THE SCIENCE NEWS-LETTER

With this issue the personal subscription edition of the Science News Bulletin becomes the Science News-Letter.

Due to the interest that has been shown by individuals and libraries in a weekly summary of science news, this change has been made.

With the inauguration of the News-Letter two additional features are being added. The list of references to books and magazine articles will suggest where further information about each of the general subjects covered by News-Letter articles can be obtained. With the cooperation of the Research Information Service of the National Research Council we shall be able to give each week some of the most interesting questions received and a summary of their answers.

It is hoped that each subscriber to the News-Letter will feel free to suggest improvements in the work of Science Service. We shall appreciate receiving information about any phase of science or its applications in any part of the country from time to time, and we hope that through the cooperation of our subscribers we may more effectively keep in touch with all the fields of science.

SCIENCE NEWS-LETTER

A weekly summary of current science, for personal use or use in classes, study clubs or libraries. Publication of the articles contained is expressly prohibited. $5 a year, postpaid.

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BROADCASTS

Radio News of the Week

WIDE-SPREAD BROADCASTING ASSURED BY RADIO CONFERENCE

Washington, The allocation of radio wave lengths and recommendations made in the tentative report of the Conference on Radio Telephony called by the Department of Commerce have assured the widespread use of radio for the broadcasting of public information and other matters of general interest.

The experts who have been deciding on the future of America's youngest, fastest growing and most astonishing development recommend, in brief, the following action:

Amend present radio laws to give the Secretary of Commerce effective and practically complete control of all transmitting stations. Receiving stations are not to be regulated except where they produce radiations that interfere with other stations. Radio communication is a public utility and as such should be regulated and controlled by the Federal Government in the public interest.

The conference has laid out an ambitious program of research to be undertaken by the Bureau of Standards of the Department of Commerce with a view to reducing interference between stations. It declared that "the types of apparatus most effective in reducing interference should be made freely available to the public without restriction".

The findings of the conference look forward to the day when one person will be able to simultaneously address by radio the majority of people in this country. Under the tentative recommendations official federal government broadcasting has

first rights on the ether, and next educational and public broadcasting by states, universities and public institutions will have the most privileges. Third in order of priority comes private broadcasting of entertainment news and other such features and then toll broadcasting by public service companies that rent apparatus and furnish a broadcasting service will be allowed.

There is no chance for the counterpart of the newspaper and magazine advertisement, the car card, and the billboard in the ether. The conference recommended that "direct advertising in radio broadcasting service be not permitted" and concerns broadcasting will only be allowed to state their name and call letter.

Twenty bands of radio wave lengths have been set aside for various uses and five of these are devoted to broadcasting.

Government departments and public institutions will use wave lengths between 1050 and 1500 meters, and government broadcasting will also be allowed between 1850 and 2050 meters. Private and toll broadcasting will have rights on wave lengths from 310 to 435 meters. Cities and states will be able to spread information relating to public safety on wave lengths, 275 to 285 meters. Seven hundred miles inland, government and public broadcasting will be permitted within the band 700 to 750 meters.

Ships at sea whose only telephonic link with land is through the ether are treated generously in the new allocations, as they are under the old regulations. "Mobile radio telephony" is given rights to the following bands of wave lengths: 525 to 650, 650 to 750, and 2500 to 2650 meters.

Radio telephony and telegraphy for aircraft use has been given the exclusive use of the wave length bands: 500 to 525, 850 to 950, 1500 to 1550 meters.

Radio beacons that warn ships at sea during fog have, in accordance with international convention, been given exclusive use of wave lengths 50 meters on both sides of 1000 meters. The radio compass stations of the Navy have similarly been given the wave length bands whose center is 800 meters.

The recommendations of the Conference are at present tentative and the experts will gather again in two or three weeks to consider constructive criticism from interested organizations and frame a final report.

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RADIO AMATEURS ALLOTTED
NEW BAND OF WAVE LENGTHS

Washington, The Government conference on radio telephony has tentatively recommended that the amateur be given exclusive rights to a band of radio

wave lengths from 150 to 275 meters. Under present regulations most amateurs operate on a wave length of 200 meters, while the more expert of them are authorized to send and receive on 375 meters.

The upper part of the new band, from 200 to 275 meters, will be shared with technical and training schools, similarly to the way in which 375 meters was formerly shared.

