# THE SCIENCE NEWS-LETTER

*A Weekly Summary of Current Science*

EDITED BY WATSON DAVIS

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## SCIENTISTS, PUBLICISTS AND RELIGIOUS LEADERS DECLARE THAT SCIENCE AND RELIGION ARE ALLIES, NOT ENEMIES

In a joint statement recently issued representative groups of scientists, religious leaders, and men of affairs unite in declaring that science and religion "meet distinctive human needs and in the rounding out of human life they supplement rather than displace or oppose each other."

This is intended to counteract anti-evolution and anti-science propaganda as well as anti-religious movements. Dr. R. A. Millikan, physicist and director of the Norman Bridge Laboratory of Physics at Pasadena, Calif., who formulated and secured the signatures to the statement, said in explaining its object:

"The purpose is to assist in correcting two erroneous impressions which seem to be current among certain groups of persons. The first is that religion today stands for medieval theology; the second that science is materialistic and irreligious."

The full statement and signatories are:

### A Joint Statement Upon The Relations of Science and Religion

We, the undersigned, deeply regret that in recent controversies there has been a tendency to present science and religion as irreconcilable and antagonistic domains of thought, for in fact they meet distinct human needs, and in the rounding out of human life they supplement rather than displace or oppose each other.

The purpose of science is to develop, without prejudice or preconception of any kind, a knowledge of the facts, the laws, and the processes of nature. The even more important task of religion, on the other hand, is to develop the consciences, the ideals, and the aspirations of mankind. Each of these two activities represents a deep and vital function of the soul of man, and both are necessary for the life, the progress, and the happiness of the human race.

It is a sublime conception of God which is furnished by science, and one wholly consonant with the highest ideals of religion, when it represents Him as revealing Himself through countless ages in the development of the earth as an abode for man and in the age-long inbreathing of life into its constituent matter, culminating in man with his spiritual nature and all his God-like powers.

## Religious Leaders

Bishop William Lawrence, Episcopalian, Boston, Mass.

Bishop William Thomas Manning, Episcopalian, Bishop's House, Cathedral Heights, New York City.

Dr. Henry Van Dyke, Presbyterian, preacher and poet, Princeton, N. J.

Dr. James I. Vance, Presbyterian, First Presbyterian Church, Nashville, Tenn.

President Clarence A. Barbour, Baptist, Rochester Theological Seminary, Rochester, N. Y.

President Ernest D. Burton, Baptist theologian, President of University of Chicago.

President Henry Churchill King, Congregationalist, Oberlin Theological Seminary, Oberlin, Ohio.

Dr. Robert E. Brown, Congregationalist, Second Congregational Church, Waterbury, Conn.

Bishop Francis John McConnell, Methodist, Pittsburgh, Pa.

Dr. Peter Ainslie, Disciple, Christian Temple, Baltimore, Md.

Dr. William Louis Poteat, baptist, president, Wake Forest College, N. Car.

Dr. John D. Davis, presbyterian, Princeton Theological Seminary, Princeton, N. J.

## Scientists

Charles D. Walcott, Geologist, President of the National Academy of Sciences, President of the American Association for the Advancement of Science, and Head of the Smithsonian Institution of Washington.

Henry Fairfield Osborn, Paleontologist, President of the American Museum of Natural History, New York.

Edwin Grant Conklin, Zoologist, Head of the Department of Zoology, Princeton University.

James Rowland Angell, Psychologist, President of Yale University.

John Merle Coulter, Botanist, Head of the Department of Botany, University of Chicago.

Michael I. Pupin, Physicist and Engineer, Head of the Department of Electromechanics, Columbia University.

William James Mayo, Surgeon, Mayo Foundation for Medical Education and Research, Rochester, Minn.

George David Birkhoff, Mathematician, Head of the Department of Mathematics, Harvard University, Cambridge, Mass.

Arthur A. Noyes, Chemist, Director of the Gates Chemical Laboratory, California Institute of Technology, Pasadena, Calif.

William Wallace Campbell, Astronomer, Director of Lick Observatory and President-elect of the University of California.

