

## Marvels of Everyday Science

Competent Scientists Apply Their Skill to Problems of Agriculture, Housekeeping, Schools, Business and Governmental Activities.

**W**HAT are the dimensions of the smallest object which could be perceived by the human eye studying the moon through a telescope? Laymen ask the astronomer this question frequently, and it is not so easily answered as might be supposed. They ask, "How near do the most powerful telescopes bring us to the moon? Would we be able to see human beings if they were walking around there?" The scientific question is, "What is the size of the smallest object that we could distinguish on the surface of the moon?"

Arago states in his "Popular Astronomy" that as the moon is 238,850 miles away, a telescope magnifying it ten times ought to bring it with 23,885 miles, a magnification of 100 times within 2,388 miles, and a magnification of 1,000 times to within 238 miles of the earth, so far as vision is concerned.

What could we see on the moon at a distance of 238 miles? Hardly anything in detail, for all would be beyond the power of sight. And besides where is the astronomer who can hope to obtain a magnification of 1,000 times? The conclusion must be that we can hope to distinguish upon the surface of the moon only very large objects, such as mountains or huge craters.

According to Arago's reasoning, if we could secure a magnification of 2,000 times it would be as if we were looking at some object on earth removed to a distance of 119 miles.

But this reasoning is all wrong when applied to a star high above the horizon, near the zenith of the heavens. In this case our eyesight has to pass through layers of air equal only to that between us and an object five miles away on earth. The problem must therefore be attacked from another, more scientific side, before the question can be properly answered.

On account of the limitations of vision of the human eye, even when aided by the most powerful telescope, the figures given before must be corrected. If we get an enlargement of 90 times the amateur can see objects 1,800 feet in diameter. If our eye could use a telescope magnifying 1,000 times the object seen on the moon might be only 100 feet in diameter and 2,000 times only 81 feet in diameter. But this is only theoretical.

Practically the case is quite different, for the power of the eye is now the main consideration. The eye may be trained even for astronomical observation, so that it sees more than the untrained eye. But then we are face to face with another difficulty, that of the atmosphere. The wider the opening of the telescope the greater are our difficulties with the atmosphere. The image becomes so trembling and indistinct when looked at through the larger telescopes that we see hardly anything.

Theoretically we should have to secure an enlargement of 3,000 times to see an object 54 feet in diameter, and if we wanted to see something a yard in diameter the enlargement would have to be 54,000 times. Even if we ever get a telescope of this power the human eye will not be able to see through it, even though we place the telescope upon the highest mountain so as to escape the thickest layers of the atmosphere.

The greatest astronomers, like Sir William Herschel, have made their most valuable discoveries by comparatively low-power telescopes. The eye of man, unless some new laws of optics are discovered, will never be able to see any small object on the moon, no matter how powerful our telescopes are made. We may see mountains and craters—that is about all.

### Shoe-Box Closets.

For the living room the housewife bought a wooden box for 10 cents at the shoe store. She had two shelves put in and covered it with an old single length of Japanese curtain material. Stood on end it served the purpose of a cupboard admirably.

For the two bed rooms two more shoe boxes were bought, but only one shelf was put in these. The tops were covered with white oilcloth and the sides and fronts with silkoline. The latter was cut in three lengths, tops turned

in for gathers; lower edges hemmed to make it easy to put shoes on the lower part and towels or other small possessions on the shelf. Each box was nailed to the floor so it would not be unsteady or upset; the top served as washstand.

### Boiling Egg on Ice.

This shows how an interesting experiment was performed by Emil Bachellet, inventor of a train without wheels which goes 300 miles an hour. Bachellet's "flying train" is forced to move by a series of electrical magnets. The

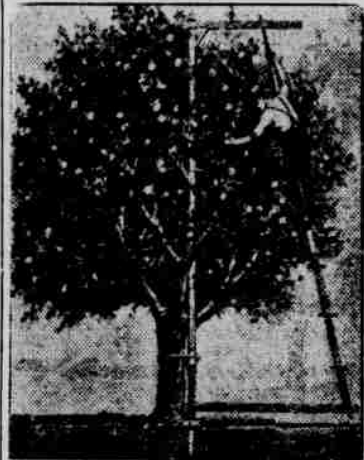


inventor's great secret is in the way he controls the electrical currents. While he has refused to explain this, he has furnished illustrations of how the principle works. For instance, he boiled an egg in water in an aluminum kettle which was separated from the

magnet by a block of ice. The ice was seemingly not affected by the currents passing through it from the magnet, yet the "harnessed" electricity set the water to boiling within an incredibly short time.

