matched against a pack of such dogs as could be induced to face it, and left to fight it out to the death. The tactics of the dogs, dashing in one or two at a time to worry the poor beast and then leaping back to safety, never giving the victim a moment's peace, gave rise to the verb, "to badger."

The odds were usually arranged in favor of the dogs, and they had to be pretty heavy, too; for the badger has a neat way of biting a dog's forepaw that cripples at the first onset, and a dog once bitten was more than twice shy. Moreover, the long, thick hair on the badger's back pretty effectually protected it against attack from above.

One canine enemy has a right to be feared, and that the least likely-looking of dogs—the long, trundling, mild-mannered, comical-looking dachshund. The Old-World badger is known in German as *Dachs,* and this short-legged, long-jawed breed was originally called into existence as a badger-battler.

The dachshund's encounter with the badger was no one-sided affair, either. It was strictly a duel between one dog and one badger, and in the latter's own home den, too. That is why the dachshund's legs were kept so short and his muzzle drawn out so long. He could run in to the attack almost as low as a snake, and get under the badger's guard to seize him by the throat. Pet dachshunds of today may not look it, but they are descendants of warriors.

Science News Letter, April 12, 1941

PHYSICS

Speed of Light Slightly Less Than Previous Values Showed

No Slowing in the Rate at Which It Travels, But Method of Measurement Is Now Made More Accurate

LIGHT travels at a speed of 186,272 miles per second, a figure which is probably not more than 8.7 miles per second in error.

This new value, about 12 miles per second less than hitherto generally accepted by scientists, was announced by Dr. Wilmer C. Anderson, now with the American Research Company, of Beaumont, Texas. He made the determinations while on the staff of the Cruft Laboratory of Harvard University.

This does not, however, mean that the velocity is lessening, for he has included correction for a factor known as "group velocity," which has been assumed to be negligible in previous researches and has been neglected. This might amount in some cases, he says in a paper in the *Journal of the Optical Society of America* (March), to as much as 4.3 miles per second. He concludes, therefore, "that the velocity of light is a constant as nearly as we can measure it at present."

Dr. Anderson's measures were made with the aid of an electric eye, or photoelectric cell, and used automatic means of recording the data, eliminating, to a great extent, errors of human measurement.

Fundamentally, this was the method used: An electric current vibrating 19,200,000 times a second controlled a Kerr cell, which is a form of light valve, and produced a beam of light with the same number of variations per second. This beam, therefore, was made up of sections of light a few feet long, alternated with dark spaces of the same length.

By a mirror with a very thin coating of silver, this beam was divided into two. One part was sent to a nearby mirror and back, the other part traveled over a much longer path, before it was sent back, and the two recombined, to fall on the electric eye.

If the two parts of the beam are joined so that the bright and dark portions are exactly in step, then the light falling on the electric eye varies just like the original beam, and there is a maximum electric current from it. Now, if the nearby mirror is moved, the path of the first part of the light beam may be increased by just the length of one of the bright sections. Then, when the two parts of the beam are brought together again, the dark part of one will coincide with the bright part of the other. The resultant beam will then be steady, and no current will come from the electric eye. From the difference in the light paths when this minimum value of the current is reached, the speed of the light may be calculated.

Elaborating greatly on this fundamental method, Dr. Anderson and his associates made 2,895 measurements. These give the speed of light as 299,776 kilometers (187,272 miles) per second. This may be in error as much as 14 kilometers (8.7 miles) per second. The chief source of error remaining is one that involves the electrons in the electric eye which watches the changing light beam. The electrons which are shot out from the sensitive surface of the photoelectric cell where the two parts of the beam strike, have to travel a slightly different distance, and this prevents the most accurate measurement of the times when the beams are in and out of step.

This problem, he says, will have to be solved before the accuracy of the method may be increased.

Science News Letter, April 12, 1941

AGRICULTURE

Harvesting Machine For Pyrethrum Flowers

A HARVESTING machine for pyrethrum flower heads, combining features of corn binder and cotton stripper, has been developed by workers of the U. S. Department of Agriculture. With it, two persons can harvest the flowers from at least four acres of pyrethrum a day.

Pyrethrum is the base of several types of insecticide, especially of the fly- and mosquito-repellent sprays that have become popular in recent years. It is a plant closely related to the chrysanthemum, with flowers that look like white daisies. The effective principle is found mainly in the flower heads, shortly after opening.

Because it has always had to be hand harvested, pyrethrum has never been grown on a commercial scale in this country. Instead, we have depended on imports from lands where labor is cheap, principally Japan, Yugoslavia, Brazil and Kenya in Africa. During the past couple of years imports from Japan have slumped sharply, and the increasing quantities received from Africa have not made up for the shortage. Present imports are far under the all-time high of 20 million pounds, brought in during 1937.

The Department of Agriculture has just issued a publication on the new machine, prepared by A. F. Sievers and M. S. Lowman of the Bureau of Plant Industry, and W. M. Hurst of the Bureau of Agricultural Chemistry and Engineering.

Science News Letter, April 12, 1941