EXPERT EXPLAINS "WEATHER"

Famous Scientist Takes Weather Apart to See What Makes It Act So Peculiarly; Scoffs at Professional Rainmakers.

By DR. FRANK THONE
Science Service Staff Writer

What makes the weather?

And what makes the weather act so mean at times?

Whenever we get too much weather of one kind, as we have been during the past few weeks (or as we did of its opposite, last winter) we are apt to ask these questions. Sometimes in the brittle temper that persistent heat engenders, sometimes in dogged hopelessness—but we really would like to know a little about it, as if that would make our discomfort a trifle easier to endure.

Science cannot answer all weather questions, for science, and the science of weather in particular, is still "too young to know" all the answers. But science can answer some of them.

That weather happens at all is due to three interacting factors: the warming sun, the turning earth, and the presence of an atmosphere on our planet. Where the sun shines it gets warm: we've all noticed that. Where the sun shines on the air, the air gets warm. Anything that is warmed expands and thereby becomes lighter.

An Awesome Picture of a Tornado One of Weather's Freaks.

Air rises when thus expanded and lightened, because cooler, denser air from somewhere else tends to flow in under it and boost it up, thus working toward a restoration of the disturbed equilibrium. Since the sun shines straightest and hottest near the equator, and has less heating effect near the poles, the general tendency is for the cool, heavy air to flow southward along the surface, while the rising, cooler air flows northward over it.

If the earth stood perfectly still and had a perfectly smooth and uniform surface, and if the warming sun went round and round it (as in the ancient Ptolemaic astronomy), the surface wind would always be straight from the north, and the upper-air wind straight toward the north.

Two Forces Act Together

But the earth turns on its axis, and it doesn't hang onto the air as tightly as it does to land and water, so that the air tends to slip a little. If the north-and-south circulation set up by the warming sun did not exist, this turning of the earth would give us a wind straight out of the west, all the way to the top of the atmosphere. But as it is, the two forces act on the air together, causing an air-movement general trend from northwest to southeast in the northern hemisphere, and from southwest to northeast in the southern.

But this is not all of the picture. The surface of the earth is not perfectly smooth and uniform. It has mountain ranges sticking up here and there, which act as paddle wheels or blades to cause further deflections in air current directions. And it has alternations of irregularly shaped oceans and continents, deserts and forests, which load different air masses with differing amounts of water, and also act differently in squeezing that water out of them again, condensed into rain or snow.

The facts, then, rough out the broad framework of the world's weather-machine. In its details it becomes terrifically complicated. Is it any wonder that the weather sometimes gives even the experts who devote their lives to it a headache?

Is the Climate Changing?

What is climate, anyway? What is the difference between climate and weather?

These questions puzzle a lot of people. There is a difference between them, all right, though the dividing line is not knife-sharp.

J. B. Kincer of the United States Weather Bureau puts it this way:

"Climate is the general run," or sum total of weather, and that sum total does not seem to be undergoing any fundamental changes. Weather is the phase of climate that we experience from day to day and week to week, or even year to year. Therefore, weather varies, often abruptly from day to day, due to vast changes in air mass movements. In other words, climate is relatively stable; weather erratic."

Thus, we can speak of the climate as a more or less dependable thing. If you go to England in autumn, of course you take umbrella and rubbers; if you go to Southern California in summer, equally of course you do not. You count on the climate. Yet there might be a sudden erratic shift in weather, that would sizzle you in London in September, or drench you in Hollywood in June.

Climates do change, but not in a human lifetime, or even in a whole row of generations. Permanent climatic changes are jobs for the millennia. It is suspected that the climate of northern Africa was moister 10,000 years ago than it is now, but we are not certain. The climate of Ohio was once like that of Greenland—but that was a matter of a million years. The climate of Greenland was once like that of Ohio—but that was even longer ago.

Cycles Are Irregular

Climate does have its fluctuations—that is, prolonged "spells of weather" of one kind, followed by equally prolonged "spells" of opposite sign. These are the "cycles" you hear talked about. About every thirty or forty years there is a climax of drought, like the one we are having now. In between, there will be an opposite climax of wet years. There may be other cycles within these, and perhaps, even longer ones outside them; but all the cycles are too irregular in arrival and duration to permit of dependable prediction just yet.

