statement: "Although the factors concerned in evaporation have great influence upon evaporation, this influence is definitely controlled by the stomata. When the stomata are wide open or nearly wide open, transpiration is the result of the action of the factors of evaporation alone, since the stomata in nowise interfere with the action. As the stomata close, the influence of the factors is lessened, but until closure has reduced the apertures to fifty per cent. or less, stomatal regulation is still largely overshadowed by the control exerted by them. When closure is almost complete, the regulation of water-loss by the stomata is very close and the effect of the factors overshadowed by the effect of even very small changes of the opening." This is, of course, quite different from the conception of "regulation" of some physiologists when they have attempted to compare the stomata-transpiration complex with the mechanism which rather effectively controls or "regulates" the speed of an engine under a variation of load.

The plates showing the features of the stomata in various plants under various conditions should receive special mention. The micro-photographs are arranged radially in such a manner as to show the condition of the stomata in upper and lower epidermis, especially the degree of opening, at each hour of a twenty-four hour day, together with curves for sunlight, temperature and humidity plotted toward the center of the circular figure. This commendable method enables one to compare readily the condition of the stomata in upper or lower epidermis at different hours of day or night and as related to the light, temperature and humidity values.

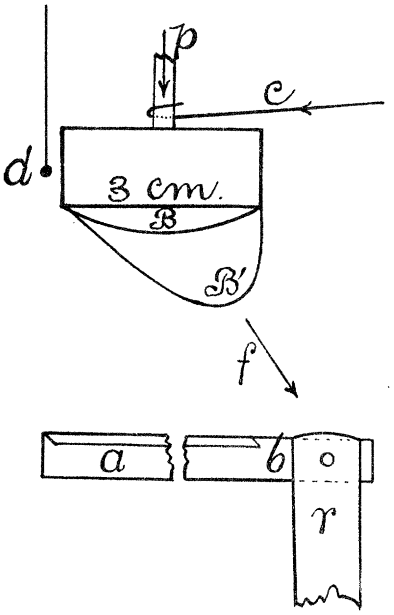
Loftfield's book is very stimulating, on the whole. It must be in the hands of every investigator working on problems in which stomatal behavior is involved.

RAYMOND J. POOL

SPECIAL ARTICLES

SPARKLESS SPARKS[1]

1. The endeavor to take away all the internal pressure (measured by the U-tube interferometer as in the preceding paper) from the soap bubble by charging it electrostatically, does not usually succeed unless the bubble is well anchored; otherwise the lower end is apt to break apart and fly off along the lines of force. A wide blower (say 3 cm. in diameter) as in the figure, with but a small segment of bubble *B* projecting, is satisfactory. The initial pressures are thus reducible to .04 mm. of Hg, so that with flattish bubbles I have actually obtained negative pressures within, on charging.



The charged bubble usually takes an oblique oval figure, *B'*, being drawn out along the incidental lines of force *f*. This expansion, on very slowly increasing the potential, reaches a maximum, after which the bubble suddenly, in fact spasmodically, jerks back from *B'* to *B*, remaining intact. With the same bubble a succession of 10-40 spasms may be easily obtained, at the end of which the bubble bursts. A pitch ball, *p*, near the metallic holder shows a definite but only very slight diminution of obliquity at each spasm. An adapted aluminum electroscope (right angled strip of aluminum, say 8 inches long, .03 mm. thick, flexible at *b*, appressed against a hacksaw blade and clutched by the hard rubber stem *r*) placed below *B'*, indicates a marked increment of potential, even at the least spasm of the bubble, from the beginning up to the maximum. With each such case, therefore, there is partial discharge, an outrush or ions, or an intermittent current. A few of the lines of force break loose and slide off.

[1] Advance note, from a Report to the Carnegie Institution of Washington, D. C.

2. As I understand the phenomenon, it is near the tip, B', that the surface tensions acting with a component inward are first balanced by the electric pressure $2\pi\sigma^2$ outward. The application of the latter is strictly on the outer surface. Hence the surface layer of molecules is successively slid toward the point and then stripped off, until after ten or more repetitions, the remaining tissue is so thin that it breaks. This ionized molecular exfoliation, which takes place entirely without light effects even in the dark, may be referred to as in the caption.

In the beginning, when the bubble is thick at the bottom, holding a drop, etc., the first faint sparks imply an internal pressure reduction of less than 25 dynes/cm^2. At the end, when the bubble is possibly thinnest at the bottom, the pressure reduction is usually about 55 dynes/cm^2, and it is here that the surface tension proper competes with the electric pressure. If the pressure to produce a spark be estimated at 68 dynes per cm^2, the lines would seem to break off, to this extent, more easily from a liquid than from a solid surface; but in view of the varied curvature of the bubble, it is difficult to ascertain the distribution of the contending forces. The difference of capillary and electrical pressure only must be constant and it is rather remarkable that the two data given are so near together.

CARL BARUS

BROWN UNIVERSITY,
PROVIDENCE, R. I.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORT OF THE TREASURER FOR 1922

Accepted by the Council, A. A. A. S., at Cambridge, Massachusetts, December 26, 1922

TO THE COUNCIL OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE:

Gentlemen:

IN conformity with article 15 of the constitution and by direction of the council, the treasurer has the honor to submit the following report for the period December 20, 1921, to September 30, 1922. This period covers the time necessary to comply with the new arrangement for the fiscal year of the association. Henceforth the fiscal year of the treasurer will begin on October 1 and end on September 30.

The total of cash receipts during the period is $4,803.14. Disbursements made in accordance with directions of the council amounted to $4,720.10.

The total amount of funds of the association, consisting of cash, cost value of securities purchased, and appraised value of securities received from the Colburn estate is $121,414.77.

A detailed statement is appended.

(Signed) ROBERT S. WOODWARD,
Treasurer

Washington, D. C.
September 30, 1922.

TREASURER'S CASH STATEMENT
December 20, 1921 to September 30, 1922

Receipts

December 20, 1921, balance from last report		$ 5,585.90
Interest from securities	$ 4,772.13	
Interest from bank balance	31.01	
		4,803.14
		$10,389.04

Disbursements

Grants:		
B. E. Livingston, permanent secretary (for Dr. Greenman)	$ 500.00	
A. W. Smith	150.00	
L. R. Ingersoll	150.00	
F. C. Blake	150.00	
A. W. Rowe	250.00	
Harold Hibbert	200.00	
William C. Rose	100.00	
W. Tyler Olcott, Secretary	200.00	
Caroline E. Furness	100.00	
Herman J. Muller	250.00	
S. O. Mast	200.00	
Ralph E. Benedict	125.00	
Fred T. Rogers	200.00	
Frank P. Knowlton	200.00	
Frank H. Hartman	150.00	
Sebastian Albrecht	100.00	
Otis F. Curtis, Treasurer	250.00	
John T. Buchholz	125.00	
August F. Foerste	150.00	
F. Canu	250.00	
Raymond Dodge	400.00	
Franklin O. Smith	300.00	
		$ 4,500.00
Two life memberships from Jane M. Smith Fund		200.00
Rental of safe deposit box		20.00
Foreign exchange		.10
		$ 4,720.10
Cash in banks:		
Fifth Avenue Bank	$ 4,397.60	
U. S. Trust Company	1,271.34	
		5,668.94
		$10,389.04

TREASURER'S BALANCE SHEET
September 30, 1922

Assets

Investments:	
Securities (Exhibit A)	$121,414.77
Current Assets:	
Cash in bank	5,668.94
	$127,083.71