

## SCIENCE NEWS

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### SEARCH FOR A NEW PLANET

A NEW planet about the size of Pluto but a little less distant may be added to the sun's family, which already contains nine members.

No such tenth member has yet been found, but the attraction of such a body would account for the three days' delay in the return of Halley's comet in 1910, according to the calculations of Dr. R. S. Richardson, of Mount Wilson Observatory, reported in the Publications of the Astronomical Society of the Pacific. He has told astronomers just where to look for the new body. It should now be found, he says, at about right ascension 16 hours, declination minus 20 degrees. These figures enable astronomers to point their instruments directly at the suspected spot.

At first, Dr. Richardson thought Pluto might be the culprit that held back Halley's comet. But it turned out that Pluto was miles away at the time—in fact, more than three billion miles away. This was the very closest the planet ever got to the comet, and it happened in October, 1901. Also Pluto is so tiny, only about as big as the earth! Finally, Dr. Richardson's very careful calculations showed that if Pluto had any effect at all, it was in the wrong direction; it would have hastened rather than delayed the comet.

Pluto moves in an orbit at a mean distance of 3,700,000,000 miles from the sun, which is nearly 40 times the earth's distance, 93,000,000 miles. Pluto's nearly circular orbit is so large that the whole of the long and narrow orbit of Halley's comet falls well within it, with a margin of about a billion miles. The comet requires 77 years to traverse its orbit, while it takes Pluto 248 years to get around its circuit.

What is needed to explain the comet's dilatory behavior, Dr. Richardson found, is a planet whose orbit just grazes the furthestmost tip of Halley's orbit, grazes it by about 9,000,000 miles. The planet would be about the size of Pluto or the earth. A larger planet at a greater distance would also do the trick, but the planet must be small because otherwise it would have been discovered.

If this planet is found, it will be the third to have been predicted mathematically and afterwards discovered. The other two are Neptune, discovered in 1846 from the calculations of Leverrier and Adams, and Pluto, discovered in 1930 from the calculations of Lowell and Pickering.

### THE CURVE OF A BASEBALL

THAT a baseball really does curve and may deviate from a straight line as much as 6½ inches at the home plate appears from measurements made by Frank L. Verwiebe, of Eastern Illinois State Teachers College, and reported in the *American Journal of Physics*.

These results run counter to the claims, made in *Life* magazine last September and supported by convincing pictures, that all "curves" are really straight and that the curves that many protested having seen are merely optical illusions. The results also contradict the asser-

tion in *Life* that if there is any curvature at all, it occurs in the first half of the pitch, the last half being perfectly straight. The measurements here showed that most of the curving occurred during the last half, thus giving solid foundation for the "break" which so many insist they have seen.

The measurements were made in the same way that the path and the velocity of a bullet are determined. Four rectangular screens were set up between the pitcher and the home plate and one at the home plate. The five screens were crossed by vertical and horizontal threads, accurately spaced and aligned by a surveyor's transit. The position of the ball as it passed through each screen could be determined by the broken threads to within less than an inch.

One throw was intentionally straight, and the measurements showed that it really was straight. All pitches called as "curves" proved to be actually curved, the deviation from straight line travel varying from 2½ to 6½ inches as measured at the home plate. The outdrops deviated most, and are apparently the easiest curves to throw.

The speed of the ball was found to vary from 90 to 130 feet per second, requiring from half to two fifths of a second to travel the 50 feet from the pitcher to the batter's box. For a six-inch deviation, most of it occurring in the last fifth of a second, the ball must be traveling crosswise at two feet per second, which can easily give the batter the impression of a "break."

To cause a ball, launched horizontally at 130 feet per second, to rise requires that it be given enough spin to lift itself 7½ inches, this being the distance it would fall during the flight by gravity. This is very difficult, according to Mr. Verwiebe, although conceivably a Walter Johnson or a Bob Feller might give the ball a slight "hop." He concludes that many peculiar effects reported about baseball curves are still unexplained.

### BOMBING A LAVA STREAM

BOMBING a lava stream to keep it from destroying a city is more or less like blasting a levee to relieve the pressure of a river in flood, except that a lava river builds its own confining embankments.

Lava of the type that Mauna Loa sent to threaten the city of Hilo early this month rapidly forms a crust on its outer surface as it flows, according to Dr. E. S. Shepherd, volcanologist of the Carnegie Institution of Washington. It not only builds up side walls but even roofs itself over.

This produces some impossible-appearing results, including the ability of the advancing stream to climb slight rises and to ignore side slopes that would deflect a stream of any normal, unconfined liquid. These confining walls of hardened lava crust are often thick—from six inches to two feet—but the rock is brittle and readily broken by heavy explosive charges. All that is necessary is to drop a few moderately heavy bombs—say 500-pounders—against the side wall at a point where the

break will permit the lava to drain down a slope into an unoccupied valley.