Those of us who can remember back to the early nineties will recall the bankrupting drought that scourged the country then. And an earlier generation found in a similar climatic depression the spur that sent them migrating to the Oregon Territory. Some of those emigrant trains left wagon-tracks across the dried bed of Goose lake, in Oregon. Subsequently the lake re-filled. But in the drouth of 1934 the tracks were again laid bare. The cycle had fulfilled itself.

What causes these climatic cycles? Nobody knows. Sunspots have many champions — but also many opponents. That is one of the things on which the doctors still disagree—and the patient is free to suspend judgment or take sides himself, according to his own personal temperament.

When will it rain? What will make it rain?

To those anxious queries, certain pessimistic souls are singing the answer, in a doleful minor key: "It ain't gonna rain no mo'!" Nevertheless, it will: it always does rain, eventually.

But assurance that rain will come is not an explanation of its coming.

What does make rain?

Altitude Has Effect

Rain is the offspring of the marriage of contrasts. It comes when warm, moist air meets something cold. The something may be a land mass lying athwart a moist sea wind. The higher the land the harder the rain, other things being equal. That is why the rains of England and Ireland are gentle and moderate, and that is why precipitation is heavier, and frequently much more violent as well, on such mountain heights as the Himalayas and the top of Mauna Kea in Hawaii.

But in normal seasons we get plenty of rain, and frequently quite violent rainstorms as well, in regions where there are no mountains at all—the open sea, and the wide lowlands of the central United States. Why there?

Even in mountainless lands there are what might be called meteorological mountains. They are masses of cold air, migrating down from the Arctic and meeting the warm, moisture-laden air migrating up from the Gulf. The normal thing when two air masses collide is for the cooler to plow under the warmer, lifting it into the air. As it rises it expands, and as it expands it cools. When it no longer contains heat enough to keep the water in vapor state the water condenses, first into microscopic droplets or tiny snowflakes to form clouds, then by coalescence of the cloud-droplets into drops large enough to fall as rain.

Frauds Flourish

Can't we do anything about the weather? Must we just sit still and let the rain come when it gets good and ready?

We can't. We must. For in spite of the old and oft-quoted complaint of Mark Twain, there is as yet nothing that can be done about the weather.

The usual crop of weather-making proposals has been harvested of the drouth. These pseudo-scientific suggestions always flourish when all useful growth is scorched with sun and perishing of thirst. They grow when even cactus wilts.

Rainmakers need only one kind of fertilizer: money. They invariably make the modest proposal: you pay my expenses while I do the work, and a bonus for every tenth of an inch of rain that falls. No rain, no bonus; only my living and travel expenses, and the cost of the secret chemicals used in my formula. If rain falls, they take the credit—and the cash. If no rain falls, they still take considerable cash—for the "secret chemicals" are invariably expensive. Heads I win, tails you lose: what could be a sweeter racket for a smooth-talking "professor" with a Van Dyck beard?

Older rain-making methods are simpler and less expensive—for their practitioners. The magicians of primitive tribes imitate the sound of thunder with rattles and drums, or they throw water into the air, or they nick a vein in the chief's arm and let a little blood, or go through some other "sympathetic" procedure. But like their more cultured colleagues of our own land, they still get their expenses paid.

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To a Farmer Like This—the Weather Is All Important.

Hurrying With the Harvesting Before an Oncoming Storm Breaks.

WORLD'S FAIRS

Display of Cartwheel Maker at Manchukuoan Fair.

Prepared by the National Geographic Society, Washington, D. C.—WNU Service.

TEXAS tips its ten-gallon stetson to a stream of visitors for whom Dallas is a reception committee, and inaugurates the first United States exposition in the world's bumper crop for 1936. After the Texas Centennial, the veteran exposition fan may as well start packing for jaunts to Cleveland, Ohio, and Johannesburg, South Africa.

Although this is the first world's fair in Texas, the United States has been a happy hunting ground for elaborate expositions. Philadelphia, Chicago and San Diego have each had two. St. Louis had one. New York and San Francisco have both set the date for their second, 1939.