John J. Carty, Engineer, Vice-President in Charge of Research, American Telephone and Telegraph Company, New York.

Robert A. Millikan, Physicist, Director of Norman Bridge Laboratory of Physics, Pasadena, Calif.

William Henry Welch, Pathologist, Director of the School of Hygiene and Public Health, Johns Hopkins University, Baltimore.

John C. Merriam, Paleontologist, President of the Carnegie Institution of Washington.

Gano Dunn, Engineer, Chairman of the National Research Council, Washington, DC.

Men of Affairs

Herbert Hoover, Secretary of Commerce, Washington, D. C.
James John Davis, Secretary of Labor, Washington, D. C.
David F. Houston, ex-Secretary of the Treasury, 195 Broadway, New York City.
Frank O. Lowden, ex-Governor of Illinois, Oregon, Ill.
John Sharp Williams, ex-United States Senator, Yazoo City, Miss.
Rear Admiral William S. Sims, Commander United States Naval Forces in European waters during the World War, Newport, R. I.
Harry Bates Thayer, President, American Telephone and Telegraph Co., 195 Broadway, New York City.
Julius Kruttschnitt, Chairman of the Executive Committee, Southern Pacific Railway, 165 Broadway, New York City.
Frank Vanderlip, ex-President National City Bank of New York, Scarborough, N.Y
Henry S. Pritchett, President, Carnegie Corporation of New York.
Victor F. Lawson, Publisher, Chicago Daily News, Chicago.
John G. Shedd, ex-president, Marshall Field Co., Chicago.
William Allen White, editor, Emporia Gazette, Emporia, Kansas.

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Dr. Edwin E. Slosson

C H A T S  O N  S C I E N C E

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RELIGION AND SCIENCE

Timid souls who have become alarmed at the idea that religion and science are inevitable antagonists should be assured by the "Joint Statement upon the Relations of Religion and Science," signed by a number of the foremost scientists, religious leaders and men of affairs of the United States. These forty distinguished thinkers in various fields found it easy to agree upon a simple statement of their opinion of the relation of religion and science and their belief that both have a place in modern life. No one can question either the ability or sincerity of such men as these and since their adhesion to the declaration is purely voluntary it is evident that they find no essential incompatibility between a personal religious faith and a scientific view of the universe.

The list of signers could be extended indefinitely, in fact the statement probably represents in general the position of most of the educated and moderate minded men of our time and country. It is a curious feature of the present situation that the laity are more alarmed over the advances of science than the clergy. That is, those who know the most about theology and who have most at stake in the church are most willing to welcome historical criticism and scientific research. The real conflict is not between science and religion as such, but rather between dogmatic and intolerant religionists and scientists on the one side and liberal and tolerant religionists and scientists on the other side. It is more a difference of temperament than of opinion. The effort to fetter freedom of investigation or to force thought into fixed formulas is equally fatal in science and religion.

Overmuch fear of heresy indicates lack of faith. Scientific men have such absolute confidence in the validity of the scientific method that they permit their most fundamental principles to be challenged even in their own societies. Chemists listen without a shudder to destructive attacks upon the immutability of the elements and the indivisibility of the atom. The Royal Society of London even applaud a speaker who sets an upstart foreigner like Einstein above Newton, one of its oldest and most venerated members.

The papers have reported a half dozen cases of professors who have been dismissed from educational institutions under ecclesiastical control for teaching evolution but there has been no retaliation from those whom some call the "enemies of religion". I never heard of the National Academy of Sciences expelling a member because he was suspected of being a Presbyterian or of the American Association for the Advancement of Science blackballing a man because he had been baptized. Girard College is the only institution that excludes clergymen by charter and I understand that the doorkeeper there is not very gigilant in searching every visitor to see if he has a dogma concealed about his person. If we begin to rewrite our textbooks in science to suit a single sect, or section of a sect, we may soon have Methodist and Baptist zoologies, Protestant and Catholic chemistries, Jewish and Christian theories of gravitation, as we now have northern and southern histories, and proletarian and capitalistic economics.

