds about 8 minutes later.

But all the reports are positive that sight and sound come at the same time!

Of course many of these reports came from what we used to call "uneducated people." Because of this, their stories were rejected. Educated people knew sight and sound could not arrive together.

It is similar to the sight-sound problem of a jet plane passing high overhead. You all know that the sound seems to come from far back of the plane. You hear it to the east, for example, but have to look west to see the jet itself.

Thus, because of what was known about the speed of sound, most scientists rejected these reports of hearing and seeing the fireball at the same time.

### Trying To Solve It

Today's scientists think that the reports may be genuine. If so, the simul-

taneous arrival of light and sound from the fireball suggests that the sound travels not as sound—but as electromagnetic radiation. All such radiation—light, radio waves, etc.—travels at the speed of light.

This will give us the simultaneous arrival. It also gives us at least two specific problems to experiment with:

1. How can a fireball send out radio waves?
2. How are these waves changed into sound waves at the point of observation?

The modern answers to these questions open up a whole vast area for study.

### Perhaps It's Electricity

There is much evidence to suggest that meteors do send out electromagnetic waves of some kind. In 1896 in Madrid, Spain, the city electric light system lit up during the passage of a fireball. The Sikhote-Aline (Russia) meteor of 1947 produced current in a disconnected telephone wire. It was enough current to give the repairman a heavy jolt. The RAND researchers would like to find more such evidence.

A few observers have reported fluctuations of the compass needle during meteor passage and during meteor showers. Measurements of the earth's magnetic field have shown rises during fireball passage.

Meteors are sometimes heard as static on ordinary radios, and Canadian physicists have shown that some bright

If you have ever seen a bright fireball—and by that we mean one that lights the night sky up as bright as day or in the daytime stops everyone in their tracks—you can help the information to the scientists who are

working on this problem. Address your letter to Dr. Donald L. Lamar, RAND Corporation, 1700 Main Street, Santa Monica, California 90406.

Do not write CURRENT SCIENCE.

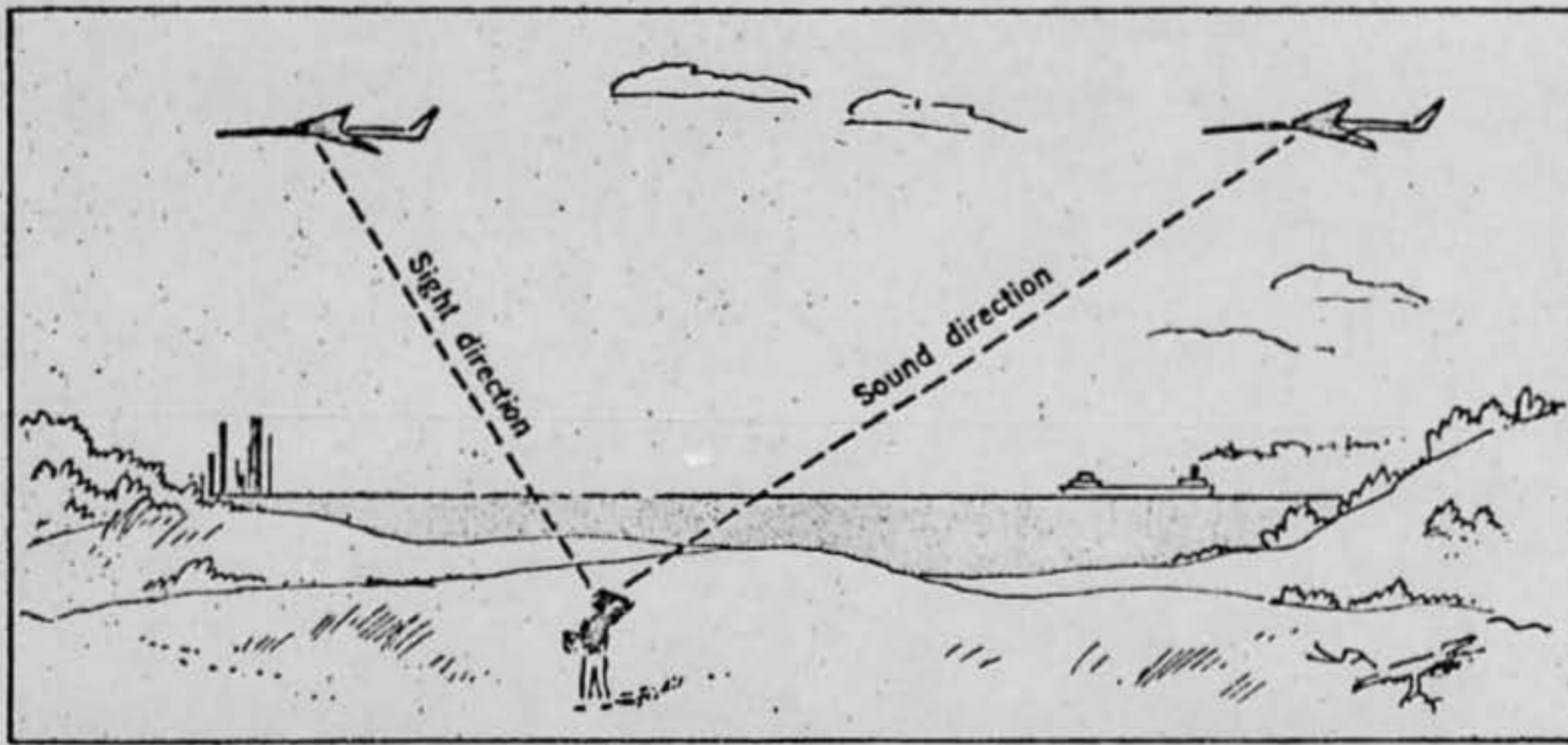
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OBJECTS IN SAME GENERAL AREA PD A SURVEY OF FLYING ACTIVITIES OF  
THE 13TH AND 14TH FIS SIOUX CITY IOWA REVEALS NO AIRCRAFT IN AREA  
AT TIME OF REPORT PD