The radio experts of the conference have recommended that the wave band assigned to amateurs be divided into still smaller bands according to the method of transmission. Damped wave stations would be assigned the band of lowest wave lengths, interrupted or modulated continuous wave radio telegraph stations the next band, radio telephone stations the next band, and finally unmodulated continuous wave radio telegraph stations the band of highest wave lengths. It is recommended that amateurs be permitted to carry on broadcasting within the wave length band assigned by the Secretary of Commerce to amateur radio telephony.

In order that the relayed messages may be sent across natural barriers such as the Rockies and other sparsely populated areas, 310 meters has also been set aside for restricted special use by amateur radio telegraphers.

The allocations of amateur wave lengths made by the conference are essentially those favored by a recent amateur radio convention held here in Washington.

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GOVERNMENT DEPARTMENTS TO
DISTRIBUTE BROADCASTING WAVE LENGTHS

Washington, To decide how the radio wave lengths between 1050 and 1500 meters, allotted for governmental broadcasting by the radio conference, shall be used by various government agencies, a federal interdepartmental conference will be held here shortly.

Practically all the government departments are interested in radio broadcasting, particularly the Department of Agriculture, which has been distributing market, crop and weather information by radio, the Department of Commerce which has the enforcement of radio legislation, and the Post Office department, which has developed a system of radio stations in connection with the postal service. The Navy and War departments developed extensive radio systems for military use, and while they are not so vitally concerned in civil broadcasting, they will be represented.

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FORESEE TRANSOCEANIC
RADIO TELEPHONY

Washington, Telephone conversations from continent to continent across oceans are predicted in the tentative report of the government radio telephony conference. A band of wave lengths from 5000 to 6000 meters has been set aside for "transoceanic radio telephone experiments" and the report states that "when transoceanic radio telephone experiments are to be conducted the Department of Commerce should endeavor to arrange with other countries for the use of the wave band 5000 to 6000 meters assigned for this purpose."

Radio experts connected with the Department of Commerce say that no transoceanic radio telephony experiments are definitely planned so far as they know, but they are confident that this will be a development of the near future.

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"WIRELESS" DEAD AS
RESULT OF RADIO CONFERENCE

Washington, "Wireless" has been officially killed if recommendations of the committee on nomenclature of the Government Radio Conference are carried out.

The word "wireless" and names derived from it are obsolete, say the experts. Instead they urge the use of "radio". Thus official sanction is given to a word which even late dictionaries mark "colloquial".

"Statics" or the shorter "X"s" are common radio terms which they ban instead of approve. They suggest the use of "atmospheric disturbances" or "atmospherics".

Other recommendations of the committee on nomenclature include:

For the generic title of the vacuum tube, of any number of electrodes, and any of its recognized modes of operation, use "electron tube". For the specific title of the ordinary three-electrode tube, use "triode".

For the generic title for a system of conductors for radiating or absorbing radio waves, use "aerial". For an open circuit aerial use "antenna". For a closed circuit aerial use "coil".

For a receiving arrangement in which beats are produced by a separate local oscillator, use "heterodyne". For a receiving arrangement in which the same electron tube is used for generating oscillations and detecting, use "self netro".

NEWS OF THE STARS

Spring Arrives March 21.

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

At 4.49 a.m., Eastern Standard Time, on March 21, spring arrives. The sun crosses the equator going north. The line separating day and night then passes through the poles and day and night are equal in length all over the globe. And while spring begins in the northern hemisphere, fall is inaugurated in the southern hemisphere.

On this day the sun passes directly through the zenith at the equator rising due east and setting due west. After this date it rises in the northern hemisphere north of east and sets north of west so that it will shine for a part of the day on the north sides of our houses until it again reaches the equator going south in the fall.

At the north pole the plane of the equator coincides with the horizon plane so on this date, or rather a few days earlier owing to the effect of refraction, the sun appears on the horizon and makes a complete circuit of the heavens in twenty-four hours without setting. This brings to an end the long winter night of six months duration.

From this time until the sun crosses the equator going south in September, it remains continually above the horizon for the observer at the north pole and gradually makes it way upward until it reaches an altitude of 23½ degrees at the beginning of summer in June. It then begins to gradually wend its way downward once more toward the horizon, disappearing beneath it at the beginning of fall for another six months.

