in which M is a substance which determines the rate of penetration of salts and the electrical resistance of the protoplasm.

If the antagonistic substances are NaCl and $CaCl_2$ it appears that $CaCl_2$ accelerates the reaction $A \rightarrow M$ while both $A \rightarrow M$ and $M \rightarrow B$ are inhibited by a salt compound formed by the union of NaCl and $CaCl_2$ with a constituent of the protoplasm.

From this standpoint the slow penetration of antagonistic substances should not have unfavorable results provided these substances are properly balanced at the start and remain so (*i. e.,* if their relative proportions are not too much changed by unequal speed of diffusion, precipitation, chemical union, etc.) after they enter the cell. For they must affect the life processes mentioned above in quite the same way in the interior of the cell as at the surface[7] and these life processes will go on in the normal way so long as the antagonistic substances within the cell remain properly balanced.

The result will be the preservation of normal permeability as well as of all other properties essential to life.

It has been shown by the writer[8] that the normal permeability may be regarded as a sensitive and accurate indicator of health and vitality. All factors which disturb it bring about temporary or permanent injury and eventually produce death if the action be sufficiently prolonged. It is therefore evident that the life processes which preserve normal permeability are of peculiar importance and that the manner in which they are influenced by antagonistic substances is of especial interest. Methods are being developed for the study of these questions and it appears probable that a considerable amount of information can be obtained in regard to the nature of these processes.

Summary.—Antagonism has been explained by assuming that antagonistic substances prevent each other from entering the cell. A difficulty is found in the fact that they slowly penetrate the cell even in a properly balanced solution. This difficulty disappears if we suppose that the antagonistic substances affect certain life processes which control permeability. So long as they are present in the right proportions their effect on these processes is favorable and their penetration into the cell can do no harm.

The preservation of normal permeability may therefore be regarded as the result rather than as the cause of antagonism.

[7] Whatever effects are found at the outer surface of the cell are doubtless to be found also at many of the internal surfaces such as the surfaces of vacuoles, plastids, microsomes, etc.

[8] *Plant World,* 16, 143, 1913. Science, N. S., 40, 488, 1914.

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THE DETERMINATION OF RELATIVE HUMIDITY

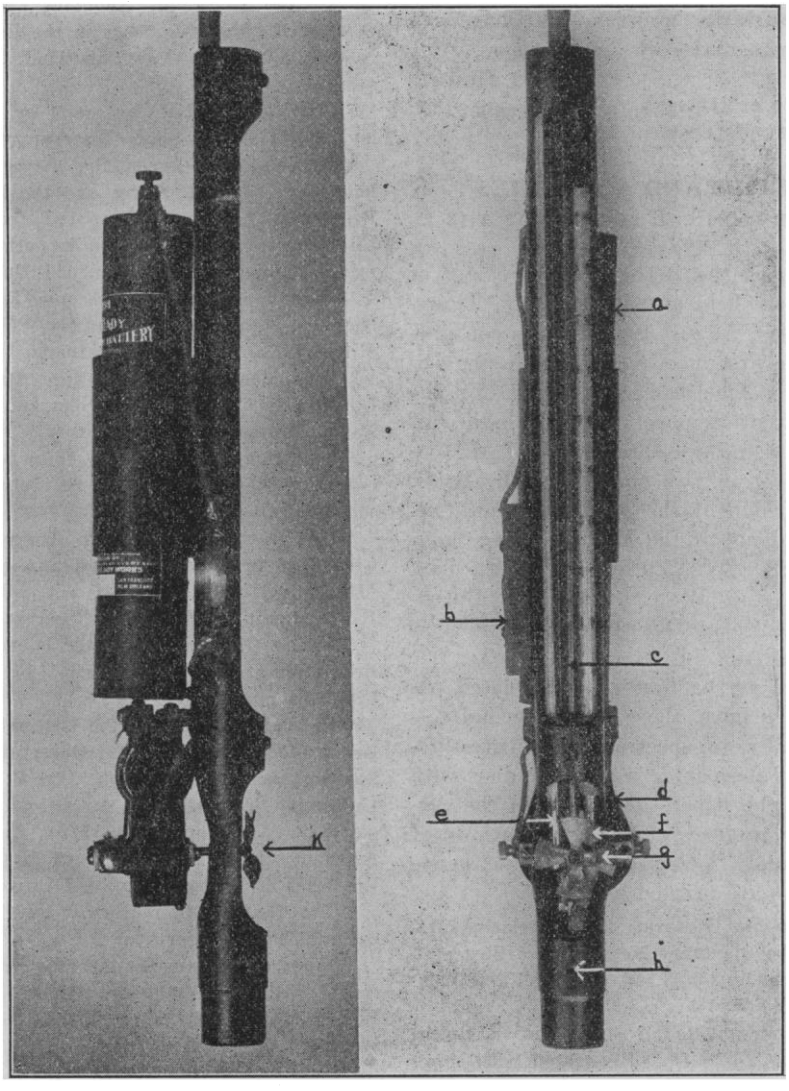
In the present stage of knowledge of what constitutes healthful and comfortable air for the average healthy person, the question of the value and significance of the determination of relative humidity is still decidedly debatable. It will, therefore, be necessary to continue such determinations in connection with other types of ventilation tests, in order to assign to relative humidity its proper value as a factor in the problem of conditioning air for health and comfort. There is at least one standard procedure for this determination—the use of the sling psychrometer. This instrument is supposed to give reliable results if used in accordance with the government directions. One need not spend the fancy price for the instrument de luxe. Two thermometers, firmly lashed together in such a way that the bulb of one projects beyond that of the other gives perfect satisfaction. The lower bulb is moistened in the usual way and the pair is swung by a strong cord.