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18/0722Z DEC RJEDNG



Most people know that you see and hear a high-flying jet plane at different spots in the sky. This is because sound travels so much slower than does light. However some people report a "second sound" that seems to come directly from the jet. This may be related to the fireball problem.

meteors sent out a signal over and above the radar that was trained on them. There seems enough evidence to suspect that meteors may send out electromagnetic signals.

#### Closing In

If these signals do reach the observer the next problem is—how do they get changed into sound?

For about a quarter of a century, the standard hypothesis said that the "radio" waves from the meteor were changed into sound by non-linear rectification. This simply means that objects near the observer somehow acted as natural radio receivers. These would work much like the old-fashioned crystal receiver.

Any metal object which is covered by an oxide layer may convert radio frequencies to sound frequencies. The galena crystal worked like this. Today we tailor-make transistors that do the same job. A man standing near an old-model, rusty automobile would have better luck than a man in a new car, according to this theory.

If waves from the meteor at radio frequencies are thus altered to sound frequencies and the metal is able to vibrate at these sound frequencies, the sound may become audible.

Thus we have a pattern:

1. Meteor emits something in the radio band. This travels at the same speed as the light waves. Both then reach the observer together regardless of the distances involved.

2. Some natural oxide-metal near the observer changes the radio to sound.

This is the older theory. It's a little hard to confirm with controlled experiment. Fireballs do not come on a schedule.

Another electrical, and very different, hypothesis is based on the fact that the earth and atmosphere form a gigantic electrical condenser.

