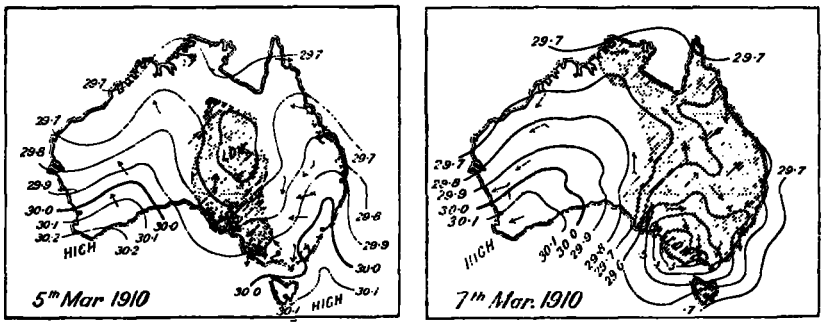
copious rain. At many points there a fall of more than 20 inches has been received within 24 hours, and several times falls in excess of 30 inches have occurred. An oval area 20 by 85 miles receives an annual average of more than 100 inches. One point (Harvey Creek) has a 19-year average of 163.7 inches.

This memoir with its 183 maps and diagrams and its 74 tables requires much more than the foregoing summary to be fully appreciated. It is an important piece of work well done. It would have been improved, however, by summaries, and index, and perhaps by the use of fuller base maps. No two of the larger maps of Australia are on the same scale, or on the same base; reference points and lines are quite inadequate on most



FIGS. 9, 10.—Australian weather maps: Tongue developing into cyclone, and cyclone forming at tip of tongue. (Rainfall indicated by shading.)

of these maps, and on the weather maps for intercomparison. Nevertheless, in each one the features shown are very clear.

CLIMOGRAPH CHARTS.[1]

By Sir NAPIER SHAW.

[Abstract.]

That the climographs, prepared by Dr. Griffith Taylor, which attempt to give graphically an idea of the climatic conditions of a locality by means of plotting relative humidity against the wet bulb temperature, are not the first attempt of this kind, is a fact that should be noted. Dr. John Ball, of the Egyptian survey department, in the Cairo Scientific Journal, vol. 1, No. 4, made use of similar diagrams, using the dry-bulb temperatures. The use of the dry-bulb temperature instead of the wet does no more than alter the position on the sheet and makes little difference in the general appearance of the diagram.

"As a matter of fact, neither form of diagram seems to be completely satisfying as distinguishing between the comfortable, the tolerable, and the unendurable in climate. Some years ago Mr. W. F. Tyler, of the Chinese customs service, pointed out that between the limits of temperature, say, 55° F. and 65° F., nobody minded much what the humidity was; but outside these limits of the 'generally comfortable' there was a range of temperatures of the 'just tolerable' order for damp air, which soon got the 'unendurable' on the side of the higher temperature. Beyond these, again, is a range of temperatures under which life is possible only in dry air. An effective climatic diagram would in some way or other exhibit the relation of the climate to the ranges compatible with comfort, life, and death."—*C. L. M.*

[1] *Nature*, London, Jan. 16, 1919, No. 2508, vol. 102, p. 383.

A NEW INTERPRETATION OF THE RELATIONSHIPS OF TEMPERATURE AND HUMIDITY TO INSECT DEVELOPMENT.[1]

By Dr. W. DWIGHT PIERCE, Bureau of Entomology.

[Abstract.]

"Upon the proper interpretation of the laws of climatic control of life rests the solution of many practical problems, and inasmuch as all plant and animal life reacts to climate in the same general manner it is apparent that

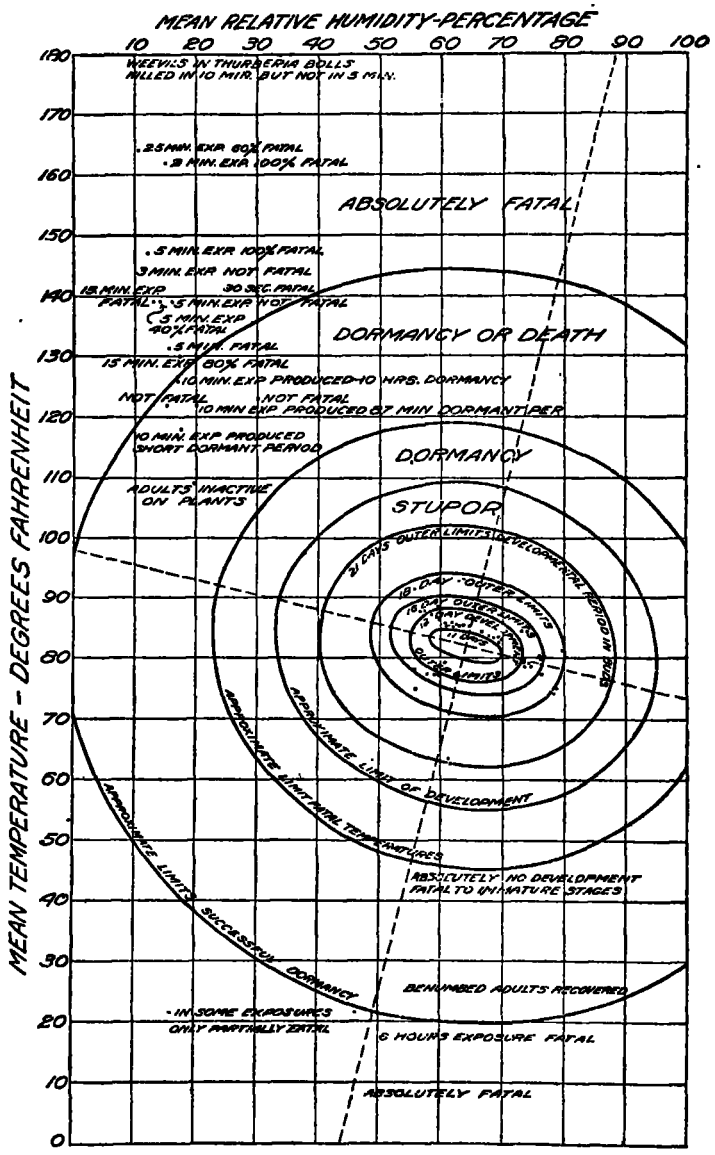


FIG. 1.—Graph showing the relations of temperature and humidity to cotton boll-weevil activity.

the study of the climatic control of insect development may throw light upon the problems of all other forms of life."

Mr. Pierce thus opens his discussion of the relationship problem, and further notes that all so-called theoretical laws of effective temperature for all life do not properly explain many of the phenomena that are observed. The former theory of a fixed zero of effective temperature, so long maintained by biologists, is only in recent years rejected upon the findings that each species might have a different zero. In addition, it is only recently that the factor of humidity has been definitely used in the solution

[1] Jour. Agr. Research, Dept. of Agr., Washington, Mar. 20, 1916, pp. 1183-1191.