At latitudes between the north pole and the polar circle the sun appears above the horizon before the beginning of spring and rises and sets daily until it reaches a distance north of the equator equal to the observer's distance from the pole. It then makes a complete circuit of the heavens without setting, touching the horizon at the north point and the phenomenon of the midnight sun can be seen. The sun remains continually above the horizon from that day on, attaining a little higher altitude each day until the beginning of summer. After that its altitude above the horizon begins to decrease. When it has reached the same point as before on its southward journey it rises and sets daily once more until it is as far south of the equator as the observer is from the north pole when it disappears completely from view below the horizon and the long winter night sets in to last until the sun has

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passed through the winter solstice and has again reached the same distance south of the equator on its return journey to the north.

At the polar circle, 23½ degrees from the pole, the midnight sun is seen on only one day, that of the summer solstice, when the sun is 23½ degrees north of the equator. Between the polar circle and the equator the sun rises and sets daily, the difference between the length of day and night being most pronounced in high latitudes.

Although, theoretically, day and night are equal in length at the beginning of spring the refraction of the sun's rays by the earth's atmosphere causes the sun to appear above the eastern horizon before it has actually risen and to be visible above the western horizon after it has set. As a result the day is lengthened at the expense of the night by several minutes. Of course, at all times of year the effect of refraction is to lengthen the day and shorten the night by a small amount.

USE OF PNEUMONIA VACCINE
STILL IN EXPERIMENTAL STAGE

New York, Experiments on prophylactic inoculation against pneumonia have not yet yielded sufficiently convincing proof of its efficacy to warrant universal application in the belief of a special committee of the New York Academy of Medicine that has investigated the matter.

Although they can not now recommend promiscuous use of the vaccines, the medical experts found that the vaccines have some value against three of the fixed bacteriological types of lobar pneumonia and that under the circumstances and until such time as the rules against spitting and unprotected coughing and sneezing are universally followed, the most promising means of preventing acute respiratory diseases lies in the prophylactic vaccine inoculation.

Use of the vaccines by persons coming in continuous contact with pneumonia is approved by the committee.

"The vaccinations do no harm and there have been no fatal or serious results from them," the committee says. "The duration of immunity secured is not very long, probably not over five to six months. The inoculation, in order to be complete, has to be given in three doses. In some cases a rather unpleasant reaction develops and about one-twentieth of the cases feel ill for a day or two. Experiments are being made with some success, with indications of still greater success in the future, rendering the vaccines less constitutionally disturbing without being less efficacious." However, the committee warns that there are many preparations put on the market which are of doubtful value and that the promiscuous use of vaccines should not be encouraged.

SCIENCE OF GROWING THINGS

Agriculture News of the Week.

ESSENCE OF SOIL IS
COLLOIDAL "ULTRA CLAY"

Washington, Soils contain a large amount of material quite different in nature from the mineral particles and organic matter which we formerly believed made up the whole of the soil, investigations of the Bureau of Soils of the Department of Agriculture have revealed.

This material, named "ultra clay" seems to be the fundamental part of the soil. Large quantities of it have been isolated from a large number of different soils. Studies of the behaviour and properties of the colloidal particles that make up this ultra clay are giving a new concept of the soil and it is predicted that these researches will throw fresh light on many soil problems.

"Ultra clay is a gelatinous material which shrinks greatly on drying," explains P. L. Gile, assistant in charge of chemical investigation of the Bureau of Soils. "It has a high absorptive power for water, ammonia, salts, and dyes. At the proper moisture content it may have a binding power far greater than Portland cement. At other moisture contents it is highly plastic. In short, this material has in an exaggerated degree most of the properties characteristic of the soil as a whole.

"Chemically, ultra clay appears to be chiefly a gelatinous silicate of aluminum with varying amounts of ferric hydroxide, silicic acid, aluminum hydroxide and organic matter, in a colloidal condition.

"These substances making up the ultra clay exist in such a fine, or colloidal, state of subdivision that when the material is shaken up with water a permanent, opalescent suspension is obtained and many of the individual particles appear under the ultramicroscope only as points of light in active motion. In the presence of certain salts the colloidal particles coagulate, forming large aggregates which readily settle out."

