eling about a thirteenth of its complete annual journey westwards around the sun. The result is that we see the sun farther east, among the stars in the background, than we did before, and the moon has to travel about two days more before it is as far ahead of the sun as it was before. The moon is full every 29½ days; this is called the synodic month; while the other period, in which the moon actually goes around the earth, is called the sidereal month. This causes the times of perigee and apogee, the point at which it is farthest from earth, to shift around at different times with relation to the phases.

Closest of Year

But during September it happens that perigee occurs at 1:06 p. m., Eastern Standard Time, on the 12th, 2 hours 12 minutes before full moon. Even though the moon comes to perigee each month, it is not always the same distance, and it further happens that the one during September is the closest of the year. At that time it will be only 221,750 miles away. In contrast, when it was at perigee in May, it was 229,650 miles from us. Apogee, this month, comes on the 25th, at 11:36 p. m., with 252,750 miles separating us.

All these things have an important bearing on the height of the tides. As 's well known, these are caused by the gravitational pull of the sun and of the moon, particularly the latter. Even though it has so much less mass than the sun, it is so much closer that its tide-producing effect is more than twice as great. The force of the gravitational pull between two bodies varies with the square of their distance. The part of the earth nearest the moon, therefore, is attracted more than its center, and there is a tendency to pull the surface up at the point where the moon is overhead. A very slight effect of this kind on the solid ground has been detected, but it is more noticeable in the ocean, where the water can respond more readily, so there is a rather large bulge. Also, the earth itself is pulled more strongly than the water on the side of the earth opposite from the moon, and there is another bulge in that direction. These two bulges follow the moon as the earth turns on its axis, the friction delaying them a little after the place where the moon is highest in the sky. And, of course, the water in these bulges must come from some place, so there is an area of low water half way between them. For a person on the seacoast, high tide comes when one of the bulges is going past, low tide when the depression reaches him.

The sun's effect is about 5/11 of the moon's, and so it also produces two bulges and two low spots. When the moon is new, or full, the bulges from the attraction of the two bodies, which are then in line, coincide, and we have extra high, high tides and extra low, low tides, which are called the spring tides. At first and last quarter, the solar and lunar tides tend to cancel each other, the range from high to low each day is much less and then we have the neap tides.

As the moon changes its distance from earth, the tide raising effect is altered. At perigee the tidal range is about a fifth greater than when the moon is most distant. Therefore, when the moon is new or full at the time it is in perigee, the difference between high and low tide is greatest of all. As that happens this month, people who live near the sea or bodies of water connected with it will probably see the highest high tides and the lowest low tides of the year, with the moon almost as close as it can possibly come.

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Phases of the Moon

First Quarter	Sept. 5
Full Moon	Sept. 12
Last Quarter	Sept. 19
New Moon	Sept. 27

THE BEAR-DRIVER GOES; THE CHARIOTEER COMES

ARCHAEOLOGY

Honey Given to Dead In Old German Burials

DEAD MEN ate honey, in the afterworld of the ancient Central European religion.

That at least is the inference that seems likely, from evidences dug out of ancient burials in Germany, as analyzed under the microscope of Prof. Johannes Grüss of Berlin. (*Forschungen und Fortschritte,* July 10/20). For many years, Prof. Grüss has been building a wide reputation for his painstaking researches in what might be termed "micro-archaeology"—examination under the microscope of such minutiae as starch grains, yeast cells and shreds of fibers found in ancient ruins and tombs.

His newest investigation has to do with the contents of a little pottery vessel found in a log coffin in an ancient Allemannic cemetery by archaeologists of the Stuttgart Museum. Mingled with the fine-grained clayey debris that filled it were masses of recognizable pollen grains and a quantity of yeast cells. There were also minute bits of flower petals and wheat-grain fragments.

The wheat-grain fragments argued a funeral gift of bread, a not uncommon find with the dead of all lands. The pollen grains and petal debris indicated that honey was at one time present. This was confirmed when Prof. Grüss made a test for sugar, and found a small but quite definitely measurable quantity.

What had become of the honey itself was shown conclusively enough by the remains of the yeast cells. The burial had been in a moist place. The honey had absorbed water enough to dilute it. The yeast, already present, had fermented most of it to alcohol, which in the course of time vanished.

A considerable proportion of the pollen grains were well enough preserved to permit their identification. They came from a considerable variety of flowers: dandelion, hawkweed, cherry, heather, rose, snowdrop and a number of other species of wild plants.

Honey was not by any means a common funeral gift among the ancient Germans, Prof. Grüss remarks. Presumably it was not very easy to get.

