custs, and this could have been a precursory stage to aggregation through response to feeding noises.

The mandibles of *Paratylotropidia brunneri* show no special modification indicative of a role in sound production. Because of the importance of mandibular structure in feeding, it seems unlikely that mandibular sounds could ever become as extensively elaborated as the tegminal and tegminofemoral stridulations of other Orthoptera. It is probably significant that *P. brunneri* occurs in a habitat where there are few other sound-producing insects, and where a soft, simple sound is more likely to become an effective long-range signal.

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Dialysis of Certain Sugars through Cellophane

Abstract. Of several sugars examined, alkali most affects the rate of dialysis through cellophane of alpha-beta-D-mannose and alpha-beta-maltose. The rates of dialysis of these two sugars are influenced by 0.01 and 0.1*N* solutions of sodium and potassium hydroxide. The rate of dialysis of sucrose is not influenced by the solutions employed.

During applications of the procedure of Craig (*1, 2*) for the selective dialysis of solutes, it was observed (*3*) that changes in chemical environment affect the rates of dialysis through cellophane of certain sugars more than the rates of others. Particularly clear was the effect of hydroxyl ion on the dialysis rate of some sugars. Since the effects could be reversed by neutralizing the alkali, chemical degradation of the carbohydrate could not account for the observations.

Seven milliliters of a 0.2- to 0.4-percent sugar (reagent grade) solution known to be at equilibrium with respect to the alpha and beta anomers were dialyzed through cellophane (19 mm diameter when round, No. 10886, Will Corporation) into 70 ml of the indicated solvent at room temperature. Every effort was made throughout to keep the dialyzing surface at approximately 52 cm^2. The procedure outlined by Craig (*2*) was employed. The selected time for dialysis, 45 minutes, was the approximate half escape time for most of the sugar solutions. All analyses were by means of the *o*-aminobiphenyl procedure (*4*). An analysis was considered satisfactory when the total sugar calculated from the concentration of the 70-ml dialyzate and the 7-ml bag contents agreed with the total sugar calculated from the measurement of the concentration of the original solution. Values in Table 1 are differences obtained by substracting the percentage of sugar remaining in the dialysis bag after 45 minutes in the indicated solvent from the corresponding value when water was the solvent. For example: at 45 minutes 41.8 percent of D-mannose remained when dialyzed in water, while 70.8 percent remained when the solvent was dialyzed in 0.10*N* sodium hydroxide. The difference, 29, appears in Table 1. For this same sugar placed in 0.1*N* sodium hydroxide for 45 minutes, neutralized with HCl and dialyzed, the percentage remaining was 43.1, a value sufficiently different from the value obtained when dialyzed in sodium hydroxide that the cause for the difference between rates in alkali and water could not be deterioration of the sugar in sodium hydroxide. Percent remaining values represented mean values which for three determinations would differ by no more than 4.5 percent of the mean. The analysis, as would be expected, for a sugar showed a smaller deviation. For example, when 300 μg of glucose were measured in ten trials, the mean for the ten observations was 299.6 and the standard deviation was 6.3.

To further test the reliability of the measurement of the observed dialysis rates, a hexose mixed with pentose was dialyzed with water as the solvent. The sugars remaining in the cellophane bag after dialysis were chromatographically separated (*5*) and the relative quantities of sugar found were compared with the relative quantities of the sugars in the original solution of the mixed pair before dialysis.

When D-glucose and D-arabinose were dialyzed mixed, the absorbance ratios of the *o*-aminobiphenyl derivatives of the chromatographically separated sugars agreed within 1 percent with the ratios of the optical densities such derivatives of the sugars separately dialyzed.

