ment. The new quarters will house additional storerooms, offices, laboratories and a large machine room, and will almost double available floor space. They will be informally dedicated and opened to public inspection on June 8, when the institute and the college hold joint commencement exercises.

DISCUSSION

DISTRIBUTION OF TERMITES

IN a recent issue of SCIENCE,[1] A. E. Alexander records *Reticulitermes flavipes* (Kollar) from Ithaca, New York, with the implication that termites are scarce north of the Mason and Dixon line. Such remarks may give an erroneous impression of termite distribution. Termites were recorded from Ithaca in M. D. Leonard's "List of the Insects of New York."[2] Maps in books by C. A. Kofoid and others,[3] and by T. E. Snyder,[4] include Ithaca within the range. As a student at Cornell in 1914–18, I frequently found these insects and can personally state that they are not scarce in central New York. Dr. L. O. Howard states in a letter to Dr. T. E. Snyder that he found termites in 1872 or 1873 in the exact locality mentioned by A. E. Alexander.

There are numerous localities along the northern border of the United States from which termites have been reported. They are now known from every state in the Union and from Vancouver Island, British Columbia. They have not been recorded previously from the Dakotas, but Miss Olive Falls has collected *Reticulitermes tibialis* Banks from Englewood, Centerville, Freeman, Canton and Alcester, South Dakota; the writer has collected the same species at Devil's Tower, Wyoming, not far from the South Dakota border; and Dr. G. C. Wheeler collected this species from a log near Amidon, North Dakota, thus adding the latter state to the records. Miss Olive Falls also collected *R. flavipes* at New Castle, Lincoln County, Maine. Other new northern records furnished by Dr. T. E. Snyder, of the U. S. Bureau of Entomology and Plant Quarantine, are Bellows Falls, Vermont, for *Reticulitermes flavipes;* Gillette, Wyoming, Glendive and Newlon Junction, Montana, for *R. tibialis*. The writer has collected *R. tibialis* near Shoshone Dam, Wyoming, between Cody and Yellowstone Park. E. Goellner has taken *R. flavipes* at Grand Haven, Michigan. Dr. Snyder also has record of damage by an undetermined species of termite at Duluth, Minnesota. Collections along the Canadian border or further north are worthy of record as well as locality records in the northern parts of all the border states.

One commonly finds press reports stating that these destructive insects are spreading, and the above records should not be interpreted as indicating a northward migration. The genus *Reticulitermes* is a distinctly temperate genus and has not been able to invade the tropics. It has been reported from Baltic amber and from the Florissant beds (also Creede) of Colorado—a strong indication that these termites have been in temperate regions for many millions of years. Since there is no valid evidence as yet that would indicate that termites are spreading northward within historical times or are increasing markedly in numbers in any locality, the writer is inclined to discount statements of such increase or extension unless accompanied by critical evidence. Often these statements are part of the propaganda of fear which is spread by persons or firms interested in commercial eradication of termites, either through their own ignorance or through the desire to exploit the ignorance of the lay public. Reputable firms engaged in termite eradication, however, often find a strong tendency for householders to exaggerate the damage caused by termites and, unquestionably, many magnified accounts are merely examples of the human tendency to "improve the truth." Likewise it is also possible to give examples of human apathy when faced with a real termite menace.

There is need for critical data upon the abundance of termites in various localities. Specialists are aware of differences in relative abundance, but exact population studies have not been made and the causative factors governing distribution can only be surmised. The northern and southern extreme limits of distribution throughout the world seem to be correlated fairly well with the 50° F. annual isothermal line. In the United States, the northern limit of distribution is between the 40° F. and the 45° F. annual isothermal lines. Relative humidity and soil moisture seem to be correlated strikingly with the distribution of certain species. Toleration experiments by Dr. O. L. Williams[5] indicate that humidity has a direct effect upon distribution, at least in the case of certain species.

The environmental requirements of the various species seem so rigid that it is very unlikely that species can gain a foothold in environments very different from their native conditions. *Reticulitermes flavipes,* native to the United States east of the Mississippi

[1] Vol. 83, No. 2141, p. 34.
[2] Mem. 101, Cornell Univ. Agr. Exp. Sta., 1926.
[3] "Termites and Termite Control," Univ. Calif. Press, 1934.
[4] "Our Enemy the Termite," Comstock Publishing Company, 1935.
[5] "Termites and Termite Control," Univ. Calif. Press, 1934, 2d edition.