When the soil is in a good condition for agriculture the ultra clay particles are "under restraint"; they are practically all coagulated and the soil works well. When, however, the particles become dispersed by excessive rains and mechanical agitation, the soil becomes a mud similar to that existing in certain roads this time of the year. Mud to the soil scientist represents a soil condition where the colloids have become too individualistic, each particle shimmying around by itself.

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$1,800,000 IN GOLD
AWAITS DREDGES IN CANADA

Ottawa . By dredging the Cariboo district of British Columbia, famous as the scene of the Cariboo gold rush of the early sixties, gold worth at least $1,800,000 will be recovered, W. A. Johnston of the Canadian geological survey estimates.

Although dredging has never been attempted in this district, Mr. Johnston believes that his estimate of the future gold production is conservative. It is probable that when mining costs have reached a lower level dredging will be commenced in this field.

The Cariboo gold rush of the early"sixties" forms one of the most interesting chapters in the history of pioneer mining in western America and the now famous old Cariboo road built for several hundred miles through the mountainous country between the Cariboo and the lower reaches of the Fraser river still stands as a reminder of the adventurous gold seekers of those eventful days. Many millions of dollars worth of gold was packed out over this road during the early days. One short stretch on Williams creek alone yielded between $8,000,000 and $9,000,000 in gold, and the output of Antler creek during the summer of 1861 has been estimated at $10,000 per day, some of the ground yielding as much as $1,000 per square foot. Three claims on Conklin Gulch produced $1,500,000 in gold.

This famous camp has continued to produce gold up to the present time and is the oldest producing placer field in British Columbia. The remarkably long life of this camp is accounted for by the peculiar conditions under which the gold occurs. The great bulk of the gold was concentrated in the streams just before the Glacial period. During this period the country was covered by a thick sheet of ice, but, owing to the unusual fact that the ice-sheet was nearly stagnant, the placer deposits were not removed or destroyed as they otherwise would have been, but were instead buried beneath a thick mantle of glacial clays and gravels, which protected them from the later glaciers flowing through the valleys during the closing stages of the Glacial period. This covering of clay and gravel not only protected the gold from later glaciers but prevented the early miners from obtaining more than only a portion, in some places less than half, the gold present. Considerable gold, therefore, remains, much of which can be obtained by dredging.

PHYSICAL EDUCATION DECLARED
A NATIONAL NEED

Washington, March 14.- Physical education must be viewed in the light of national needs, the conference on the future of public health in the United States was told today by Prof. Jesse F. Williams of Columbia University.

The revelations of the physical examinations made under the selective service act during the war have awakened the people to the needs of physical education, he declared.

"Health as freedom from disease is a standard of mediocrity. Health ought to be given a social interpretation," said Prof. Williams. "We must not hold physical education as a supplementary means to be employed as a corrective of life, but as a fundamental scheme of physical activities for all, directed in accordance with the biologic, social and human needs of boys and girls and men and women everywhere."

Five striking facts of human biological and social developments on which the importance of physical education is directly founded were enumerated by Prof. Williams:

1. Men and women today share in the biological inheritance of the race. Primitive man in the primordial mud and his successors, whether as arboreal or ground creatures, marked out for us for all time the physical and organic bases of life. The development of the muscular system and the subsequent rise and elaboration of the vital systems of the body determined the fundamental importance of physical activities for the individual. Modern civilization shaped by economic needs, by artificial selection, tends to ignore the biologic story. The increase in functional nervous diseases, the disorders of the mind and personality, the increase in the chronic degenerative diseases of middle life propound serious questions for our civilization.

2. The importance of physical education in the United States is seen in the history of our industrial development since the Civil War. The growth of industrialism and the factory system, the stripping of the home of occupations and activities, the segregating in shops, stores and industrial physical effort, present not only problems for capital and labor but also problems in man's social development.

3. The swing of the population from rural to urban districts constricts greatly the range and character of life. In 1800 only 3.9 per cent and in 1840 only 8.5 per cent of the total population lived in cities of over 8000 inhabitants,

as compared with 35 per cent in 1910 and 50 per cent in 1920. This swing to the city has been accompanied by increases in the number of women and children engaged in industrial occupations.

