

PHYSICS

Boiling Water Measured By Singing of Kettle

► SCIENTISTS are catching up with what housewives have known a long time—you can tell about how hot a kettle of water is by listening to the sound of boiling.

In experiments to relate the sounds of boiling with temperature and the flow of heat from heater to liquid, three University of Illinois chemical engineers, J. W. Westwater, A. J. Lowery Jr. and F. S. Pramuk, boiled methyl alcohol at 148 degrees Fahrenheit, using a copper heating unit, and listened to what happened.

They found there are three separate stages in boiling, each with its typical sound pattern, depending on the temperature difference between the liquid and the metal heater, which is the kettle bottom in a kitchen.

First came "nucleate boiling," when there was repeated, systematic bubble formation at specific spots on the metal surface. This kind of boiling ceases when the temperature difference between liquid and heating surface is 85 degrees Fahrenheit.

From that temperature up to a difference of 130 degrees Fahrenheit comes "transition boiling," when bubbles form violently and at random over the copper heater. The boiling sound increases rapidly across the transition temperatures.

Beyond 130 degrees Fahrenheit, lies "film boiling," when the hot metal is blanketed in a film of vapor and the sound level is rather uniform.

As the liquid temperature increases, there is less heat transfer from the metal to the liquid, the scientists found. During film boiling, the heat transfer is very poor.

While the sound of boiling does tell about a liquid's condition, it does not increase steadily with the amount of heat transferred, but varies according to the temperature difference between the liquid and the heating metal, they report in *Science* (Aug. 19).

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TECHNOLOGY

Cool Villagers Party More Than Hot Neighbors

► FAMILIES in the 22-house "Air Conditioned Village," Austin, Texas, entertain four to five times as much as their non-air-conditioned neighbors, according to latest data collected by scientists of the National Institute of Home Builders, studying the effects of air conditioning on living habits.

The researchers fail to report whether the additional entertaining is done willingly, or whether friends and relatives just drop in to share the families' comfort.

The data show a house becomes a home when air conditioning enters. Families with teen-age children were at home together, during waking hours, for 24 hours a week. Families with teen-agers in non-conditioned homes stayed together only 14

hours a week. Whether the cool families will continue to stay home together, or whether this effect is temporary, is not yet known.

The air-conditioned families also slept more. Adults got eight hours at night, then napped an average of 45 minutes during the day. The children averaged nine and one-half hours at night, napped 90 minutes a day. Both adults and children got an average of at least an hour's sleep more than their hot neighbors.

The now-famous Austin Villagers have better meals than their warmer neighbors. This is because cool housewives cook better meals, and cool families have brisker appetites.

Although the 22 families are living in an oasis, surrounded by outdoor temperatures of over 100 degrees, they are not without some complaints:

1. They do not like the noise of some units.
2. They do not like units in which the fan turns off when the cooling unit is not needed. Continuously circulating air was found to be more comfortable.
3. They want fewer gadgets to tend.

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TECHNOLOGY

Blimps Are Link In Radar Network**See Front Cover**

► NEW LINKS in the radar network guarding North America are Navy ZPG-2W radar picket blimps carrying high-power airborne search radar, housed in the radome beneath the cabin, as shown in the photograph on the cover of this week's SCIENCE NEWS LETTER. Associated electronic equipment is carried inside cabin.

By carrying the radar several thousand feet in the air, the blimp's instruments can detect low-flying planes over the horizon long before surface radar equipment. This is because radar beams follow "line-of-sight," and do not bend over the horizon to follow the earth's curvature. Raising the radars thus widens their range.

The radars are made by General Electric's Light Military Electronic Equipment Dept., Utica, N. Y.

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ZOOLOGY

Aussies Use Reflectors To Track Kangaroos

► EARS OF KANGAROOS in Western Australia are being taped with reflector-tape while the animals are asleep, so that scientists can later check their night motion.

The tape in several different colors is stuck to light metal tags attached to the kangaroo's ears. Water at their drinking place is drugged to put the kangaroos asleep, during which time the tags are attached.

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IN SCIENCE

BIOCHEMISTRY

Drug Co-Discoverer Studies Rare Mosses

► DR. ALBERT SCHATZ, co-discoverer of streptomycin, is studying a group of rare mosses he believes may be the lonely survivors of vegetation that carpeted the earth in the dawn of time.