Such celebrations are becoming the accepted sort of birthday party for important national anniversaries. The Philadelphia Centennial in 1876 brought the world's activities in miniature to the front door of a nation just one hundred years independent. The Columbian Exposition in Chicago in 1893 was intended to show Columbus that he hadn't seen the half of it when he discovered America 400 years before. In 1907 the effectiveness of English colonization of this country was displayed by the Jamestown (Virginia) Tercentenary. The young nation's first wavering westward steps were recalled in the Louisiana Purchase Centennial in St. Louis in 1904, and Portland's (Oregon) celebration of the Lewis and Clark expedition's hundredth anniversary in 1905.

The South contributed to the country's fair festivities with the Cotton States exposition at Atlanta in 1895, the Tennessee Centennial exposition at Nashville in 1897, and in the South Carolina Interstate and West Indian exposition at Charleston in 1902. Seattle was "at home" for an exposition in honor of Alaska, the Yukon and the Pacific coast in 1909.

By that time the United States had acquired the world's fair habit, and would have one at the slightest provocation. When the Panama canal was opened in 1914, no one wanted to wait a hundred years for the event to simmer down into a centennial; so that formality was waived, and the occasion itself was celebrated with important expositions both in San Francisco and in San Diego.

Began Again After the War.

The general enthusiasm for fairs was dampened somewhat, after 1916, by the World war, which appeared to destroy man's appetite for the arts and industries of civilization. Then Philadelphia gave its second performance, the Sesquicentennial in 1926. Chicago followed suit in 1933 with its own hundredth birthday party to which everyone was invited, and to which everyone went and then went back the following year. In 1935 the San Diego exposition was announced along with centennial celebrations in Arkansas, Wisconsin, and Springfield, Mass.

The past century might well be called the Exposition Era, for it has witnessed the sudden gaudy sprouting of the world's fair from the ancient family tree of the traditional trade fair. This new and dazzling era began in 1851 with that grand-daddy of fairs in the modern manner, the London Crystal Palace exhibition, officially opened by Queen Victoria and Prince Albert. Since then, many crowned heads and presidents have seized such opportunities to combine official business with seeing the sights.

After London started the world's fair fever, it spread through Europe and North America with amazing rapidity, with isolated cases cropping up all over the world from Melbourne, Australia, to Seville, Spain. Within 85 years Paris has had seven important expositions and reports another planned for 1937, establishing a world record for world's fairs. London follows, with a score of five. It is often difficult to decide whether a busy industrial exposition or a big centennial celebration is a world's fair.

There are few set rules for playing the exposition game, although an international agreement on the subject has been discussed and standing committees exist in most European countries. Almost any occasion now is considered legitimate excuse for a world's fair. Rio de Janeiro staged one to celebrate the centenary of Brazilian independence in 1922, Antwerp to commemorate Belgium's century of independence in 1930, and Brussels in honor of the centenary of Belgian railroads in 1935.

Transportation's Big Part

Indeed, the latter seems symbolic of the tendency of the 85 years of fairs— away from the early arts and crafts and toward the accomplishments of science, especially in the service of transportation. In 1851 the only transportation exhibit sent to the exposition from the United States was an artificial leg! But at the Chicago Centennial in 1933-34 modes of transportation constituted a more extensive display than did the exhibit of any one State or nation. There is no wonder, however, that fairs recognize transportation as important, since fairs are becoming bigger and better and more frequent largely because of the ease with which they can be reached.

The world's fair today, with its bewildering mixture of amusement, education and commercialism, is sometimes hard to distinguish from its more workaday relative, the international trade exposition for advertising purposes, such as the International Petroleum exposition in Tulsa, Okla. The world's fair is a sporadic celebration, however, and thus differs from the perennial industrial exhibition, like those of the British Industries fair held simultaneously in London and Birmingham every year since 1915, and the Leipzig fairs which have been landmarks of international trade for 700 years and are now considered the oldest and largest of the hardy perennials.

Each fair offers a novelty of some sort, like London's original Crystal Palace, Chicago's camel-ride in 1893 and its sky-ride in 1933, or the Texas Centennial's rocket-ride; but there is no novelty in holding a fair. Always it has been "fair" weather somewhere in the world, since Chinese tribesmen began to congregate at some convenient crossroads 3,000 years ago, when trade really meant trade and business was on the barter standard. Ancient Greeks and their Roman imitators held periodic fairs garnished with games and some religious trimmings.

