

equations which were solved simultaneously for the values of  $A$  and  $t$ .

Substances dissolved in sea water the concentrations of which are altered by biological activity are useful in investigations of its circulation when used either as simple identifying properties or in combination with a conservative property; in such cases it is frequently not necessary to know the rate of the biochemical change of concentration. Particularly useful combinations of conservative and non-conservative properties, such as oxygen and salinity, or oxygen and temperature, may under certain defined conditions be used to trace movements and mixing of water masses and to supplement the results of circulation as calculated from the Bjerknes circulation theorem. The oxygen salinity or oxygen temperature relationship has its counterpart in the temperature salinity relationship (originated by Helland-Hansen), but differs in that the latter strictly conservative relationship is chiefly useful in interpreting combinations of water masses of distinctly different physical properties, whereas the combination of conservative and non-conservative properties may be used advantageously in investigating characteristics of a water mass of marked homogeneity. The latter relationship recently used in an investigation of the water (between approximate depths of 200 and 1,200 metres) in the Caribbean Sea region made it possible to trace the movements and mixing of water masses entering the passages from the open Atlantic and to bring out certain details not clearly indicated by the temperature-salinity relationship.

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#### Effect of Addition of Calcium on the Biological Value of the Proteins of Indian Diets

DURING our investigations<sup>1</sup> on the biological value of the proteins of typical Indian diets, it was found that the proteins of the Madras diet gave a biological value of 44 at 10 per cent protein level, though rice with a biological value of about 83 formed the major item of the diet. In the course of an informal discussion with Dr. W. R. Aykroyd, director of the Nutrition Laboratories, Coonoor, he suggested that the low biological value might be due to a low content of calcium in the diet. Experiments were conducted with addition of calcium in the form of calcium carbonate to the Madras diet. Results are given below:

CALCIUM IN DIET, 0-124 PER CENT.

Rat. No.	Initial weight (gm.)	Final weight (gm.)	Digestibility (%)	Biological value (%)	Average
1	130	134	59	34	44
2	115	123	65	45	
3	165	169	61	45	
4	123	130	64	44	
5	114	119	66	45	
6	94	103	69	52	

CALCIUM IN DIET, 0-124 PER CENT + 2 PER CENT CALCIUM CARBONATE.

Rat. No.	Initial weight (gm.)	Final weight (gm.)	Digestibility (%)	Biological value (%)	Average
1	105	109	86	66	76
2	102	107	93	81	
3	109	125	85	71	
4	105	114	87	81	
5	94	99	90	79	
6	122	130	92	78	

Examination of the above results reveals that the biological value of the proteins of the Madras diet increases from 44 to 76, and the digestibility from 64 to 89 on the addition of calcium to the diet, even though the calcium content in the Madras diet is just enough according to Sherman's accepted standard for an adequate diet. The low biological value in the first table might be due to the non-availability of calcium in the diet. Further work to confirm the above observation is in progress.

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<sup>1</sup> "Contributions to the Study of the Biological Value of the Proteins of Typical Indian Diets. I. Biological Value of the Proteins of Madras, Bombay (Parsi) and Punjab Diets" (sent to the *Indian Journal of Medical Research*).

#### Biological Fixation of Nitrogen

THE oxime which is formed in the root nodules during the nitrogen fixation of legume bacteria<sup>1</sup> has at last been isolated and characterized. The oxime precipitates according to Foreman's method, which fact already indicates it to be the oxime of a dicarbonic acid. Extracting the oxime with ether, we succeeded in preparing the copper salt from it. The analysis of this salt showed that the compound is the oxime of oxalacetic acid. Thus the formation of aspartic acid in the biological fixation of nitrogen via the oxime of oxalacetic acid has been finally confirmed.

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<sup>1</sup> NATURE, 141, 748 (1938).

#### Electric Lines of Force

WHEN a piece of cotton wool is placed on one of the charged spheres of a Wimshurst machine, it is immediately repelled, and, following the lines of force in the air, proceeds to the oppositely charged sphere. This is the usual method of demonstrating the phenomenon, but it is not always easily controlled.

I have recently been trying substitutes for the cotton wool, amongst them the down of birds. The down was furnished by my budgerigar. I find that the down attached to the base of the feathers which the bird pulls out answers the purpose admirably. A piece of this, placed on a charged sphere, gradually takes up the charge, the fine points of the immature feather standing out, and finally leaps across the four or five inches of air separating the two charged spheres. If the spheres are not highly charged, it may be as long as five seconds or so before the repulsion takes place.

The way the charge is taken up is extremely interesting and worth projecting on a screen. The down is a poor conductor with many fine points I think this explains its peculiar behaviour.

The electric lines of force are well shown by this method as it is possible to have two or three pieces of down going to and fro at the same time.

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