Science and religion, properly understood, need never conflict but should always cooperate in the advancement of the human race, for each supplies what the other lacks. Science provides the means by which human toil and suffering may be alleviated and shows how human life may be lengthened and enhanced. Religion gives inspiration to the individual, an aspiration to a high ideal. Science gives eyes to religion. Religion gives a heart to science. Knowledge is power. But power is impotent unless set in action and dangerous if set in action by the wrong motive. Religion, unless enlightened by science, wastes its energies in vague longings or in fruitless and sometimes harmful efforts to remedy bodily or social ills.

Science may discover what conduct is most conducive to human welfare in the future. But science as such cannot go beyond this. It can point out the best way but it cannot inspire the individual voluntarily to follow it against his personal interest. Mere knowledge cannot of itself supply the motive for self-sacrifice for others or for the future. It cannot make a mother risk her life for her child or a man risk his for his country. The altruistic impulse is a religious instinct whether it is recognized as such or not.

Science can supply the motive power. Religion must supply the motive.

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READING REFERENCES- White, Andrew D. A History of the Warfare of Science with Theology in Christendom. New York. D. Appleton and Company, 1896. Kellogg, Vernon. Human life as the biologist sees it. New York, Henry Holt and Company, 1922.

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An artificial body of water which will produce 50,000,000 kilowatt hours of electrical energy for industries and will irrigate over 74,000 acres of land has been created on the Tirso River in Sardinia.

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## THE ALARM CLOCK IN SEEDS

By Dr. E. E. Free

One of the most mysterious things in Nature, if you do not know the clue to it, is the accuracy with which all the millions of plant seeds that have lain quietly in the ground all winter wake up and begin to grow in the spring. One day the fields are bare. A week later they are thickly covered with the little green plantlets. After waiting for months, until the weather got to be just right, all the seeds in the ground suddenly decide to begin growing, almost on the same day.

It seems as though they possessed some sixth sense telling them what the weather was like up above them in the open air, or as though they all had little alarm clocks of some kind to tell them just when it was time to wake up.

Indeed the seeds do have inside them a set of physical and chemical mechanisms which we might call an alarm clock, only these mechanisms are a great deal more complicated than the insides of the ordinary tin alarm clocks that we humans use. Only in the past few years have the scientists who study the physiology of plants succeeded in working out all the features of this wake-up machinery inside the seeds.

This machinery is started off in the spring by a combination of three separate things, like the three separate combination dials that bankers sometimes use on the vaults where they keep their money. Only when all three of these dials on the vault doors are set each at just its proper position can the door be opened. And in just this same way, it is only when all three of these separate things about the seed are exactly right that the seed will wake up and grow.

One of these three things is water. Seeds that are quite dry will not sprout no matter what time of the year it is. But just as soon as the snow begins to melt in the spring the seeds that are lying in the ground soak up water from the wet soil, just as a handful of shriveled, dried-up peas will do when you put them into water. This is the first thing that the seed must do before it begins to sprout.

It must soak up water; just enough water but not too much.

The second of the three combination locks on the seed's alarm clock is heat. If the seed is too cold it will not begin to grow. And so the rays of the spring sun must have time to warm up the ground a little before the awakening of the seeds can begin.

The third of the three things is one that you never would think of, probably, unless some scientist told you about it. Indeed, the scientists themselves did not find out about it for a long time even after they had begun to study in their laboratories the way that seeds sprout and grow.

This third thing is air. The seeds must have air before they can sprout, just as you must have air before you can work or even stay alive.

This need of air is really, in most cases, the actual thing that touches the seeds into life in the spring. The water and the heat that the seed needs are usually at hand before the necessary air is.

The water begins to be available very early in the spring, as soon as the snow is well melted and the frost begins to be out of the ground at all. And not long after this the ground is reasonably warm, in the daytime at least. But though the seed may be quite wet enough to sprout, and the soil warm enough to encourage it to do so, there is not enough air. The soil is too wet. No air can get into ground that is fully water-soaked and the seeds simply sit tight and wait for some of the water to drain away so that the air they need can get in to them. So soon as this happens and the air actually does begin to seep down into the pores of the soil all the seeds wake up.