It is even possible, Dr. Shepherd said, to deflect such a lava flow with a firehose, by directing the stream on one part of the front to cause the more rapid formation of the confining crust there, permitting the lava to move in the desired direction at another point. The trouble is, however, that there is neither water nor firehose in most of the area ordinarily traversed by the lava flows of Mauna Loa.

Bombing volcanoes to provoke eruptions in enemy territory is not a very promising tactic. The biggest air bombs would probably have no effect at all if dropped directly into either Japanese or Hawaiian volcanoes, or indeed into any of the volcanoes in the whole Pacific region.

Only one type of volcano might conceivably have its outburst triggered by an outside explosion. That is one in which the lava column rises close to the very rim of the crater, and then hangs there for several days before beginning active eruption. If bombed at just that time, the outbreak might be speeded. Obviously, such an opportunity comes too seldom, and is never timed just the way an attacker might want it. Furthermore, the eruption might not destroy what you wanted destroyed. Better use the bombs directly on the military target itself.—FRANK THONE.

#### PAPERS READ AT THE MEETING OF THE AMERICAN ASSOCIATION OF CEREAL CHEMISTS

WHEAT germ may become the war diet substitute for cheese, beefsteak and the Sunday roast, it appears from experiments reported by E. L. Love and C. G. Harrel, of the Pillsbury Research Laboratory, Minneapolis, at the Chicago meeting of the American Association of Cereal Chemists.

Wheat germ protein, they found in diet experiments with laboratory rats, is as good as or better than casein, chief protein of milk and cheese, for maintaining growth. They conclude that it "can be used in the human dietary as a supplementary protein equal in value to casein or other animal proteins."

Animal proteins, from meat, fish, poultry, milk or cheese, have heretofore been considered better for human nourishment than proteins from plant sources such as vegetables and grains. But the "impending shortage of animal proteins" throughout the world due to the war makes the finding of an adequate protein from other sources particularly important.

The wheat germ protein, however, can not be obtained from ordinary bread, because this part of the wheat is discarded when flour is bolted. Bread made from unbolted, stone or water ground flour would contain the wheat germ and its protein. The germ of the wheat is discarded in flour milling because it also contains an oil which readily turns rancid.

THAT improved nutrition for the "uninformed and the unprogressive as well as to others at the trivial cost of 20 cents *per capita* per year" can automatically be

attained through enrichment of bread and flour with the two vitamins, thiamin and niacin, and the mineral, iron, was pointed out by Dr. R. R. Williams, of the Bell Telephone Laboratory, who discovered a way to produce thiamin synthetically. Thiamin is vitamin B<sub>1</sub>, also known as the morale vitamin. Niacin is the new name scientists have given to the pellagra-preventing vitamin.

Dr. Williams stated that something more than a third and less than a half of the nation's bread and flour supply is now being enriched, thanks to the cooperation of the milling and baking industries.

He listed obstacles to further advance as follows: (1) The highly competitive situation in low priced flours such as are used by low-income people has so far made such flours unavailable in enriched form. This is a definite challenge to the flour industry. (2) The public appreciation of the values of enrichment is still slight so that bakers find it difficult to recoup the costs of bread enrichment. This is a challenge to the nutritionists of the country. (3) Delay in the promulgation of final regulations for the enriched products retards progress.

#### BRAZIL

IN Brazil there is a mountain of iron darkening a tropical sky with twelve to fifteen billion tons of ore equal to the best produced by Sweden.

Through the Reconstruction Finance Corporation, the United States has loaned its sister Republic \$14,000,000 for a railroad to carry that ore from the State of Minas Gerais to Port Victoria on the Atlantic Coast. Another loan, this time \$20,000,000, will enable Brazil to build a steel plant at Volta Redonda in the State of Rio de Janeiro where the iron can be floated from Port Victoria, or sent by rail.

While Brazil is building the new steel plant, for which it is spending \$25,000,000 of its own money, the rich ore can be shipped to U. S. smelters. We need Brazil's iron. With U. S. war production still below top peak, our steel industry is working at only 98 per cent. capacity.

In Brazil, too, are manganese, which puts backbone in steel, bauxite from which comes aluminum, commercial diamonds to grind the delicate mechanisms of bomb sights, beryllium for steel alloy, and graphite important to our crucible steel industry; and Brazil is the largest producer of chrome ore in the Western Hemisphere, another item in the manufacture of high-grade steel. In area and population, Brazil represents almost half of South America. She is the fourth largest nation in the world, and gifted with illimitable resources. Her merchant fleet is the second largest in this hemisphere.

The United States is already Brazil's best customer—in 1940 it took 42.3 per cent. of its total exports—and the U. S. search for raw materials for war is converting the South American republic into a new and mighty arsenal of strategic materials.

Our Army and Navy Munitions Board lists fourteen such materials "for which strict conservation and distribution control measures will be necessary." These materials are antimony, chrome, coconut-shell char, ferrograde manganese, manila fiber, mercury, mica, nickel, quartz crystals, quinine, rubber, silk, tin and tungsten.

Four of these—rubber, manganese, mica and bauxite—exist in potentially great quantities in Brazil. Already they have been streaming into the United States as fast as available ships can haul them.