The date of Table 1 indicate that the dialysis rates of D-mannose, D-arabinose, maltose, and cellobiose are most affected by 0.1*N* sodium hydroxide. Of these four sugars, all but D-arabinose are affected by 0.01*N* sodium hydroxide. The dialysis rates of D-mannose and maltose are most affected in both concentrations of sodium hydroxide. Increasing the concentration of sodium hydroxide from 0.1*N* to 0.5*N* (not shown in Table 1) did not increase the effect of sodium hydroxide on mannose (rate in 0.5*N* sodium hydroxide minus rate in water was 26.4). How significant an increase the corresponding difference for maltose, 25.2 in 0.5*N* sodium hydroxide, is over the value in 0.1*N* sodium hydroxide (20.7 in Table 1) is not decided by these data. The data show that 0.01*N* potassium hydroxide has a greater affect on the dialysis rate of maltose than does sodium hydroxide of comparable concentration. The dialysis rates of D-mannose and maltose were not changed by increasing the concentration of potassium hydroxide from 0.01 to 0.1*N*.

Table 1. Comparison of rates of dialysis of certain sugars in water and alkaline solutions. The values shown are the rate of dialysis in alkaline solution minus rate in water.

Sugar	Alkaline concentration	
	0.01*N*	0.10*N*
	Sodium hydroxide solution	
D-Glucose	3.2	9.1
D-Galactose	4.1	10.4
D-Mannose	11.4	29.0
D-Arabinose	2.2	18.3
L-Arabinose	0.1	10.3
D-Xylose	1.9	5.3
L-Xylose	3.5	11.5
Sucrose	0	3.6
Maltose	12.0	20.7
Cellobiose	10.2	15.1
	Potassium hydroxide solution	
D-Glucose	0.8	9.5
D-Mannose	12.8	12.7
D-Arabinose	6.7	12.8
D-Maltose	18.2	17.8

The sugars D-mannose and maltose, the dialysis rates of which are most affected by the changes in chemical environment examined above, are considered "alkali sensitive" by Reeves (*6*), when optical rotation is the index (*6*). Changes in conformation of the sugars, claimed for the effect of alkali on optical rotation (*6*), cannot explain here the failure of sucrose to dialyze at a lower rate than that observed. By the same reasoning, cellobiose would be expected to dialyze more rapidly than it did here. It is unlikely that the alkali effect observed here in dialysis could be attributed entirely to the influence of the hydroxyl ion on the equilibrium between the alpha and beta forms of the sugars. If influence on mutarotation were the explanation, one would presume that glucose, maltose, and cellobiose might be similarly influenced, since each has the same percentage (*7*) of

alpha and beta forms at mutarotation equilibrium in water. On the other hand, the behavior of sucrose would support the view that the effects observed here are due to events involving the anomeric carbon.

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18 March 1960

Contribution of Hardtack Debris to Contamination of the Air during 1959

Abstract. A comparison of the concentrations of tungsten-185 and strontium-90 in the air at various times after the 1958 U.S. nuclear tests in the Pacific indicates that debris from this test series contributed less than 10 percent of the total Sr^{90} content of the ground-level air at Miami and Washington during the spring of 1959.

The detection at sites along the 80th meridian (west) of W^{185} produced uniquely in the U.S. Hardtack series of nuclear tests at the Pacific Proving Grounds in 1958 showed the rapidity with which radioactive debris could be disseminated by atmospheric processes (*1*). By making certain assumptions regarding the relative amounts of W^{185} and Sr^{90} produced during these tests, the quantitative determination of these isotopes at later times can lead to a rough estimation of the contribution of Sr^{90} from Hardtack to the total Sr^{90} in a given sample.

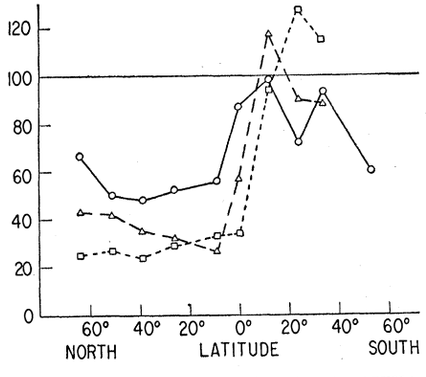

Fig. 1. Latitudinal variation in the W^{185}/Sr^{90} activity ratio. Vertical axis describes the ratio, W^{185} corrected for decay to 15 July 1958. Circles, January readings; triangles, March readings; squares, May readings.