#### Biological Answers

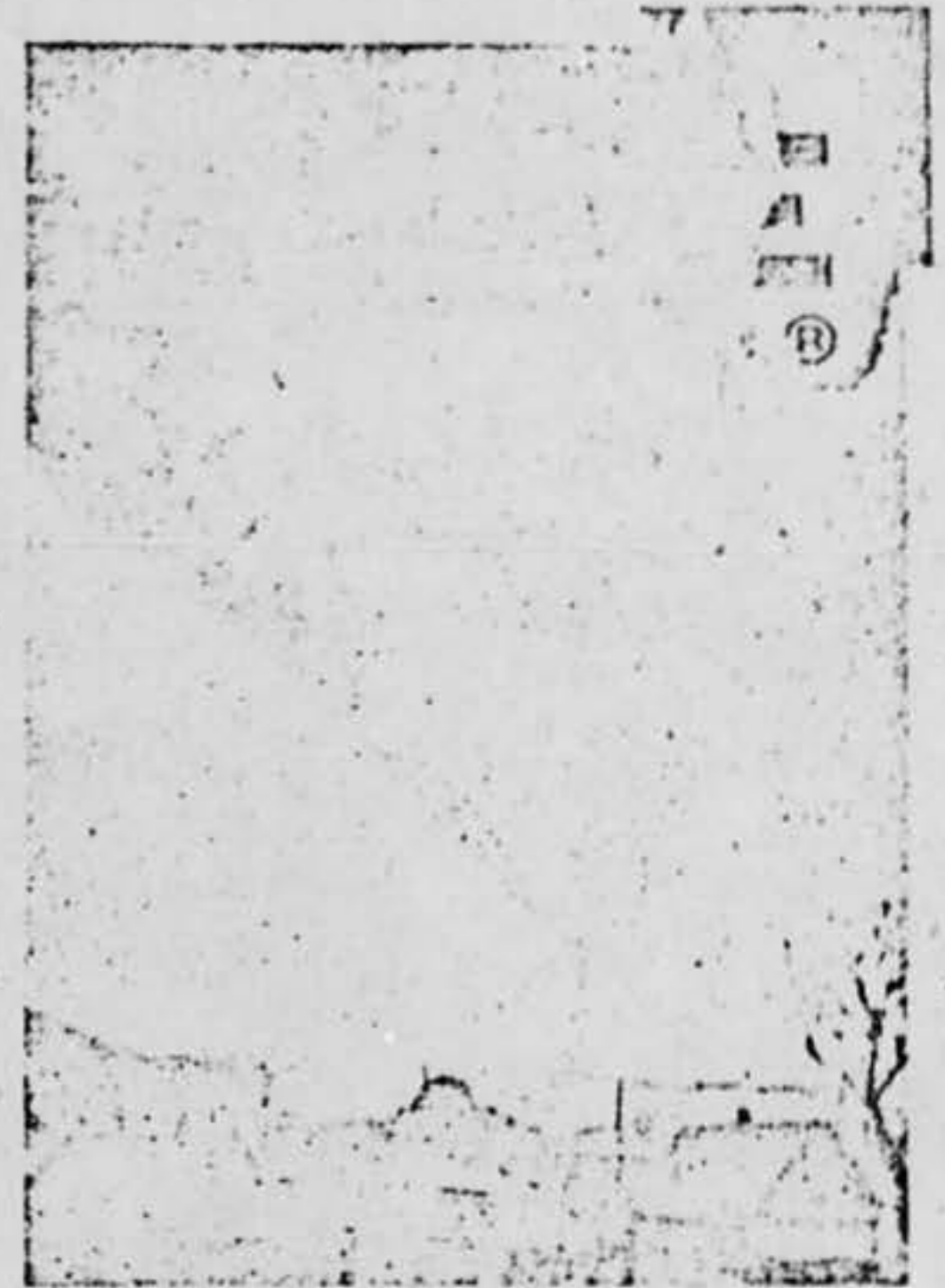
More recently, and more imaginatively, the latest theory is that the electromagnetic radiation from the fireball is "rectified" (changed to sound) within the body of the observer.

Experiments in the last couple of years have shown conclusively that radiation at radio frequencies can be heard directly by some individuals. The mechanism of the process is still largely unknown.

Consequently, students of the puzzling fireball sounds believe that people do hear the fireball at the same instant they see it, and that the processes involved take place within the body itself.

But much more data is needed, and RAND scientists are seeking for volunteers. They want to hear from any person who has "heard" a fireball. If you know of such a person send the data to the address given in the box on our previous page. Do not send it to CURRENT SCIENCE. Scientists are especially interested in the reports of young people. Children can hear higher frequencies than adults. There is some evidence that they may be better observers than their parents. Get busy now.