In Medieval Times

Shrewd medieval European merchants reaped the rewards of virtue when they all journeyed to their nearest religious center—and set up booths for a fair during a church festival. So general was this practice that some languages combined the word "fair" with that for "church service." The hiring of servants and the settlement of marriage contracts were transactions no more out of place on primitive medieval midways than the exchange of cattle or the sale of horses. Incidental merrymaking became such a substantial factor that it soon set up in business for itself, primly differentiated with the term, "pleasure fair." One of these, the St. Bartholomew's Fair, was abolished in London only as late as 1926. England retains traces of many primitive fairs, such as Goose Fair and Onion Fair, while developing the more modern trade show to a high degree of specialization, from the annual exhibition of British products to an international audience with 80 different potential language markets, to the restricted Antique Dealers' Fair or the Exhibition of Acetylene, Oxy-Acetylene, and Allied Industries.

The old-fashioned fair to which products were brought, sold, and carted away now is being replaced by the modern exhibition which is simply a huge sample case, where potential buyers make choices but not purchases. Such are the fairs which have made traveling buyers thrive where the vanishing traveling salesmen once flourished, around such international commercial centers as Leipzig, Lyons, Basle, Praha, and Nizhni Novgorod in Russia. The great Hindu market at Hurdwar in India is less advanced.

The world's fair, no matter how frivolous, brings profit to its exhibitors by whetting the public's appetite for commodities to be bought later. One novelty introduced at the Philadelphia Centennial in 1876 was Dr. Alexander Graham Bell's curious machine called the telephone, which carried voices across empty space for some distance but seemed to the fair-goers too fantastic to amount to much.

Expositions have set the style for everything from jewelry to hotel facades. The Chicago Columbian exposition of 1893 was responsible for an epidemic of pseudo-Grecian architecture which supplanted the brownstone front throughout the United States until 1915, when the Moorish-Spanish buildings of the San Diego and the San Francisco fairs started a wave of low strawberry stucco structures topped with red-brown tiles. The Eiffel Tower, at the Paris exposition of 1889, served as a calling card for the steel construction which later came to stay, in modern skyscrapers. Style tides turned again in 1925 when the Paris Exhibition of Modern Decorative and Industrial Arts popularized diagonal lines and nonpictorial designs on everything from kitchen stoves to mirrors, and again when the Paris Colonial exhibition of 1931 created a vogue for wooden buttons and heavy jewelry copied from colonial natives.

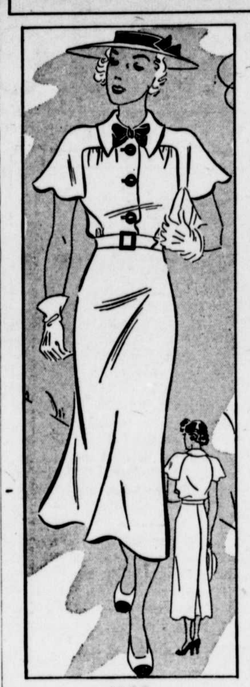
Swallows Grow Lighter

Bank swallows are lighter as adults than they were between twelve and seventeen days after hatching.

The English Lesson

"I 'eat' seven eggs this morning."
"Of course you mean 'ate.'"
"Well, maybe it was eight."

A Smartly Simple Frock



1933-E

Swingin' down the lane with a bit of a zip and a full quota of what it takes, this smartly simple frock goes places without effort—an engagingly youthful and chic affair which can be made in a trice (first cousin to a jiffy) and make you the belle of the campus.

Its simplicity is totally disarming, yet it has all the aplomb of a professor in English — just one of those frocks which can't miss. Delightfully cool and as chipper as a breeze, it requires just seven simple pieces in the making, in any fabric from the A's to the Z's. The yoke and sleeves cut in one and the collar is just long enough to take the prize.

Send for Barbara Bell Pattern No. 1933-B designed for sizes 12, 14, 16, 18 and 20—bust 32 to 38. Size 14 requires 4 yards of 39-inch fabric. Send 15 cents in coins.

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Send your order to The Sewing Circle Pattern Dept., 247 W. Forty-third St., New York, N. Y.

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Not Quite Enough for a Selling Order

Mrs. Raysun came dashing into the room where Raysun was absorbed in his evening paper.

"It's exactly 98 degrees on the back porch," she announced.

"Um, huh," Mr. Raysun replied.

Ten minutes later Mrs. Raysun popped in again. "Just think, darling," she cried, "it's now 101."

"OK with me," from Raysun.