All three of the combination dials on the alarm clock are then set at the proper points; the seed is wet enough and warm enough and it has air enough. So the alarm starts off and the seed wakes up. The draining away of the water and the seeping of the air into the soil usually take place about at the same time all over a field. That is why all the seeds wake up about on the same day.

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READING REFERENCES- Ganong, W. F. The living plant, a description and interpretation of its functions and structure. American nature series. New York. Henry Holt and Company, 1913.

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## HOW SEEDS BREATHE

By Dr. E. E. Free

So far as we know every living thing in the world has to breathe in a good deal the same way that we do. Even the seeds of plants breathe all the time. The packets of seeds lying quietly on the shelf waiting for you to plant them in the garden are breathing. If you should seal them up in a tight bottle so that they could get no air at all they would die just as surely as you would, though not quite so quickly.

Breathing, you remember, consists of taking some oxygen gas out of the air and putting back into the air, in place of this oxygen, some of another gas called carbon dioxide. This is what humans do when they breathe. Some oxygen is taken up by our lungs, and some carbon dioxide gas is breathed out into the air in its place.

Scientists who have been studying seeds find out that all the seeds do exactly this same thing. Of course seeds have no chests that expand and contract as ours do, nor do they have anything corresponding to our lungs, but the substance of the seeds itself, the living matter inside it, is continually taking up oxygen and giving out carbon dioxide gas in just this way.

Of course the quantity of oxygen used up by a seed is very small. Dry seeds, like those in a seed store, use up so little of it that you need the most delicate and complicated chemical apparatus to make sure that it is being used at all. But always, no matter how dry the seed is or how small or how old, there is always a little oxygen being used up by it so long as it is alive and retains the power of growth. Scientists have used this fact, even, as an extremely delicate and quite certain test to tell whether important samples of seeds are still alive or whether they have accidentally died.

When seeds have been planted in the ground and are getting ready to grow they use up more oxygen and breathe a great deal faster than when they are dry and are merely resting between seasons. This is why it is so necessary for air to penetrate into the pores of the soil before seeds will wake up and sprout in the spring. When they begin their real job of starting a new living plant they have to breathe faster, just as we get short of breath and begin to breathe more deeply when we work our muscles harder than ordinary.

Seeds swell, too, when they begin to wake up. Of course this is really because they are soaking up water, but when we think of it and of their faster breathing at the same time, we might almost say that the sleepy seed stretched itself and took a few deep breaths when it first got up in the morning, just as we do.

This faster breathing when they begin to grow applies to all ordinary kinds of seeds. They will not get up in the spring until they have had a few good deep breaths, until there is plenty of air in the soil. But a Japanese scientist, Dr. Takahashi, discovered some years ago that there is one kind of seed that does not need air in order to wake up. This is the seed of rice. The ordinary rice grains of the stores are merely the inside of these rice seeds, with their yellowish husks or coats scraped off by machinery and thrown away.

Rice seeds, Dr. Takahashi found, will start growing even inside a sealed bottle where there is no air at all, provided only that the seeds are wet enough and warm enough. Recently Dr. W. A. Cannon and I found another kind of seed that will do the same thing. It is the seed of wild grass that grows as a weed in the rice fields of California. These two kinds of seeds, the rice seed and this grass seed of ours, are the only known kinds of seed that have this extraordinary ability of starting off in the spring without needing any breath of air.

But this does not mean that these seeds can really live and grow without breathing. They do breathe, but they are able, strangely enough, to breathe <u>water</u>. Water, you know, is a chemical compound of hydrogen and oxygen. What the rice seeds do, we believe, is to break up some of the water into its chemical elements, just as the chemist can decompose water with an electric current in the laboratory. Then the clever little rice seed breathes this oxygen that it has made for itself out of water, so that it doesn't need to get any from the air the way all the other seeds have to do.

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As a result of the recent rubber depression in the Federated Malay States, extensive experiments are being made in the cultivation of various crops suitable to the development of more diversified farming.