### Revolving Ladders for Use in Picking Oranges.

Ordinary ladders when used for picking fruit from a tree often damage the tree, and to overcome this a new form of ladder has been adopted by some orange growers of California. A central shaft is lashed to the trunk of the tree, while horizontal arms are fitted



at the top and bottom so that they may be swung about in all directions. Notches cut in the tops of the arms provide support for the rungs of the ladder at varying distances from the tree. With this device, every part of the tree may be picked without disturbing a branch.

## Making Milk and Butter Yellow

Kind of Feed More Important Than the Kind of Breed, Experiments Show

That the rich yellow color demanded by the public in dairy products is primarily due to the character of the cow's feed is demonstrated by recent experiments carried on by the U. S. Department of Agriculture in cooperation with the Missouri State Experiment Station. For some years dairy experts have been studying this question. Their conclusion is that, although to some extent a breed characteristic, the intensity of this yellow color may, within certain limits, be increased or diminished at will by changing the animal's rations.

Chemical tests show that the yellow pigment in milk consists of several well-known pigments found in green plants. Of these the principal one is carotin, so called because it constitutes a large part of the coloring matter of carrots. The other yellow pigments in the milk are known as xanthophylls. These are found in a number of plants including grass, but are especially abundant in yellow autumn leaves.

These pigments pass directly from the feed into the milk. This explains the well-known fact that fresh green grass and carrots increase the yellowness of butter, the only standard by which the average person judges its richness. On the other hand, a large proportion of these pigments is deposited in the body fat and elsewhere in the cow. When the ration is changed to one containing fewer carotin and xanthophyll constituents, this hoarded store is gradually drawn upon and in consequence the yellowness of the milk does not diminish so rapidly as it otherwise would. This yellowness increases, however, the instant the necessary plant pigments are restored to the ration.

Green grass is probably richer in carotin than any other dairy feed. Cows fed on it will therefore produce the highest colored butter. Green corn, in which xanthophylls constitute the chief pigment, will also produce a highly colored product. On the other hand, a ration of bleached clover hay and yellow corn is practically devoid of yellow pigments and the milk from cows fed upon it will gradually lose its color. It is, of course, indisputably true that the breed does influence the color of the milk fat; but vary the ration and there will be a corresponding variation

in the color of the milk fat in each breed.

In cows of the Jersey and Guernsey breeds the body fat is frequently of such a deep yellow color that some butchers and consumers look with disfavor upon beef from these breeds. For this prejudice there is absolutely no justification. The yellowness of the fat springs from the same causes as the yellowness of the milk and there is no reason for objecting in one case to the very thing that is prized in the other.

### COMING EVENTS.

Tillikum Potlatch, Seattle, Wash., July 16-18.  
Society of Montana Pioneers, Bozeman, Aug. 6-8.  
Everett Chautauqua, Everett, Wash., September 12-20.  
Frontier Days, Walla Walla, Wash., September 17-19.  
Washington State Fair, North Yakima, September 21-27.  
Round-up, Pendleton, Ore., Sept. 24-26.  
Oregon State Fair, Salem, September 28-October 3.  
National Apple Show, Spokane, Wash., November 16-21.  
Northwest Live Stock Show, Lewiston, Idaho, November 30-December 5.  
Pacific International Live Stock Exposition, North Portland, Ore., December 7-12.

W. E. Adams, of Farmington, Me., has several russet apples which were grown in the summer of 1912 and have been in his cellar through two winters. The apples are perfect in every way, not even withered.

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## Forest Fires

**T**WO convictions in Washington for burning slash without permit from a fire warden, damage amounting to perhaps \$5,000 to logs and logging equipment in the same state through fires in slashings, but no loss of green timber, is the Pacific northwest record for June, the first month of the 1914 forest fire season, according to bulletins received from several states by the Western Forestry and Conservation Association.

All protective agencies were placed on the alert at the close of June by the prospect of a drying interior wind, but the new forecast service especially for forest fire conditions which is supplied by the U. S. Weather Bureau soon reassured them that the threatening high wind pressure in Western Canada had split into two areas and the danger was for a time averted. Nevertheless all patrol forces are being rapidly recruited for the season and about 2,000 men will be on duty in a few days in Oregon, Washington, Idaho and Montana. About 500 patrolmen are employed in these states by the timber owners' protective associations, nearly 200 by the states and the Government jointly outside the National Forests, and the others by the Forest Service within the National Forests. The British Columbia Government also has 225 men on duty.

July hazard to be guarded against, other than from camp fires, is reported to lie chiefly in slash burning to clear land and rights of way and in leaving fires thus started to smoulder in logs and stumps to break out later when the inevitable hot and windy weather arrives. Forest officers announce that state laws regarding burning without permit and precaution will be enforced rigidly and also warn summer camping parties to be extremely careful with camp fires.

Mineral oil has been discovered in Somaliland, and the British government is investigating the extent of the discovery.

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