Two other products are of special note: rubber and coffee. In the Amazon River Basin area between 200,000,000 and 300,000,000 wild rubber trees grow. Yet only one per cent., or 16,000 tons, of the world's total rubber supply comes from Brazil. United States and Brazilian rubber technicians hope that plants for development of Brazil's rubber potential, already begun, will enable that country to produce 30,000 to 70,000 tons, about 5 per cent. to 12 per cent. of normal U. S. needs.

Brazil is still the world's greatest coffee producer. It produces far more than it can sell—as a beverage. But coffee is a complex chemical, and a U. S. inventor has discovered a method for turning it into a plastic he calls "cafelite." The first coffee-plastic factory has been planned for operation in São Paulo with a capacity to transform 37,000 bags of coffee annually into plastics. If successful, this experiment will inspire large-scale plastic manufacture to eat into coffee surpluses; plastic goods can be used by civilians, releasing more vital chemicals for the manufacture of explosives.

#### EXPORTS OF TANNING EXTRACT

WITH Eastern Hemisphere sources hampered by the war, the United States is looking southward for the raw materials needed for tanning its growing Army's footwear.

Smiling hopefully under U. S. gaze is Peru, where the wild tara bush grows, and whose coastline is on the wrong side of the continent for Nazi submarines. Already tara from Peru has replaced sumac from Italy, balonia from Greece and myrobalams from India in tanning blends, used in this country.

Exports from Peru have risen rapidly in late years—490 tons in 1939 and nearly three times that amount in 1941, largely to the United States. It is now urged that plantations of tara be established on thousands of uncultivated acres along the west coast of Peru. Tara grows wild along the semi-arid foothills of the west coast. It bears a long pod filled with seeds. Pod and pulp which surround the seeds have a tannin content of 50 per cent. to 60 per cent. This is even higher than that found in sumac. Tara is further desirable because it imparts little color to the leather when used in treatment.

Economists of the U. S. Department of Commerce feel that if Peru will develop her production facilities, she will find a rich and permanent market in the United States. The tanning business in this country in 1939—the last peacetime year—was greater than that of all of Europe, including the United Kingdom.

#### ITEMS

A WARNING against use of the phenol-camphor mixture for athlete's foot by untrained persons is given in the current issue of the *Journal* of the American Medical Association. It is stated that a number of studies of the possible benefits and dangers of the mixture are under way. In the meantime it is recommended that its

use be left to qualified physicians. Alternative mixtures of (1) equal parts camphor and phenol, or (2) three parts phenol and one part camphor were proposed in the December 6, 1941, issue of the *Journal* by Dr. Edward Francis (retired), of the U. S. Public Health Service. Dr. Francis warned against use of the preparation on wet skin.

To meet the present acute shortage of trained physiotherapists, a shortage expected to be intensified by the war, Columbia University will offer a two-year course starting next September. Physical therapy is a branch of medicine which treats disease by heat, sunshine, water, massage, exercise, mechanical devices and other physical measures. Since the first World War it has rapidly gained prominence. New techniques are being developed and more and more hospitals have installed special physical therapy departments for peacetime patients with ailments ranging from broken bones to paralyses and disturbances of blood circulation. Increasing numbers of trained therapists will be needed to give these treatments to speed recovery and rehabilitation of the war wounded.

THE growing need of manpower at the Colorado State Hospital for the Insane may be met by the assignment of conscientious objectors, as a possible preliminary test to assigning objectors to this type of work all over the country. A hospital for the insane is always undermanned, even in peace times, and the Colorado institution, with more than 4,000 patients, has lost many attendants. Five patients have escaped in recent days, and this is attributed to lack of manpower by Superintendent F. H. Zimmerman. Colonel Lewis F. Kosch, chief of camp operations of selective service, offered Dr. Zimmerman the use of 20 objectors from the Rocky Mountain camp near Colorado Springs. The men would be fed and uniformed by the hospital, and given an allowance of \$2.50 a month each for incidental expenses.

As a wartime security measure, all diathermy apparatus in doctors' offices, hospitals and elsewhere, including dealers' stocks, have been ordered registered with the Federal Communications Commission in Washington by June 8, in accordance with an order of the Defense Communications Board. The object of the order is to prevent subversive use of such machines by enemy aliens for radio transmission. Diathermy machines not only look like floor-model radios, but actually consist of radio transmitters choked off. They generate radio frequency energy designed for use in generating heat within the body tissues for treatment of various ailments.

AFTER a lapse of a couple of generations, hemp is again being cultivated in the United States, to make good the cutting off of our Asiatic import sources for cordage. The U. S. Department of Agriculture has bought and distributed about 3,000 bushels of hemp seed, enough to plant some 350,000 acres. Most of the planting will be done in Kentucky, where hemp cultivation started in 1775 and has survived on a small scale ever since. Hemp will also be grown in Wisconsin, Minnesota and Illinois. The acreage may be expanded into other states in 1943.