In the early days of the earth, the atmosphere was almost devoid of oxygen, an element modern plants must have to manufacture their food by photosynthesis. But these rare plants, called copper mosses, according to Dr. Schatz, appear to be able to manufacture food using sulfur, which was plentiful then, in the place of oxygen.

Before Dr. Schatz' investigation of the copper mosses, only a few forms of bacteria were believed to carry out sulfur photosynthesis.

Modern plants use oxygen found in water for photosynthesis. The copper mosses are thought to use the ill-smelling gas hydrogen sulfide which is structurally similar to water for their food manufacture.

These "fossil" mosses may come to play an important part in industry. Their preference for copper ores as a place to grow on, may mean that they can be used to locate hidden copper deposits.

The attraction of these mosses to copper ore is probably due to the occurrence of copper sulfur compounds in the ore, which furnishes a sulfur source for the fossil plants, said Dr. Schatz, director of research at the National Agricultural College, Doylestown, Pa.

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ASTRONOMY

Comet Discovered Near Pole Star

► A FAINT COMET has been discovered by an amateur astronomer in the constellation of Draco, the dragon, a stellar group that circles Polaris, the Pole Star.

The new comet was spotted by the Rev. Carl J. Renner of Castilia, Ohio, a member of the American Association of Variable Star Observers. Its magnitude is ten, too faint to be seen without a telescope.

The part of the constellation Draco in which the comet was found is nearly overhead and is close to Ursa Minor, the smaller bear. Both constellations can be seen circling Polaris throughout the year.

Its celestial position on Aug. 16 was 19 hours, 12.5 minutes in right ascension; 67 degrees, 33 minutes in declination.

Rev. Renner reported its motion as 5.6 minutes south southwest to Harvard College Observatory, Cambridge, Mass.

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CE FIELDS

STATISTICS

World Population Booms To More Than 2.5 Billion

► THE WORLD'S POPULATION is booming. Since the beginning of World War II, it has grown by almost one-third billion and now exceeds two and one-half billion. Put it down to more babies and fewer deaths.

A new record low death rate has been set by American wage earners and their families. For the first six months of 1955, it was the lowest in the nation's history.

Even for heart, blood vessel and kidney disorders, the death rate among the wage-earner group was below last year's, 344.9 per 100,000 compared with 347.1.

These birth and death figures come from Metropolitan Life Insurance Company statisticians in New York. For their millions of industrial policyholders, the death rate during the first six months of 1955 was 644.4 per 100,000 insured, compared with the previous low of 652.1 set last year.

The death toll from cancers in the insured group stayed at last year's level, about 129 per 100,000.

Birth rates in Europe, Japan and the Philippines have fallen to or below pre-World War II levels, except for France and Norway. In the United States and other English-speaking countries outside Europe, notably Canada, Australia and New Zealand, the birth rates have stayed a third or more above the prewar levels.

Less well-developed areas of the world continue to have high birth rates.

In the United States the margin of births over deaths has increased population at a rate of about one and one-half percent a year. The rate of increase has been even greater in many countries in Asia and Latin America. These countries, the statisticians point out, have potentialities of rapid population growth for many years to come.

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MARINE BIOLOGY

Fiddler Crabs Show Neurotic Symptoms

► FRUSTRATION RESULTS in crazy, mixed-up sand fiddlers, experiments by a South African zoologist indicate.

When frustrated in his romantic designs, or when caught between desire and fear, the male sand fiddler takes up a pointless "displacement activity," in which he goes through the motions of feeding without eating anything.

This is reported by Helen R. S. Gordon of the University of the Witwatersrand, Johannesburg, in *Nature* (Aug. 20).

In normal feeding, the male fiddler de-

liberately stuffs mud into his mouth, using the smaller of his claws. Food material in the mud is sorted out by the mouth parts, and the worked-over mud is dropped to the ground in pellets. But when a female refuses his advances, all this changes.

Faced with a female who is not charmed by the beckoning of his handsome larger claw, the male fiddler petulantly begins to feed "nervously," scooping more often than usual and far less deliberately. The rejected male actually gets a negligible amount of food to his mouth, so little that no pellets are formed.