Radiochemical analyses of debris from the Hardtack test series indicated a possible value of 1000 to 1200 for the W^{185}/Sr^{90} activity ratio of the tungsten-containing shots (*2*). If it is assumed that this value is typical of all the tungsten-containing shots, and, furthermore, that one-half the total fission yield of the series resulted from shots of this nature, a W^{185}/Sr^{90} activity ratio of near 500 is obtained as a reasonable characterization of this series. Thus, airborne debris in filter collections made at various sites during 1959, upon radiochemical analysis for W^{185} and Sr^{90}, and with suitable decay corrections, can be assigned to Hardtack or non-Hardtack nuclear tests. Some data on the measured air concentrations of W^{185} and Sr^{90} at several sites along the 80th meridian are listed in Table 1.

As may be seen in Fig. 1, the W^{185}/Sr^{90} activity ratio varies with latitude and with time. This ratio is considerably lower in the Northern than in the Southern Hemisphere—about one-half to two-thirds as high in January 1959 and only about one-fourth as high in May, during the time of peak air activity from the previous series of nuclear tests, by the U.S.S.R., in the Arctic (October–November 1958).

Simple calculations indicate that during May 1959 only about 5 percent of the Sr^{90} activity in the North Temperate Zone, along the 80th meridian, originated in the U.S. Hardtack tests. During earlier and later periods, when radioactivity from the U.S.S.R. tests was not so prevalent in the ground-level air, Hardtack debris contributed perhaps 10 percent of the total Sr^{90} (Table 2). In the Southern Hemisphere during early 1959, while the actual W^{185} concentration in the air was only one-quarter that in the Northern Hemisphere, the Hardtack series contributed nearly 20 percent of the total airborne Sr^{90}. This points up the fact that the stratospheric burden of debris both from Hardtack and from other nuclear test series is considerably lower in the Southern than in the Northern Hemisphere. Furthermore, it is evidence that the transequatorial mixing process in the stratosphere, as in the troposphere, is a relatively slow one.

Table 1. Air concentrations of W^{185} and Sr^{90} at several sites along the 80th meridian (W^{185} corrected for decay to 15 July 1958). Activity is registered in disintegrations per minute per 100 standard cubic meters.

Washington		Miami		Antofagasta	
Sr^{90}	W^{185}	Sr^{90}	W^{185}	Sr^{90}	W^{185}
		July 1958			
2.9	53	1.5	43	0.88	46
		September 1958			
1.6	179	1.2	186	1.3	77
		November 1958			
2.4	222	2.2	193	0.69	60
		January 1959			
5.7	274	5.9	308	1.01	73
		March 1959			
6.6	234	10.4	330	0.41	37
		May 1959			
9.0	214	6.7	198	0.30	38
		July 1959			
2.7	98	1.4	73		

Table 2. Contribution of Hardtack Sr^{90} to total Sr^{90} in the air, expressed as percentage.

Total Northern Hemisphere	Washington (39°N)	Miami (26°N)	Antofagasta (24°S)	Total Southern Hemisphere
		July 1958		
4.7	4	6	10	12
		September 1958		
	22	31	12	
		November 1958		
	19	18	17	
		January 1959		
10.7	9.6	10.4	14.5	17.5
		March 1959		
7.0	7.1	6.4	18.0	
		May 1959		
5.5	4.8	5.9	25	18.2
		July 1959		
8.5	7.3	10.4		

The usefulness of W^{185} (74-day half-life) as a tracer for Hardtack debris is rapidly nearing an end because of the isotope's depletion through radioactive decay (*3*).

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