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PHYSICS

Multiple Lightning Strokes Crush Strong Wires

Internal Pressures of From 10,000 to 20,000 Pounds Per Square Inch May be Built up in .8-Inch Core

DESTRUCTIVE lightning strokes which shatter a tree or telephone pole, burst a block of concrete through which a wire runs or dig a hole in the ground are the result of too much confinement, reports P. L. Bellaschi, engineer of the Westinghouse Electric and Manufacturing Company laboratories (*Electrical Engineering,* August).

If the core of the lightning stroke is confined within a bore having a diameter less than about eight tenths of an inch, internal pressures may be built up of anywhere between ten to twenty thousand pounds to the square inch. Few natural materials will stand such forces and naturally blow up.

Electrical engineers were led to investigate the shattering of wires by lightning strokes because of the paradox that small wires were known to be able to withstand high currents comparable with those of lightning and yet were sometimes fused and destroyed by lightning, Mr. Bellaschi will report in a paper to be delivered at the forthcoming meeting of the American Institute of Electrical Engineers in Seattle, Wash.

The secret, the electrical engineer reveals, appears to be that many lightning strokes are not single discharges but multiple ones. Lightning, in other words, sometimes strikes anywhere from five to ten times in the same place within a fraction of a second.

From a collection of experimental data gathered in a study of lightning with a super-speed camera it was found that 80 per cent. of the lightning strokes were single ones. The other 20 per cent. were of a multiple nature.

The multiple flashes are suspected of being the ones which crush large hollow cylinders, fuse telephone wires and other heavy-current carrying electrical leads.

Laboratory tests showed that very heavy lightning strokes, having currents up to 200,000 amperes, would be needed to destroy conducting equipment in the manner authentically reported. The cumulative effect of several more moderate strokes coming one on top of the other is believed to explain the lightning paradox.

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ENGINEERING

Giant Lightning Arresters Built for Boulder Dam

THE first of the twelve giant lightning arresters which will protect the power transmission lines from Boulder Dam to Los Angeles against lightning has now been completed. The arresters are 45 feet high, weigh 4,500 pounds and are rated at 287,000 volts.

The strip of brass wire cloth shown in picture was used in artificial lightning tests to simulate the steel tower on which the arrester will hang in actual service.

Insulating material of the arresters is the new substance Thyrite, for whose discovery Karl B. McEachron of the General Electrical Company received the Edward Longstreth Medal of The Franklin Institute, Philadelphia.

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The wood of the Osage orange tree was valued by Indians as material for bows and war clubs.

When tin cans were novel containers for food, tinsmiths made cans by hand at the rate of about 60 a day.

The Seventh Pan American Child Congress will be held in Mexico City in October of this year.

To salvage the diamonds in the gravel bed of the Vaal River, South Africa, a large part of the river has been diverted.

PHYSICS

Nitrogen Afterglow Hints Possible New Lamp Type

THE FUTURE may bring a new form of illumination for domestic and commercial use which will supersede all other forms now in use, Prof. W. H. Rodebush of the University of Illinois has predicted.

He referred to the afterglow of nitrogen which occurs when this gas is placed in a glass tube with small amounts of oxygen and subjected to low pressure electrical discharges.

Among the virtues which this form of light appears to have is a practically complete conversion of electrical energy into light with no detectable waste in the form of heat.

Furthermore, it does not require continuous supplies of electrical energy, for under some conditions the afterglow lasts for hours after the electrical discharge is stopped. By proper mixture of gases used, light can be produced which approximates the ideal "white" light of the sun.

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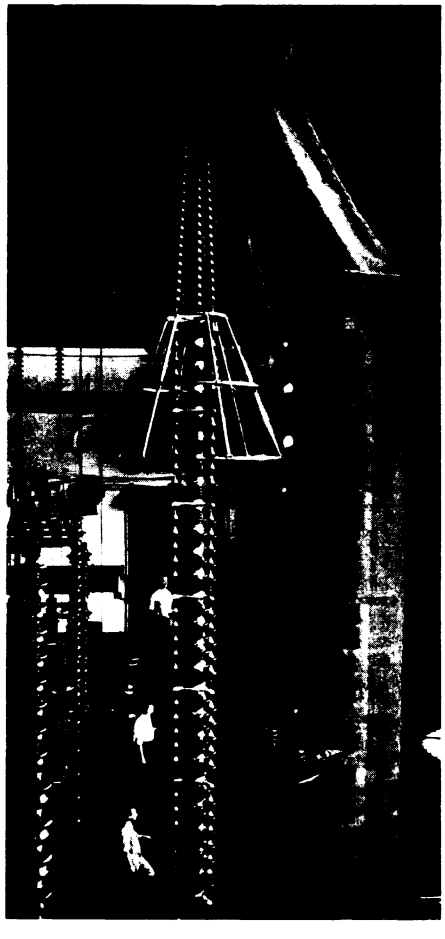

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