4. Recent world wide events give predilection to the belief that nationalism rather than internationalism will be the controlling policy of nations in international commitments. The reaction from the world war and its sequels have emphasized nationalistic aims and have cemented nationalistic programs.

5. Physical education concerned as it is with activities of the child in which primitive impulses and desires are expressed, will remain the principal means for moral education of the young of the race. Moral education rests upon these immemorial racial activities and their expressions, and physical education forms the chief means by which such expressions may be guided to social ends.

CONSIDER UTILIZATION OF
WEST'S GREAT POWER SOURCE

Washington, A commission is now considering how the country's greatest potential power source, the Colorado River, can best be utilized. At Phoenix, Arizona, the second meeting of the Colorado River Commission is being held (March 15) with public hearings. Secretary of Commerce Hoover, chairman of the commission, and representatives of the seven states that contain parts of the Colorado River basin, Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming, are now determining how this river, capable of developing 6,000,000 horse power, nearly one-third as much as the present utilized waterpower of the world, can be made to yield electricity and at the same time fill the irrigation needs of that large portion of the west.

The first construction in the great development recommended by the Reclamation Service, would be a dam at Boulder Canyon, Arizona, 600 feet high, taller than the Washington monument, which would give an initial amount of 500,000 horse power, nearly as much as that developed now on both the American and Canadian sides of Niagara.

The progress in long distance electrical transmission will yet bring all possible power of the river into national use, it is predicted.

WOODLESS BOARD, RIVALLING EIFFEL TOWER HEIGHT, WOULD MAKE THREE BUNGALOWS

New Orleans, Woodless lumber, in boards twelve feet wide and 900 feet long, nearly as high as the Eiffel tower, the world's highest structure, has been produced in a plant recently erected near here.

Trees do not produce these boards, each of which contain sufficient material for three five-room bungalows. They are made from the same plant that gives up our sugar, the sugar cane.

Bagasse is the residue of the sugar cane which is left after the cane has been squeezed through heavy rollers for the purpose of extracting from it its sugar-containing juice. It is this waste material that is being converted into lumber. This bagasse consists of a mass of short pieces of the crushed and broken cane and it is filled with fibres of considerable length. It was for a long time wholly wasted, great piles of it being burned to dispose of it. Mark Twain in his "Life on the Mississippi" says that "bagasse 'fog' was the bane of the river pilot". More recently it has been used as fuel under the boilers of the sugar mills. But it contains so much moisture that its fuel value is very low, and it is so light and bulky that feeding the boilers with it was very wasteful of labor, and it is now being replaced as fuel by oil and natural gas which have been found to occur in this vicinity in abundance.

In converting it into lumber the bagasse is first cooked to destroy the decay-producing spores contained in it, then treated with chemicals to make it waterproof, then pulped in "beating machines" and then formed into a board which is compressed by passing through rollers into the continuous gigantic sheets which when dried are ready for use.

Because of the long fibres existing in the bagasse the material is felted into a structure which is filled with air cells. Hence, the lumber is very light, weighing but three-fifths of a pound per square foot, and, because of the air cells contained in it, it is a very perfect non-conductor of heat. It is composed of cellulose as is wood and it resists exposure to the weather similarly to wood.

"Sugar cane grows rapidly and large quantities of the raw material for the new lumber are produced annually," says M. Treadway B. Munroe who constructed the new plant. "One ton of bagasse yields 3,000 feet of lumber and the waste from the cane fields of Louisiana alone will yield over 750,000,000 feet per year. Hence, we may view with more complacency the rapid destruction of our slow growing forest trees, though there are many purposes for which wood is employed that this new lumber producing process will not satisfy."

DO YOU KNOW THAT -

A good fox pelt is often worth as much as $600, but few raised in captivity are now killed as the animals command a higher price for breeding purposes.

German industries are carrying out an extensive program of standardization of materials and manufactured products.

The water power capacity of the plants at Niagara is being increased by 114,500 horsepower in the United States and 300,000 horsepower in Canada.

Fires on motor trucks carrying gasoline in California have been caused by sparks from small charges of static electricity. The danger was eliminated by grounding the rubber tire insulated trucks by a drag chain.

DO YOU KNOW THAT -

The amount of moisture that various common materials hold under various conditions affects many uses of the materials.