This method has obvious limitations. It can not be used under many circumstances where the determination of relative humidity is desired, *e. g.,* in crowded places, between skin and clothing, etc. It is ofttimes inconvenient and dangerous to use, *e. g.,* in conspicuous places such as churches and libraries, and in cramped quarters such as the berths of

sleeping cars. Outside the realm of hygiene, it is often unsuitable, for example for determining relative humidity among the stems and leaves of seedling plants.

To obviate these difficulties, there have been put upon the market within the last two or three years mechanisms in which not only is the ventilation of the wet bulb accomplished by the obvious and simple method of using a motor-driven fan, but also a graphic record of the readings is kept.

If a continuous record is not desired, it is obvious that the fan ventilation of the thermometer bulbs presents no mechanical difficulties and offers some advantages over the sling method.



a. Dry cell. *b.* Key. *c.* Tube leading to water reservoir. *d.* Motor. *e.* Dry-bulb thermometer. *f.* Wet-bulb thermometer. *g.* Fan. *h.* Water reservoir. *k.* Direction of air current.

In August, 1913,[1] I described such a device in which the fan was moved by clock-work. This I used with satisfaction for a year, but replaced it (see figs.) by an apparatus in which the fan was driven by a toy motor. The latter is practically noiseless and has been used in experimental work for two years.

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SOCIETIES AND ACADEMIES

THE ASTRONOMICAL SOCIETY OF THE PACIFIC

A meeting of the Astronomical Society of the Pacific was held at San Diego on Thursday and Friday, August 10 and 11, in conjunction with the first meeting of the Pacific Division of the American Association for the Advancement of Science. In the absence of the president and vice-presidents of the society, the meeting was opened by Dr. R. G. Aitken, chairman of the program committee. Dr. W. S. Adams, of the Mount Wilson Solar Observatory; Dr. W. W. Campbell, of the Lick Observatory, and Professor Charles Burckhalter, of the Cabot Observatory, presided at the three sessions held.

The papers at the first session related entirely to the nebulæ, those at the second session principally to spectrographic investigations. All of the papers were fully discussed. Abstracts of the papers are given in the August–October number of the Publications of the Astronomical Society of the Pacific, hence only the titles are printed here.

"Spectrographic Observations of Relative Motions within the Planetary Nebulæ." (Illustrated with stereopticon.) By W. W. Campbell and J. H. Moore, Lick Observatory.

"The Rotation and Radial Velocity of the Spiral Nebula, N. G. C. 4594." (Illustrated with stereopticon.) By Francis G. Pease, Mount Wilson Solar Observatory.

"Forms of Planetary Nebulæ." (Illustrated with stereopticon.) By H. D. Curtis, Lick Observatory.

"Color-photographs of Nebulæ." (Illustrated with stereopticon.) "A Simple Method for Determining the Color of a Star," by Frederick H. Seares, Mount Wilson Solar Observatory.

"Spectrographic Observations of Nebulæ and Star Clusters," by V. M. Slipher, Lowell Observatory.

"On the Motion of Nebulous Filaments in N. G. C. 6992; Variable Stars in the Lagoon Nebula, N. G. C. 6523," by C. O. Lampland, Lowell Observatory.

"Notes on Stellar Clusters," by Harlow Shapley, Mount Wilson Solar Observatory.

"A Relation between the Convergence Wavelengths in Spectral Series and the Radii of their Respective Atoms as Computed from Einstein's Photo-electric Equation and by other Methods," by Fernando Sanford, Stanford University.

"Recent Stellar Spectroscopic Results." (Illustrated with stereopticon.) By Walter S. Adams, Mount Wilson Solar Observatory.

"The Measurement of Close Pairs of Solar Lines," by Charles E. St. John and L. W. Ware, Mount Wilson Solar Observatory.

"The Suggested Mutual Influence of Fraunhofer Lines," by Charles E. St. John, Mount Wilson Solar Observatory.

"Observations with High Dispersion of the Line 6708 in Laboratory and Sun-spot Spectra." (Illustrated with stereopticon.) By Arthur S. King, Mount Wilson Solar Observatory.

"Recent Observations of the Diurnal Change of Refraction at Lick Observatory," by R. H. Tucker, Lick Observatory.

"Preliminary Note on the Determination of the Longitude of the Students' Observatory by Wireless Signals from Arlington," by R. T. Crawford, University of California.

"John Winthrop (1714–1779), America's First Astronomer, and the Science of His Period," by Frederick E. Brasch, Stanford University.

"The Chabot Observatory," by Charles Burckhalter, Chabot Observatory.

"Notes on Certain Double Star Orbits." (Illustrated with stereopticon.) "Note on Barnard's Proper Motion Star," by R. G. Aitken, Lick Observatory.

"Note on Aethra," by Dinsmore Alter, University of California.

"Comet *b* 1916 (Wolf)." (Illustrated with stereopticon.) By R. T. Crawford and Dinsmore Alter, University of California.

"A Luminous Object Seen on May 4, 1916," by C. D. Perrine, Argentine National Observatory.

"A Luminous Object Suspected to be a Comet," by A. Estelle Glancy, Argentine National Observatory.

[1] *Amer. Jour. of Pub. Health*, III., 8, August, 1913.