"Henry Raysun," Mrs. Raysun soon thereafter interrupted her man as he was looking over the stock quotations, "just think, it's now exactly 107!"

"When it gets," replied Mr. Raysun dryly, "to 110, sell!"—New York Sun.

Household Questions

A mixture of one part vinegar and two parts linseed oil, applied with a soft cloth to suitcases and bags will clean and polish them.

• • •

A large piece of blotting paper placed on the closet floor will absorb moisture from wet rubbers that may be placed in closet.

• • •

Scorch on cotton or linen may be removed with soap and water. Wet the spot with water and expose to the sun for a day or longer if necessary. The scorch disappears more rapidly if the material is moistened first.

• • •

If your garden peas get too hard for serving in the regular way, cook them until tender, press through a sieve and use the pulp in soup.

• • •

If you wish to boil a cracked egg place a little vinegar in the water in which it is boiled. This will keep the egg from seeping through the crack in the shell.

• • •

If you want your glassware to sparkle, add a little lemon juice to the water in which it is rinsed.

• • •

To make white curtains ecru dip in a solution made by boiling one tablespoon of black tea in one quart of water. Strain solution before using.

Minced ham and chopped green pepper makes a tasty filling for deviled eggs.

• • •

Raw wool left on the farm is fine for light-weight comforters, baby quilts, foot warmers, and even pillows and mattresses. Of course it as to be washed and carded.

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That's It—Let's Go Swimming!

Friends have shown me with pride pulleys and gadgets in their bathrooms for daily exercising. Revisiting them later, I usually have found the apparatus still there, but with signs of disuse.

So let us thank Nature for providing beaches, and lakes, pools and streams, with a backdrop of gorgeous scenery to appeal to our senses and lure us into the water and air; to make us cast off the garments of conventionality and give our bodies a chance to be reborn and set again in the pattern that Nature intended . . . —Dr. W. H. Eddy, Director Good Housekeeping Bureau.

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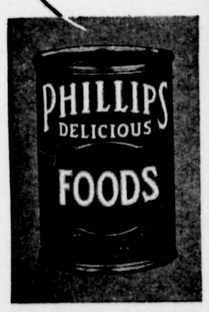
Gallant Gentleman

• IN UNITED TRIBUTE TO REAR-ADMIRAL RICHARD EVELYN BYRD, U. S. N. (Ret.), six hundred members of American industrial and scientific groups met at a dinner on June 5th. They presented to Admiral Byrd a gold medal inscribed "American Industry's Tribute."

On the reverse side, this medal commemorates the silent courage of an heroic leader who kept alone "a six months vigil for meteorological observation at the world's southernmost outpost. Before the middle of the long Antarctic night he was stricken desperately ill from the poisonous fumes of a faulty oil stove. Survival seemed impossible. He deliberately chose to die rather than tap out an S. O. S. on his radio. In fact, he squandered his strength and lessened his chance for survival by painfully hand-cranking his radio to keep his schedule and report—'All's Well'—to Little America, lest his silence cause his comrades to risk their lives coming to his rescue in the darkness. For months of the bitterest average cold ever endured, he hung precariously on the edge of the abyss. Untold suffering did not compel him to alter his decision. By a miracle he was spared."

In 22 branches of scientific knowledge the world is richer because Byrd and his comrades adventured into the Antarctic. But far beyond this the world is enriched by the character of these courageous men . . . led by a man who silently challenged death in one of the great deeds of all time . . . It is in enduring recognition of such rare leadership that the medal presented to him is inscribed "Dick Byrd—Gallant Gentleman."

Phillips Delicious Soups, Tomato Juice and Canned Vegetables were carried in the commissariat of both Byrd Expeditions to the Antarctic.



HOUSEKEEPING AT THE WORLD'S SOUTHERNMOST OUTPOST

In this tiny hut, buried under ice-fields, Admiral Byrd lived alone through months of darkness, with the temperature 80 below zero.

We are frankly proud to point out Phillips Delicious Foods among the vital supplies in this hut. When every ounce of food carried has to justify its weight . . . when morale and life itself depend upon the quality of the food . . . supplies are selected only after the most rigorous tests. By such tests Phillips Delicious Foods were approved and carried on both the 1928 and 1933 Byrd Antarctic Expeditions. They have never had endorsement that pleased us more.

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