Hydrogen can be diffused through some metals, but aluminum is impervious to this gas up to its melting point.

Although much of the experimental work on chlorinating water was carried out in New England, there is a marked aversion in that section to the application of chemicals in any form to drinking water.

Within six years Louisiana has taken first place among the States as regards value of strawberry production.

DO YOU KNOW THAT -

Soap emulsions under certain conditions prevent the corrosive action of salt solutions on metals.

A portion of Chile's railroad system is being electrified.

Before the world war Germany bought more American-grown timothy seed than any other European country.

For sixty-six years the Rothamsted agricultural experiment station in England has been conducting experiments on the effect of continuous manuring of permanent meadow-land.

DO YOU KNOW THAT -

A good pastry flour is made by sifting together one cup of bread flour and one cup of cornstarch.

Two million gallons of gasoline out of about twelve and a half millions, total daily output in the United States and Canada, are obtained by the pressure-still process developed in the last twelve to fifteen years by Dr. William M. Burton, who has just been awarded the Perkin medal.

A newly discovered coal field is reported in Shantung Province, which is said to contain immense quantity of smokeless coal.

Africa, nearly four times as big as the United States has a railway mileage but twelve per cent of that of the United States; and Asia, nearly six times as big as the United States, has only one-fourth the railway mileage of this country.

DO YOU KNOW THAT -

There are only 602 water power plants in the United States whose water wheel capacity is more than 1000 horsepower.

Before 1905 tungsten had been known for a century and a quarter only in its unrefined state and was not used for incandescent lamp filaments.

At the present time one-half of the zinc output of the country, in the form of zinc oxide, is being used by the tire manufacturers.

Selenium is used universally for coloring red signal glasses on American railways and tons of this comparatively rare element are thus consumed annually.

DO YOU KNOW THAT -

The tomato, of American origin, attracted unfavorable attention first about 1800, and it was a long time, during which it was branded as poisonous, until it found favor with a few lovers of delicacies and with growers.

Utilizing compressed air and a new form of sound box, a British invention has brought out a phonograph that is said to equal in intensity the volume of sound of a full band.

Wild mice and other rodents living in the desert regions of the Southwest get most of their water supply from the cactus.

Little dried octopuses, about the size of one's hand, are staples in the fish markets of Italy.

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RESEARCH INQUIRIES

Answered by the Research Information Service,
National Research Council, Washington.

Question--Is it true that Eugene Dubois made a discovery of two primitive skulls and jaws and is the discovery recent? Answer--A report before the Royal Academy of Science, Amsterdam, was made by Eugene Dubois on fossil human remains found by him in Java before his discovery of Pithecanthropus in 1891-1892. Dubois declares that these men are australoid and to all appearances Pleistocene. Nevertheless, the skulls and jaws are phylogenetically little more primitive than the recent Australian, but very much more robust and in the same way more primitive, as the Heidelberg jaw is more primitive than the jaws of Spy and La Naulette. The morphological differences between the Australian type and the Neandethal type are still greater here.

Question--Please give references to publications on the service rendered to modern civilization by scientific research. Answer--See National Research Council Reprint and Circular Series Nos. 8, 9, and 14. No. 8, by John J. Carty, is entitled "Science and the Industries;" No. 9, by Clarence J. West, entitled, "A reading list on scientific and industrial research and the service of the chemist to industry", contains a bibliography of industrial research and references to many articles on the subject of the inquiry; No. 14, also by John J. Carty, deals with "The relation of pure science to industrial research. A good collection of such incidents can be found in Professional Paper No. 7, published by Arthur D. Little, Inc., Cambridge, Mass. An interesting article may also be found in the "Open Road", 1921, by G. J. Esselen.

Question--What is traffic density and traffic volume in various states? Answer--Several of the states, notably Connecticut, Michigan, Wisconsin, Massachusetts, California and Maryland, are conducting a census of traffic. Dean A. M. Johnson of the University of Maryland is preparing a report which summarizes the experiences of the Maryland State Highway Commission and has also written an article published in "Public Roads", July, 1921. The scope and purpose of a census of highway traffic and the elements appearing in the census have not yet been standardized. Only a few articles have appeared in the technical press. The best present sources of information are the State highway commissions of the several states. The National Research Council is giving this matter attention and hopes to be able later to summarize the existing information.