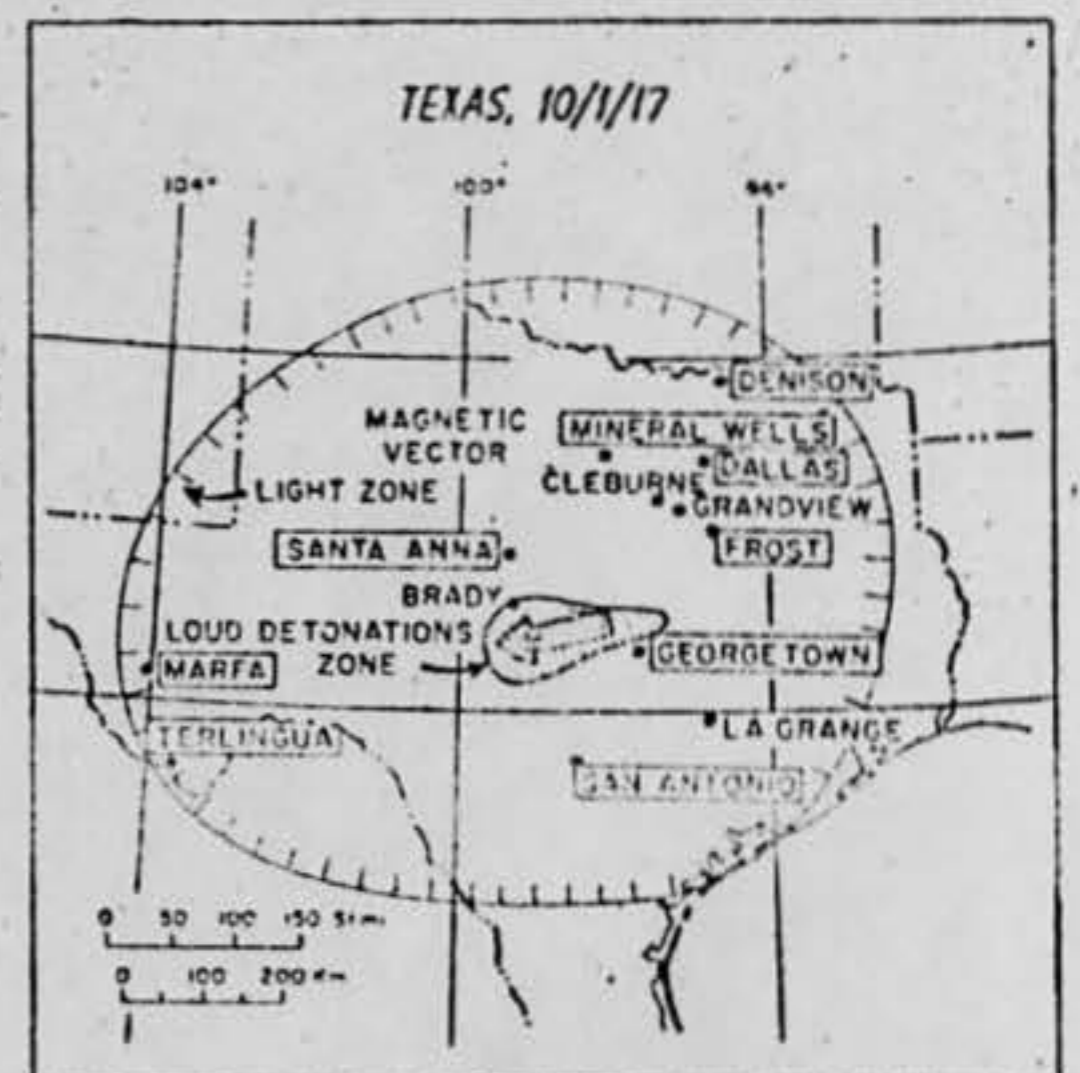
—WALTER SCOTT HOUSTON



The great daylight fireball of Sikhote-Aline (Russia) brought no reports of sounds. It did create induced currents in wires near the ground.



The great fireball of March 24, 1933, was seen from Texas to Colorado. It left this luminous trail in the sunset sky. Such photographs when taken should be sent to scientists for study.



The Texas fireball of January 10, 1917, brought many reports of hissing sounds simultaneous with the eye sighting. In this photograph the rectangles all heard the