This temper tantrum may go on until the female shows more interest or until another passing female catches his roving eye.

Male fiddlers also show this "displacement activity" when they are confronted with stronger males bent on a fight.

The only reported case of displacement activity by a female came when four males completely surrounded a lone female in a laboratory tank. Boxed up against the wall, she was cut off from the safety of her burrow. She tried time and again to scale the wall, but always fell off.

Caught in this dilemma, she began stuffing nothing into her mouth busily.

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ARCHAEOLOGY

Spanish Chain Mail Links Found in Indian Mound

► THREE JOINED metal links, thickly coated by decades of corrosion, have been recovered from the side of an Indian mound, apparently the undisturbed dwelling site of prehistoric Indians on the Rio Puerco's right bank in New Mexico.

The links, which averaged about a quarter inch in external diameter, were probably part of a chain mail suit of armor worn by a Spanish soldier in the conquest of New Mexico.

How it happened to be in an apparently undisturbed layer of refuse in a pottery mound dating back to a time long before the coming of the Spaniards is not known, Drs. Bruce T. Ellis of the Laboratory of Anthropology and Arthur Woodward of Altadena, Calif., state in *El Palacio* (May-June).

Some chain mail used in northern Mexico during the late 17th century was made in Mexico by armorer-blacksmiths, but this was coarser, with links as large as one-half inch in diameter. Finer mail was more likely to have been made in Europe.

So far as is known, no other articles of European origin have been found in this pottery mound. In the case of the chain links, the archaeologists suggest the mail may have been worn by a settler of the region as protection against marauding Navahos as late as the 18th or early 19th century. If the settler snagged his coat of mail on a mesquite bush growing on the pottery mound, links may have lain there until a rat or other burrowing animal carried it under ground to the layer.

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NUTRITION

Substance 300 Times As Sweet as Sugar

► SWEETHEARTS of the next generation may be telling each other they are "sweet as stevioside." This crystalline chemical from the leaves of a wild Paraguayan shrub has been found to be 300 times sweeter than the usual standard of lovers, table sugar.

In the meantime, unromantic scientists of the National Institute of Arthritis and Metabolic Diseases are subjecting this super-sweet compound to a series of tests to learn its chemical structure and to discover any practical applications for it.

Dr. Hewitt G. Fletcher Jr. of the National Institutes of Health, Bethesda, Md., reports that stevioside is made up of very large molecules containing only three ingredients, carbon, hydrogen and oxygen. Included in each large molecule are three sub-molecules of glucose, the common cane sugar.

Stevioside does not have the bitter after-taste of saccharin, and apparently causes no ill effects on experimental animals receiving it as food. For the diet-conscious, stevioside seems to have little or no food value.

Source of stevioside is a small shrub, *Stevia rebaudiana*, which grows wild in Paraguay and a few near-by areas in Argentina and Brazil. It was seriously considered as a sugar substitute in England during World War II. Difficulty in cultivating the plant and cheaper costs of saccharin, however, have kept stevioside a mere curiosity up to now.

Dr. Fletcher holds out hopes that stevioside may find eventual use in medicinals or in their synthesis. His report appears in *Chemurgic Digest* (July-Aug.).

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ANIMAL NUTRITION

Cows Need Vitamins When Drought Strikes

► CATTLEMEN plagued with cattle abortions and sickly new calves on drought-ridden ranges can cut their losses by addition of a new form of vitamin A to supplementary feed.

Pregnant cattle deprived of green pasturage in drought areas develop vitamin A deficiency, which leads to trouble at calving time. To test the effect of synthetic vitamin A feeding, Robert F. Miller, farm adviser of Tulare County, Calif., gave bred heifers Vitamin A in Gelatin, developed by Chas. Pfizer & Co., Inc.

From a group of 43 two-year-old cows fed vitamin A to supplement a dry diet, there were 43 full term calves, with no abortions and no retained placentas.

With a group of 128 first-calf heifers given the vitamin, 83% of the calves were born alive, about 15% higher than on the same ranch in previous years, Mr. Miller reports in *Western Livestock Journal* (Aug.).

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