

## ENTOMOLOGY

# Mark Locusts for Study

► SCIENTISTS STUDYING the movements of African migratory locusts have developed a method of marking the locusts with a spray-gun so that their movements in the solitary phase may be accurately plotted.

J. T. Davey reports from Kara in the French Sudan that locusts have been found soon after breeding in a semi-arid zone west of the outbreak area in Nigeria. During the months of November and December the number of locusts drops in this area, sometimes very suddenly.

Attempts to trace their later movements before the formation of marauding bands were severely handicapped by the inability of the scientists to mark the locusts in large numbers.

The new spray-gun method uses a hand pump and a trigger mechanism to shoot a fine jet of pigment in light oil. Using the gun, about 70 locusts can be marked in an hour. Six collectors can only mark 30 by hand in the same period of time.

Circumstantial evidence indicates that the

locusts move from the semi-arid zone to the flood plains of the Niger usually called the outbreak area. It is in the outbreak area that they form bands during the transformation phase of their development.

The new technique of marking should make it possible to trace completely all locust movements between the breeding area and the outbreak area. Mr. Davey points out that if this solitary migration can be established, it will help control authorities to estimate and anticipate the production of bands.

The arrival of a large number of locusts in the outbreak area does not necessarily give rise to bands since this depends on factors operating within the outbreak area which have not yet been studied.

Control of the African locust problem, however, will be materially aided, Mr. Davey concludes, in a communication to the British scientific journal, *Nature* (Oct. 17), if it is not restricted to the outbreak area.

Science News Letter, October 31, 1953

## RESOURCES

# Water Shortage Cause

► THE NATION'S water shortage is largely due to greatly increased use and not to a general drop in water resources.

Carl G. Paulsen, chief hydraulic engineer, U. S. Geological Survey, Washington, D. C., told the National Reclamation Association meeting in Reno that there is no evidence of a general decline in water resources.

"In the long run," he said, "we must face the reality that water resources remain practically constant, whereas the use continues to increase. Therefore, there must come a day when there will not be enough water for all the things we want to do with it."

The report on national water resources with particular emphasis on the drought-stricken areas of the West was prepared by Mr. Paulsen and A. Nelson Sayre, chief, ground water branch, Geological Survey.

Since the early days of westward expansion, engineers have warned that the increasing population and farm acreage would face water shortages. The great drought of the 1890's proved that rain does not follow the plow, and this lesson was reinforced by water shortages during the 1930's which created the Dust Bowl.

Periods of abundant water and drought seem to alternate, and Mr. Paulsen pointed out that the nation was fortunate World War II came during a period of abundant water.

In addition to the well known plight of farmers and some towns and cities in drought periods, industries are becoming increasingly worried about their water sup-

plies. Industries in Pennsylvania alone used 10 billion gallons of water daily in 1951 or about two-thirds as much water as the total daily output of all the municipal water systems in the United States.

The nation's first need in the area of water resources, Mr. Paulsen said, is a survey to determine the "location, amount and quality of water resources" throughout the nation area by area.

After such a survey has been made, the hydraulic engineer suggested that scientists could work out means of more efficient utilization of water and the possible artificial recharge of some ground water supplies.

Science News Letter, October 31, 1953

## ENGINEERING

## Bus Has One Engine Yet It Has Four Motors

► A GERMAN inventor has produced a city bus that has one engine, but which is driven by four motors—one to a wheel.

The central engine is a 175-horsepower, eight-cylinder diesel that drives an oil pump. The pump thrusts oil under pressure through flexible tubes to oil motors mounted on the wheels of the bus. The oil motors, in turn, drive the wheels.

This system has proved highly flexible since the diesel engine and its associated oil pump can be carried anywhere in the bus. It even can be towed in a trailer. Furthermore, the system provides stepless

speed control, since no gears are involved. To go faster, the motorman merely presses the accelerator down a bit.

To reduce his speed, the motorman takes his foot from the accelerator. Immediately the oil motors on the wheels begin braking the bus.

The oil motor also has proved successful in powering the propellers of ships. These propellers can be designed to change their position with respect to the ship so that they do the work of rudders. The ship's response to a turned propeller is said to be quicker than its response to a turned rudder.

Science News Letter, October 31, 1953

## SCIENCE NEWS LETTER

VOL. 64 OCTOBER 31, 1953 NO. 18

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., North 7-2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40, P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283), authorized February 28, 1950. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 1 E. 54th St., New York 22, ELdorado 5-5666, and 360 N. Michigan Ave., Chicago 11, STate 2-4822.

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