print desiring first to confirm them on a larger number of animals. In view of the growing tendency to decrease the dosage of salvarsan in the treatment of syphilis, we feel it useful to call attention to the facts observed by us.

44 (1626)

The specific electrical conductivity of the tissue fluids of desert Loranthaceae.

By J. ARTHUR HARRIS and A. T. VALENTINE.

[*From the Station for Experimental Evolution, Cold Spring Harbor, L. I.*]

MacDougal and Cannon[1] and MacDougal[2] suggested some years ago that the osmotic concentration of the tissue fluids of the two organisms is one of the fundamental variables in the relationship between plant parasite and host. Senn[3] has published one plasmolytic determination indicating higher concentration in a *Viscum* than in the leaves of the host tree and has secured similar results with other phanerogamic parasites. In the Jamaican montane rain-forest the concentration of the tissue fluids of the parasitic Loranthaceae is in general higher than those of the host.[4] The same relationship has been found to obtain in desert Loranthaceae.[5]

As far as we are aware the relative electrolyte contents of the tissue fluids of parasite and host have not been determined heretofore.

In August, 1920, we had the opportunity while carrying out work for the U. S. Department of Agriculture at Sacaton, Arizona to measure the specific electrical conductivity, K, as well as the osmotic concentration in atmospheres, P, calculated from the freezing point lowering, Δ, of the expressed sap of the leaves of the host trees and of the stems of the leafless *Phoradendron cali-*

[1] MacDougal and Cannon, Pub. Carn. Inst. Wash., 1910, No. cxxix, P. 3, 25–49.

[2] MacDougal, *Bot. Gaz.*, 1911, lii, 249–260; *Bull. Torr. Bot. Club*, 1911, xxviii, 54–55, 473–480.

[3] Senn, *Verhandl. Naturf. Ges. in Basel*, 1913, xc, 179–183.

[4] Harris and Lawrence, *Amer. Jour. Bot.*, 1916, iii, 438–455.

[5] Harris, *Mem. Torr. Bot. Club*, 1918, xvii, 307–315.

fornicum parasitic on the leguminous trees *Acacia greggii* and *Olneya tesota* and of the leaves of the leafy *P. cockerellii* parasitic on *Populus wislizeni*, *Salix wrightii* and *Fraxinus attenuata*.

Sap was extracted after antecedent freezing of the tissues in an ice and salt mixture[1] to facilitate extraction[2] and the constants determined on the centrifuged sap.

Table 1 shows the average values of Δ and of P as determined from a published table.[3]

TABLE I.

FREEZING POINT LOWERING Δ, AND OSMOTIC CONCENTRATION, P.

Parasite and Host.	Δ			P		
	Parasite.	Host.	Difference.	Parasite.	Host.	Difference.
P. Californicum						
on *Acacia greggii*	2.81	2.21	+0.60	33.66	26.57	+7.09
on *Olneya tesota*	2.25	2.10	+0.15	26.98	25.24	+1.74
P. Cockerellii						
on *Populus wislizeni*	1.92	1.84	+0.08	23.05	22.04	+1.01
on *Salix wrightii*	2.08	1.74	+0.34	24.98	20.88	+4.10
on *Fraxinus attenuata*	2.20	1.96	+0.24	26.47	23.47	+3.00

For each comparison the osmotic concentration of the tissue fluids of the parasite is higher than that of the host. Thus the results of earlier investigations in Jamaica and Arizona are confirmed.

TABLE II.

SPECIFIC ELECTRICAL CONDUCTIVITY, $K \times 10^5$, AND THE RATIO OF K TO Δ, $K/\Delta \times 10^5$.

Parasite and Host.	K			K/Δ		
	Parasite.	Host.	Difference.	Parasite.	Host.	Difference.
P. Californicum						
on *Acacia greggii*	2242	1509	+ 733	831	682	+149
on *Olneya tesota*	2471	2192	+ 279	1103	1052	+ 51
P. Cockerellii						
on *Populus wislizeni*	3061	1990	+1071	1598	1094	+504
on *Salix wrightii*	3101	1582	+1519	1488	908	+580
on *Fraxinus attenuata*	2399	1461	+ 938	1091	749	+342

The constants for specific electrical conductivity and for the ratio of electrical conductivity to freezing point lowering appear

[1] Gortner and Harris, *Pl. World*, 1914, xvii, 49–53.

[2] Dixon and Atkins, *Sci. Proc. Roy. Dublin Soc.*, 1913, N. S., xiii, 422–423; Gortner, Lawrence and Harris, *Biochem. Bull.*, 1916, v, 139–142.

[3] Harris and Gortner, *Amer. Jour. Bot.*, 1914, i, 75–78.

in Table II. This shows that electrical conductivity, like freezing-point lowering, and the ratio K/Δ is higher in parasite than in host.

Thus it appears that there is some mechanism not as yet determined by which the mistletoe accumulates and retains in solution larger quantities of dissociated salts or organic acids than does the host.

It is possible that higher transpiration from the parasite might result in the accumulation in a purely mechanical manner of larger amounts of salts from the transpiration stream, but this is merely a suggestion requiring further investigation.

45 (1627)

Chemical and molecular behavior of casein.

By JACQUES LOEB.

[*From the Laboratories of The Rockefeller Institute for Medical Research, New York City.*]

Two kinds of casein were used, both prepared according to Van Slyke and Baker, the one from skimmed milk, the other from a solution of purchasable "pure casein." Since albumin is soluble near a P_H of 4.7 while casein is not, in both cases, casein practically free from albumin was obtained.

It was possible to show that when HCl or H_3PO_4 are added to isoelectric casein, three times as many c.c. of 0.1N H_3PO_4 as of 0.1N HCl are required to bring 1 gm. of isoelectric casein in a 1 per cent. solution to a given P_H. On the other hand, it required equal numbers of c.c. of 0.1N $Ca(OH)_2$ or $Ba(OH)_2$ as of 0.1N KOH or NaOH to raise 1 gm. of isoelectric casein in 100 c.c. solution to the same P_H. Hence H_3PO_4 combines with casein in molecular proportion while $Ca(OH)_2$ and $Ba(OH)_2$ combine in equivalent proportions with casein. In other words, acids and alkalies combine with casein by the same purely chemical forces of primary valency as they combine with crystalloids. The same fact had been shown by the writer for the combination of these acids and alkalies with gelatin and crystalline egg albumin.[1]

[1] J. Loeb, *Journ. Gen. Physiol.*, 1918–19, i, 483, 559; 1920–21, iii, 85; *Science*, 1920, lii, 449.