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Wood is used for the manufacture of artificial silk, rope, carpets, and other fabrics.

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It seems probable that the mineral and vitamin contents of dairy feed may have an important bearing on the reproductive ability of dairy cattle, a statement from the U. S. Department of Agriculture says.

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Trachoma, a preventable eye disease, is especially prevalent among reservation Indians in Minnesota.

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NEWS OF THE STARS

By Isabel M. Lewis
of U. S. Naval Observatory

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## SOLAR ACTIVITY NOW AT A MINIMUM

Old Sol is taking it easy these days and is in a remarkably quiescent state for he is passing through the minimum sunspot period. Sunspots, those solar cyclones that occasionally cause so much havoc with telegraphic and radio communications upon our owh planet through the magnetic storms that they produce in our atmosphere, are now rarely visible on the solar surface. A few sporadic spots appear now and then but they are insignificant, generally, and rapidly fade away.

According to the observations of Dr. G. H. Peters ofdthe U. S. Naval Observatory, who photographs the surface of the sun on every clear day and allows no sunspot however small to escape his eye, the sun is now very close to the sunspot minimum period which occurs, on the average, once in eleven years.

It will not be possible to tell exactly when the minimum takes place until later in the year when an examination of the continuous series of observations will show exactly when the solar activity was at a minimum.

The sunspot maximum occurred in the latter part of 1917 and it has been expected that the minimum would occur at some time during the present year. When the sun is passing through the sunspot maximum period its activity is greatest. There is then scarcely a day that spots, singly or in groups, may not be seen upon its surface. The faculae, or cloud-like masses of intensely hot calcium vapor that occur most abundantly in the sunspot regions, are most conspicuous during that period. During the sunspot minimum period, the faculae are at their minimum brightness and sunspots may not appear on the face of the sun for days at a time.

Strange as it may seem, the average annual surface temperature of the earth has been found to be about a degree lower at the time of sunspot maximum, when the sun is most active, than it is at the time of sunspot minimum when the sun is most quiescent. The explanation generally given for this state of affairs is that the atmosphere of the sun is more dense during the period of maximum solar activity and more permeated with the vapors of many elements that are being expelled with great violence from the lower strata owing to the marked increase in solar energy. This increased density of the solar atmosphere has a screening effect upon the solar radiations and there is consequently a slight decrease in the intensity of the radiations that reach the earth's surface. The sun has been found to be a variable star, however, with periods of short, irregular variations in the intensity of its radiations lasting a few days, weeks or months, as the case may be, in addition to the longer period of variation that is coincident with the sunspot cycle. The effect of such a short period variation may be to mask or counteract, temporarily, the effect of the changes in the intensity of solar radiation that attend the sunspot cycle. So, while, in general, we may expect a higher mean temperature for the earth during the sunspot minimum period there may be a short-period solar variation superimposed that will temporarily mask this effect for a few weeks or months.

It is also an interesting fact that in recent times there have been periods of abnormal volcanic activity coincident with sunspot minimum periods. This happened, for instance, at the time of the eruption of Mt. Katmai in 1912 and the result was a marked drop in the earth's surface temperature owing to the presence of an unusual amount of volcanic dust in the earth's atmosphere which tends to act as a screen to shut out solar radiations.

There are, then, many factors that may more seriously affect the earth's temperature for the time being than the change in solar activity during the sunspot cycle, though in the long run this change is sure to be felt. And so, whether the effects will be noted to an appreciable extent or not it is certain that the sun is now in an exceptionally quiescent state from which he will probably not arouse himself for some months to come.

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READING REFERENCES- Hale, George E. The New Heavens, New York. Charles Scribner's Sons, 1922. Abbot, Charles G. The sun, New York, D. Appleton and Company, 1911.

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## LETS CHIGGERS BITE HIM TO MAKE PIE SAFE

There was an almost unknown hero of the war who allowed himself to be a cootie pasture so that scientists might study the habits of that nippy creature; and now comes a hero of peace, who in the cause of science and huckleberry pie has permitted the well-known chigger or "huckleberry itch" to park on his person so that it may be possible to abolish that little pest of the berry patch.