River, was originally described in 1837 from specimens introduced into greenhouses near Vienna, Austria. Even though the climate is not unlike the native habitat, this species did not spread into the surrounding country. Sometime before 1890, *Kalotermes* (*Cryptotermes*) *dudleyi* Banks was introduced into Panama, probably from the Orient. Although now a well-known termite in houses in the Canal Zone, this species has not been able to establish itself in wild situations in the region. *Kalotermes* (*Cryptotermes*) *brevis* (Walker) was introduced into buildings in Durban, Natal, some time before 1921. The native region for this species is the West Indies and Caribbean shores. So far, the records from South Africa are all from a small area in Durban and the species has not been found in wild situations. The same species was found in buildings in Georgetown, British Guiana, in 1920 but does not seem to be established in the wild areas in Guiana. Records of this species in Louisiana and Florida are also all from buildings. Recently the writer has identified a termite as *Heterotermes philippinensis* Light, a native of the Philippines, which was collected by L. P. Regnard on October 13, 1933, in Mauritius. Dr. S. F. Light has checked this determination. No data are available concerning its distribution in Mauritius. Records of *Reticulitermes lucifugus* (Rossi), the common European termite, from the vicinity of Boston were published in 1918. This does not seem to have spread far from its point of introduction. Another case that deserves careful study is the introduction of *Coptotermes formosanus* Shiraki into Hawaii some time prior to 1913 from China or Formosa. This species is surely very destructive to buildings in the cities, but published accounts do not indicate its invasion of the wild habitats in the Hawaiian Islands.

One possible exception to the general rule that foreign termites have not spread from the point of introduction into native habitats may be found in the case of *Heterotermes tenuis* (Hagen), a native of Brazil, the Guianas and Panama. This termite is reported to have been introduced into the island of St. Helena in 1840. Accounts of the damage to houses and furniture are vivid, but the invasion of native wild habitats has not been reported.

A careful study of the limiting factors of the distribution of various species of termites may ultimately enable us to predict the results of introduction, but up to date we have little evidence to support the idea that termites are extending their range or that they will be able to compete effectively with the native species in natural habitats if introduced from foreign countries.

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HIGH ALTITUDE STRATOSPHERE OBSERVATIONS[1]

IN the November issue of the *Journal of the Aeronautical Sciences* for last year we[2] described a system of radiometeorography which had shown promise as a method of securing weather data at moderate altitudes—up to 20 kilometers. In undertaking this development we had in mind ultimately to construct equipment along similar lines designed to go to much higher altitudes to secure other information from the stratosphere, such as ultra-violet intensity and cosmic-ray data, using automatic radio recording.

The practicability of this idea has been well demonstrated by a record obtained from a sounding balloon with radiometeorographic equipment which we released on March 23 of this year. A 44-inch (uninflated) rubber balloon was inflated to give an ascension rate of nearly 500 meters per minute when carrying our 5-meter transmitter with associated equipment which weighed altogether approximately 1½ pounds. The atmospheric pressure record obtained is shown in the accompanying figure. The circles in the curve I each represent a pressure reading transmitted to the ground and punched in a paper tape by a recording radio receiver. These occurred at one-minute intervals. Occasional missed readings were caused by local "interference"—not failure of signal. The

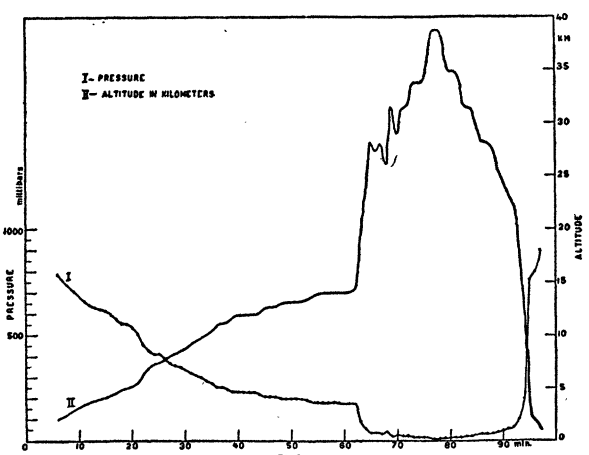

FIG. 1

minimum pressure recorded is 6 mm of mercury (8 millibars) which corresponds to an altitude of 38.7 kilometers or 127,000 feet. The transmitter also sent out signals which yielded an automatically recorded account of the temperature of the interior of the Cellophane inclosure which shielded batteries, oscillator and

[1] Publication approved by the director of the National Bureau of Standards of the U. S. Department of Commerce.

[2] L. F. Curtiss and A. V. Astin, *Jour. Aero. Sci.*, 3: 35, 1935.