

as Locke says: "Vague and insignificant forms of speech and abuse of language have so long passed for mysteries of science; and hard and misapplied words, with little or no meaning, have, by prescription, such a right to be mistaken for deep learning and height of speculation, that it will not be easy to persuade, either those who speak or those who hear them, that they are but the covers of ignorance and hindrance of true knowledge." J. INNES.

12 Edward's Road, Whitley Bay,
Northumberland, January 4.

Stellar Development in Relation to Michelson's Measurement of the Diameter of Betelgeux.

ABOUT thirty-five years ago Sir Norman Lockyer held that certain of the reddish stars are probably in an early stage of development. It was given out yesterday in Press dispatches from Chicago that Prof. Michelson had announced to the American Physical Society and the American Association for the Advancement of Science that the experiments with the Mount Wilson 8-ft. reflector at Pasadena, California, had enabled him successfully to measure the diameter of α Orionis by interference methods, and that the diameter is about 300,000,000 miles, or approximately three hundred times that of our sun. The volume of Betelgeux is therefore about 27,000,000 times that of the sun; so that, if concentric with the sun, the surface of Betelgeux would extend about to the orbit of Venus.

Now Betelgeux is a single star, and the mass, therefore, is not definitely known; yet if the mass be not immensely larger than that of the sun we shall have to conclude that the density is slight. Hence this red star is in an early stage of development, which confirms Lockyer's views first put forth about 1886. If we make the density equal to that of our sun, Betelgeux could not fill the orbit of Venus without giving the star 27,000,000 times the solar mass, which is quite inadmissible.

Dr. Elkin's Cape heliometer measures made the parallax of Betelgeux $0.023''$ and of Sirius $0.37''$, so that Betelgeux is only sixteen times more remote than Sirius; and if we neglect a slight difference in magnitude, largely due to colour, we may conclude that Betelgeux gives about 256 times the radiation of Sirius, which is itself ten-thousandfold more luminous than our sun. Accordingly, Betelgeux gives about 2,560,000 times the sun's light. Now with any admissible mass of Betelgeux this immense luminosity indicates an early stage of development, corresponding to the large absolute diameter found by Michelson.

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Naval Observatory, Mare Island,
California, December 30.

Heredity and Variation.

IN a brief criticism of Sir Archdall Reid's letter to NATURE (November 25, p. 405) in which he sought to attach new meanings to certain well-recognised biological terms, I pointed out (NATURE, December 2, p. 440) that if his contention that all characters are both innate and acquired in exactly the same sense and degree is true, then it would follow that all variations are also of one type, while experimental biologists are universally agreed that this is not the case. At least two categories of variations are postulated, whether they be called blastogenic and somatogenic, germinal and somatic, mutations and fluctuations, genotypes and phenotypes, innate and acquired, karyogenetic and cytogenetic, or by any other terms which contrast an inherited and a non-inherited departure from the parental type.

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Yet Sir Archdall Reid's only attempt to answer my criticism that the universally admitted existence of two types of variations undermines his whole position is the very weak one of quoting Darwin's tentative theory of pangenesis, which no modern biologist would consider seriously as an explanation of heredity, variation, or anything else. He says (NATURE, January 6, p. 596): "If we believe with Darwin in his theory of pangenesis that the parts of the child are derived from the similar parts of the parent . . . the distinction between variations and modifications vanishes." But we do not believe anything of the kind. The advance of knowledge made any such belief impossible a generation ago. Even Sir Archdall Reid himself admits this when he says later in the same letter (p. 598) that "Darwin . . . went hopelessly wrong . . . in his theory of pangenesis"! Why, then, did he quote it as a reply to my criticism?

This is only one, but it appears to me to be the most fundamental, of the many contradictions in which Sir Archdall Reid has landed himself in his attempt to remodel the usage of well-established terms to his own liking.

R. RUGGLES GATES.

King's College, Strand, W.C.2, January 15.

The Mild Weather.

A SPELL of mild weather set in shortly before Christmas and continued until the second week of January. It followed a sharp touch of frost, when the sheltered thermometer at Greenwich registered 16° on December 13, and for two consecutive days, December 12 and 13, the temperature remained below the freezing point, whilst for ten consecutive days the thermometer did not rise to 40° . A few facts relative to the mild spell may be of interest.

Greenwich temperatures are used throughout; they refer to the civil day, commencing at midnight, and naturally differ at times from the ordinary meteorological day readings ending at some hour between 7 and 9 a.m. The results used are absolutely comparable.

The period dealt with is from December 21 to January 10, twenty-one consecutive days. This period for 1920-21 was warmer than any corresponding period in the last eighty years—since 1841. The mean maximum temperature, the mean minimum temperature, and the mean temperature obtained from the mean of maximum and minimum were all the highest. These three readings for the 21-day period in 1920-21 are: 52.0° , 43.4° , and 47.7° F. The next highest means, for 1872-73, are 51.2° , 42.8° , and 47.0° , followed by 1915-16 with 50.9° , 41.9° , and 46.4° , and by 1852-53 with 51.3° , 40.7° , and 46.0° .

Dealing with the first ten days of January this year, they are the warmest on record for this period for eighty years, with the mean (mean maximum and minimum) 47.8° , followed by 1873 and 1916 with 46.8° , and by 1853 with 46.0° .

Considering the days with a temperature of 50° or above for the 21-day period, December 21 to January 10, there were 17 days in 1852-53, 15 in 1872-73, 14 in 1920-21, and 13 in 1876-77. The absolute maximum temperature in the recent warm period rose to 56° on three days, and in the past there has been no temperature higher than 57° .

The mild weather we have just passed through had ten nights with the minimum temperature at 45° or above, which is more than in any corresponding period since 1841, and in all there were previously only two periods with more than five such warm nights.

The mean temperature for the twenty-one days to January 10 this year is about 10° warmer than the normal.

CHAS. HARDING.

65 Holmewood Gardens, S.W.2, January 15.