This courageous scientist is Dr. Henry E. Ewing, of the U. S. National Museum, one of the men who has seen chiggers although millions have sensed them in more feelings ways. He has found that although the chigger is distributed over North America from New York State to the Rocky Mountains and as far south as Central America he is mostly of one species. As for the name of that species, it contraverts any idea that scientists are unemotional. Many people have called chiggers hard names, but nothing to beat "Trombicula Tlalzahautl", his scientific appellation.

Dr. Ewing studied the habits of the chigger by allowing a colony of about a score of individuals to settle on his forearm and to dwell there several days. He has also pursued them to their lairs in the wild woods and berry patches but nothing required such self-control, he said, as sitting quietly while they were pasturing on his forearm.

Chiggers do not live on huckleberries or dewberries or any other kind of berry or plant, Dr. Ewing believes. In badly infected areas he has found them only on the ground as a rule, seldom on any vegetation. He blames the rabbit and the field mouse, but especially the rabbit for being the principal source of nourishment for chiggers. Rabbits like to live in thick bushes such as berry patches, where chiggers are most often found. Rabbits nests have been found to be heavily infested.

The best preventive of chiggers is the fine powder of "flowers of sulphur", which should be applied to the inside of the clothing next to the skin. Thick puttees are advisable, as are tight wristlets to prevent the insect climbing up the arms. As for remedies, the first thing to do is to kill the chigger, the next to allay the itching. The first may be done by soapsuds allowed to dry on the skin, or be repeated applications of strong alcohol.

In proportion to the trouble he makes, the chigger is a small thing. His average size is about one two-hundredth of an inch, enabling him to nestle down into his favorite location in the base of a hair. Once settled, he digs in; but before settling down he is remarkably light on his feet, for like another insect of more evil fame, "he hasn't any wings at all, but he gets there just the same".

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READING REFERENCES- Department of Agriculture Bulletin No. 671. Harvest Mites or Chiggers. Washington, Government Printing Office, 1915.

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## STONE EATING MOLLUSCS DAMAGE CONCRETE PIERS

Concrete forebreakfast would not appeal to the most enthusiastic explorer of breakfast food possibilities, yet a concrete-eating mollusc has been found to have been doing extensive damage to piers at San Pedro. His name is Pholad , he is a bivalve, as are oysters and clams, and when fully grown is about three inches or less by one and a quarter.

When the piles were constructed a number of years ago they were jacketed with concrete to protect them from the common wood-boring marine animals. Recently it was found that the Pholads had bored through the concrete and so made way for the wood-borers to get at the wooden piles.

Just how the mollusc works is unknown.

The forward, rounded portion of the shells has a surface resembling a rasp or file. Whether, however, the cutting of the concrete or rock is due wholly to attrition with the rough shell, or whether it is aided by some secretion which softens the material, has not been surely determined. These molluscs have been found in some hard rocks, but are generally found in shales.

Reports state that at every point in the inner harbor where mortar-jacketed piles exist, about 50 percent had been more or less attacked, of which more than one-fifth were badly bored, and of those not attacked a number were so far inshore as to be but little exposed. To allay unnecessary alarm, it should be said that the mortar was below average in quality, from two to five inches in thickness, some being decidedly poor. That these jackets had escaped attack for fourteen years is attributed to the fact that the wooden forms used in depositing the mortar had been left in place. They were gradually destroyed by marine wood borers.

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READING REFERENCES- Thomson, J. Arthur. The haunts of life. New York, Harcourt, Brace and Company, 1922. Bartsch, Paul. A Monograph of American shipworms, Bull. 122, U. S. National Museum, Washington, Government Printing Office, 1922.

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A large track laying tractor is used by a mining company in northern Ontario to transport silver ore twenty-two miles from the mine to the mill cheaper than by water.

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Flashing flood lights were recently used at Mitchell Field, New York, to positively identify the landing field to air pilots by spelling out part of the field name in the dots and dashes of the Morse code.

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