The experiments on kites at Blue Hill have led me to the conclusion that the conditions which confront the experimenter are not so favorable as suggested by Professor Bell, nor so hard as suggested by Professor Newcomb.

I made some experiments in 1898 with a compound kite built up of a number of small rectangular kites such as are called the Blue Hill Naval Kites. In addition to the necessity of giving greater space between the cells with increasing size, I found two other difficulties: (1) When several small kites are combined into one, the pull of all the kites is concentrated on certain points which need to be strengthened by using larger sticks. This may be partly overcome by tying a string to each unit and bringing the separate strings to a single flying line at some distance from the kite. But in such a case there is a crushing strain on the central units due to the inward pressure of the outer units, so that the kite must be strengthened by trusses or larger sticks if the compound kite is to fly through the same range of wind-velocity as the unit. (2) When a compound kite strikes the ground the unit which first reaches the ground has above it the combined weight of all the other units and is instantly crushed in conditions where the unit flying alone would not have been injured in the slightest. This effect was so serious an objection that it led me to abandon the effort to build a compound kite out of units.

On the other hand, the weight of kites built on the same model does not increase so fast in practice as Professor Newcomb's law implies. The experience at Blue Hill is that if one can build a kite four feet high sufficiently strong for practical work, and it weighs one and one half ounces per square foot, then one can build a similar kite eight feet high which will weigh two ounces per square foot and be sufficiently strong for practical work. Mr. C. H. Lamson built a kite thirty feet high with two cells similar to the kites used at Blue Hill, and it weighed only about four ounces per square foot. This kite easily lifted a young man weighing about 130 pounds into the air, and, unloaded, flew beautifully in a wind of fifteen to twenty miles an hour, as witnessed by Mr. A. L. Rotch, Mr. S. P. Fergusson and myself.

The reason of this departure from Professor Newcomb's law is that only the sticks of the kites increase in size (and the necessity of this is usually partly overcome by internal bracing), while the thickness of the surfaces remains the same through wide limits.

But independent of these considerations, Professor Bell's principle of tetrahedral construction seems a promising one and further experiments are awaited with much interest, while the structure he has already developed may be found of great use by experimenters.

H. H. CLAYTON.

BLUE HILL OBSERVATORY.

SCIENTIFIC BOOKS.

The Rôle of Diffusion and Osmotic Pressure in Plants. By BURTON EDWARD LIVINGSTON, of the Department of Botany. The Decennial Publications, Second Series, Volume VIII., Chicago. The University of Chicago Press. 1902. 8vo. Pp. xiv + 150.

As stated in the preface: "The present volume will deal with the past and present of diffusion and osmotic pressure from the standpoint of plant physiology. It has a double *raison d'être*. First, it was felt that there was need of some direct and not too exhaustive account of the essential physical facts and theories of the subject. The interest of the physical chemist here has lain mainly in the light which these phenomena have been able to throw upon the ultimate nature of matter and upon electrolytic processes. It has thus been difficult for the student of physiology who is not at the same time well versed in physical chemistry to obtain the information required for the prosecution of work in this field. Secondly, it seemed desirable to bring together in a general review the literature of this subject in its biological aspects, so that the promising and unpromising points for future research might become more apparent."

Opening the book, we find that it consists of two parts; the first of forty-eight pages devoted to 'Physical Considerations.' This includes what are properly physical discussions. There is first a discussion of matter in its several states, and this is followed by a chapter on diffusion and diffusion tension.

The third chapter is devoted to 'Liquid Solutions,' the fourth to 'Ionization' and the fifth and sixth to 'Osmotic Phenomena.' In the treatment no attempt has been made to be exhaustive. Only certain aspects of the present conceptions of these matters among physicists and chemists are discussed, and their discussion is presented with the aim of clearing the way for the physiological discussions which make up the body of the book. The author especially disclaims any originality in this portion of his book, but it must be said that he has done a very great service to botanical science by making available here, for the first time, a summary treatment of these physical phenomena.

Part II. is devoted to 'Physiological Considerations,' and here in about one hundred pages the botanist will find some important discussions. The author first takes up 'Turgidity,' and follows this with a discussion of 'Absorption and Transmission of Water and Solutes,' 'The Influence of Osmotic Pressure on Organisms.' The treatment is eminently satisfactory and will prove to be very helpful to the physiological student. To show the range of the discussion in the book we may quote from the author's summary at the close of the book as follows:

As far as investigation has gone, it has been found that growth is accelerated in weak solutions and retarded in concentrated ones. The term 'growth' here includes, not only enlargement, but also the process of cell division. Also, in some cases at least, the direction of new walls is profoundly influenced by the concentration of the surrounding medium. In general, all vital processes are retarded in concentrated solutions. Reproduction, being a peculiar form of cell division, appears in some cases to be entirely dependent upon the osmotic pressure of the surrounding medium. Irritability is also greatly influenced by external pressure. Not only is this function retarded in concentrated solutions, but in some forms the direction of response to a given stimulus may be reversed by a sudden change in the osmotic surroundings. The comparative concentration of the external and internal solutions acts, in many cases, as a stimulus upon the organism, giving rise to the phenomena of osmotaxis.

All the effects of high concentration of the surrounding liquid seem to be due to extraction of water from the living cells. They may be due either to a drying-out process or to decrease in turgidity. That they are sometimes due to the former is proved by curious analogies between the various processes which extract water from the protoplasm. Whether or not this extraction of water from the protoplasm itself is the direct cause of the responses to concentrated solutions, is not yet known. The effect may be a chemical one, due to the increased concentration of the contained solutions.

This book will at once take its place as a standard work in all institutions where any attention is given to plant physiology.

CHARLES E. BESSEY.
THE UNIVERSITY OF NEBRASKA.

SCIENTIFIC JOURNALS AND ARTICLES.

THE AMERICAN JOURNAL OF ANATOMY, VOL. II., NUMBER 3. JULY, 1903.

A. M. MILLER: 'The Development of the Postcaval Vein in Birds,' pp. 283–299, with 10 Text-figs.

G. L. STREETER: 'Anatomy of the Floor of the Fourth Ventricle,' pp. 299–315, with 4 Plates and 2 Text-figs.

F. P. MALL: 'The Circulation through the Pulp of the Dog's Spleen,' pp. 315–333, with 1 Plate and 1 Text-fig.

F. P. MALL: 'The Transitory or Artificial Fissures of the Human Cerebrum,' pp. 333–341, with 1 Table.

A. J. CARLSON: 'Changes in the Nissl's Substance of Nerve Cells of the Retina of the Cormo-