

Disappearance of Nitrates in Mangolds.

DURING last autumn, winter, and spring, I made a series of analyses of mangolds, determining in each case the nitrogen present as albuminoids and as nitrates.

The roots were pulled during the last week in October, and clamped in the ordinary way. Roots of the same weight—about 7 pounds—were taken for analysis on the dates shown in the table.

The albuminoid nitrogen was determined in the dry matter, by leaving two grams in contact with 4 per cent. carbolic acid, containing metaphosphoric acid, for twenty-four hours; the nitrogen determined in the insoluble portion, by Kjeldahl's method, being taken as albuminoid nitrogen.

The total nitrogen was determined by a modification of Kjeldahl's method in the dry matter.

The nitric nitrogen was determined in the juice by Schloesing's method.

The amide and ammoniacal nitrogen was calculated from the above by difference.

The results are given in the annexed table.

Table of Results of Mangold Analyses.

Date of analysis	Total nitrogen		Albuminoid N.		Nitric nitrogen		Amide and ammon. N.	
	in per cent. of root	of total N.	in per cent. of root	of total N.	in per cent. of root	of total N.	in per cent. of root	of total N.
October 12 ..	183	100	055	30.0	050	27.3	—	42.7
December 1 ..	241	100	113	48.4	048	19.8	—	31.8
February 1 ...	238	100	075	32.1	035	14.7	—	53.2
March 10 ...	207	100	061	29.3	026	12.6	—	58.1
" " ...	204	100	053	25.9	028	13.5	—	60.6
April 20 ...	277	100	047	17.3	023	8.3	—	74.4
" "	250	100	062	24.8	022	8.8	—	66.4
May 20	233	100	056	24.0	022	9.4	—	66.6

¹ This root was rotten inside and hollow.

Two questions appear to me to arise from these analyses:

(1) Is the disappearance of the nitrates due to a denitrifying action of the cells, or to bacterial action?

(2) Is not this disappearance of the nitrates during storage answerable for the fact that mangolds are more suited for food after January than in the autumn?

I purpose repeating these experiments on a larger scale next winter.

T. B. WOOD.

Agricultural Department, University of Cambridge.

Globular Lightning.

THE following appears to be an instance of so-called "Globular Lightning" (NATURE, vol. xl. pp. 296, 366, 415, &c.).

During the thunderstorm of July 20, with which the drought broke up, an elderly man, Thomas Smith, residing in this parish about half a mile from the railway station, was watching the lightning from his cottage door, between 5 and 6 p.m., when he noticed a white ball, "about the size of an egg," dancing about in the air "like rooks when at play." He watched it through the intervals between two or three lightning flashes, therefore during several seconds. After some interval (perhaps a few minutes), he still standing at the door, his wife just coming down the stairs to him, something seemed to pass between them which felt hot to their faces. Simultaneously Miss Downes, schoolmistress, sitting on the landing above the stairs, felt something hot pass her hair behind, and then in a small bedroom, with open door adjoining, a loud detonation took place; white-wash from the ceiling covered bed and floor, the wall-paper was torn, the plaster fissured, and the house filled with a "sulphurous" smell.

There is a draught up the stairs, but no apparent reason why what it brought should enter the little bedroom. The cottage stands alone, on high ground, but not the highest, and there is nothing exceptional in its construction or its surroundings.

Cockfield, Suffolk, July 22.

J. HILL.

NO. 1448, VOL. 56]

"Bicycles and Tricycles."

IN reading Mr. Boys' most interesting review of Mr. Sharp's book on "Bicycles and Tricycles" (NATURE, July 8), a few points occur to me as requiring further notice.

In Chapter xi., on bending, the *strengths* of tubes of various sections are compared by considering the modulus (Z) of each section, while Mr. Boys speaks of *stiffness*, and mentions that D tubing is 1 per cent *stiffer* than round tube of the same weight and width. I venture to think that, in stating this, Mr. Boys has overlooked the fact that, since the D section is unsymmetrical about the longer axis, the ratio of its moment of inertia to that of round tube ($\frac{I_D}{I_0}$) is much greater than the ratio of the

moduli ($\frac{Z_D}{Z_0}$).

Thus the relative stiffness of D tube ($\frac{1542}{1250} = 1.23$) is much greater than its relative strength ($\frac{252}{250} = 1.008$).

These values assume the D section to be semicircular, and the tubes to be infinitely thin; when the thickness is finite, the round tube must have the thicker wall, and the mean diameter becomes less than the mean radius of the semicircle, so that the ratios become greater still.

In practice the semicircular section is seldom used, a much more square-shouldered shape being preferred, which, whilst only slightly less stiff than rectangular tube of the same weight, width and perimeter, is much less unsightly in appearance. The actual advantage of D tube over round is found by experiment to be from 30 per cent. to 40 per cent.

It may be well here to draw attention to tests of various fanciful sections (webbed, corrugated, &c.), which are published from time to time, showing great apparent advantages over plain tubing. In every case the test is made by supporting the tube at the ends, and applying the load at the centre by means of the ordinary knife-edge used for testing solid bars. The result is that the tube wall is crushed in long before the real limit of bending moment is reached, and the test merely indicates resistance to local denting. To avoid this the tube should be as long as possible, and the load distributed over a large area.

Mr. Sharp's book is the first serious effort that has been made to bring the cycle-maker into line with the rest of the engineering profession.

R. H. HOUSMAN.

Mason College, Birmingham.

I AM obliged to Mr. Housman for pointing out a slip of expression in my review of Mr. Sharp's book. I had not confused the ratio of the I 's for the ratio of the D 's, but merely inadvertently used the word "stiffness" in its colloquial and more extended sense, so to include resistance to forces which would seriously bend or damage, as well as to those which would produce infinitesimal bending.

While on the subject of strength or stiffness of thin tubes, it may be worth while to point out that the complete theory of bending, as applied to very thin tubes, is by no means included in the usual formulæ; and it is for this reason that properly designed experiment is essential in extreme cases.

C. V. BOYS.

"A Text-book of Histology."

MY attention has been drawn to a review of my work on histology, which appeared in your issue of May 20; and as the review appears to me to be biased, and amounts in fact to a public attack on me as an histologist, I trust you will, in fairness, give me the opportunity of as publicly defending myself, by inserting this letter in your next number.

Not one of the charges brought against the book can be fairly substantiated. Your space will not admit of my traversing more than a few of the points raised, but these will serve as samples of the whole.

(1) Your reviewer refers to a well-known excellent atlas of histology, and contrasts the accuracy of the drawings with mine. I deny the justice of his comparison: to take instances, if any one will compare the drawings of the eye and cochlea in my text-book with those of the same structures in the atlas, he will speedily be convinced as to where the inaccuracy lies. If the descriptions in the atlas referred to contained much that was new at the time, I can only say that histology must have