

but one-eighth the initial section of the unstrained rubber.

Permanent set occurs to an exceedingly slight extent, and its value is dependent upon the maximum load and independent of the elastic properties of the substance. The set of the material would not be noticed in ordinary use. Permanent loads produce permanent, continuous, extension and, in time, fracture. This was found to be true for loads rising from 40 to 330 pounds per square inch (2.8 to 23.18 kgs. per sq. cm.), and stress-strain diagrams for two weeks under small loads showed steady elongation.

Plotting curves having for their coordinates loads per unit of area and areas of section of test-piece at point of maximum reduction, the stress-strain diagram thus produced becomes altered in form and similar to those of other materials plotted in the usual manner. It has the same curvature at the initial stage, the same straight line to an (apparent) elastic limit, and finally a steady, but slight, rise with increasing loads, with a sudden break at the end. The highest load measured in these experiments was 810 pounds per square inch (56.7 kgs. per sq. cm.). The quality employed, in all cases, was that of the stationers' elastic bands.

In this connection a recent article by Professor R. A. Fessenden has peculiar interest. He had noticed that, on making a fresh cut in a piece of rubber and then stretching it, using a microscope to reveal any peculiarities of appearance, the surface showed a curious sponge-like structure, with odd little excrescences gradually protruded, as the strain was increased, exuding from the pores of the substance. He thus indicates the existence in the material of two components: a hard and horn-like substance, and a jelly-like matter in its pores. He finds the same in other highly elastic substances. He offers a curious, but none-the-less notable, theory to ac-

count for the properties of this singular material.\* The practically perfect elasticity exhibited in the experiments here described, as made in the Sibley College laboratories, lends confirmation to many of the ideas presented by that investigator, who indicated the form of the elastic curve for this curious substance in advance of its determination by experiment, and who based upon his theory of its construction explanations of its thermodynamic properties and actually produced, artificially, substances having similar elastic† properties.

R. H. THURSTON.

SIBLEY COLLEGE, CORNELL UNIVERSITY,  
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BRADNEY BEVERLEY GRIFFIN.

THROUGH the untimely death of Bradney B. Griffin, who died on March 26th at the age of twenty-six years, zoology has lost an able student and a promising investigator. He was the son of Dr. Bradney Griffin, of New York, and received his earlier education at the College of the City of New York, where he graduated in 1894. Mr. Griffin then became a graduate student in zoology at Columbia University, where he subsequently won a fellowship and took part in the zoological expeditions to the northwest coast, sent out by that institution in the summers of 1896 and 1897. He was the author, wholly or in part, of several papers relating to the fauna of that region, one of which, dealing with the nemerteans of Puget Sound and describing a number of species new to science, had been sent to

\* Journal of the Franklin Institute, September, 1896. See also Watts Dictionary, First Edition, Vol. II., p. 738—Caoutchouc.

† Thus: Sodium stearate, dissolved in 5 to 20 parts hot water and permitted to set as a jelly, gives, when cold, stress-strain diagrams like those of caoutchouc. When squeezed dry by hand, however, this compound becomes at once brittle and powdery. As a jelly it behaves like animal muscle in many ways and is polarized to electric waves.

press immediately before his last illness. His principal work lay, however, in the field of cellular biology, and a brief but important paper by him on the fertilization of the egg in *Thalassema*, published in the Transactions of the New York Academy of Sciences for 1895-6, had attracted considerable attention, both in this country and abroad. A more extended paper along the same lines, bringing forward new and important evidence on the nature of fertilization, the history of the centrosome, the phenomena of chromatin-reduction and other vexed problems of cytology was practically ready for the printer at the time of his death and will be hereafter printed. He was a man of singularly pure character. His high ideals of life, his rare and single-hearted devotion to his chosen life-work, will not be forgotten by those who had felt the stimulus of his example.

E. B. W.

#### CURRENT NOTES ON METEOROLOGY.

##### THIRST IN THE DESERT.

No more graphic account has ever been written of the physiological effects of the dry air of the desert than that by McGee in the *Atlantic Monthly* for April. The regions to which particular reference is made are those of Death Valley, farther Papagueria (the desert borderland of Arizona and Sonora), and other portions of our western arid country, where "daily for months the air is 120° F. or more in the shade, and dry, so dry that a basin of water evaporates in an hour, so dry that no drop of sweat is shed by hard-pushed horse or toiling pedestrian. \* \* \* \* Even the Indians gathered in the moister spots have a shrunk and withered mien, half mummied before death, as they are wholly after. Here thirst abides." The article is gruesome reading, portraying, as it does in the most vivid manner, the five successive stages of thirst in the desert, from the first, in which

the symptoms are beginning, to the final stage, in which "there is no alleviation, no relief, until the too persistent heart or lungs show mercy, or kindly coyotes close in to the final feast."

##### WEATHER CYCLES IN INDIA.

A PAPER by Dallas, in the *Monthly Weather Review* for December, 1897, entitled 'A Preliminary Discussion of Certain Cyclical Changes in India' makes it appear that there are two cycles, both traceable in pressure and rainfall, which affect the weather over the Indian region. One of these cycles runs through a period of 11 years, and the other through a period of 9 years. Both are more distinctly traceable in the records of southern India (Madras) than in the records of the whole of India. It does not, however, appear possible to make use of these facts in predicting, with any certainty, the probable amount of rain in any season with a view to the taking of precautionary measures against impending droughts.

##### ELECTRICAL STORMS IN CALIFORNIA.

IN the same number of the *Monthly Weather Review* Mr. James A. Barwick, Observer of the Weather Bureau at Sacramento, Cal., discusses 'The Electric Storms of California.' The impression is quite widespread that thunder and lightning are almost unknown in California, but the present paper shows that thunderstorms are by no means infrequent, and that they occur pretty well all over the State. The greatest number come in the hot months of June, July and August, and the storms of these months are confined mostly to the counties of the Coast Range and the Sierra Nevada. The hotter the weather in the summer in California, the greater is the number of thunderstorms, as is found to be the case elsewhere.

##### BLUE HILL OBSERVATORY BULLETINS.

THE Blue Hill Observatory has begun, with the present year, the issue of a series