the descriptive matter often a deftness of touch which is altogether delightful. This is a "popular" work; but it suffers from none of those elements of vulgarization that too frequently creep into the "popuar science" writing of this day. It is a book to be heartily commended to the teacher who strives for scrupulous accuracy in the non-mathematical presentation of scientific things.

The publisher says on the jacket of the book that it contains "the largest and finest collection of cloud photographs ever presented in one volume." One must express surprise at this encomium. The illustrations are good, on the whole; some of them are very good; a scant few of them possess the almost stereoscopic loveliness in the halftone rendering of form and depth and distance, which is an outstanding characteristic of some recent foreign cloud books.

The clouds presented as types are in a few cases disappointing. It would be difficult indeed for all to agree on the choice of the picture intended to illustrate a given type. For instance, Figure 33, "Stratocumulus, Roll Type," seems to the reviewer to present nothing more than a good cumulus cloudscape with the usual receding glimpses of the bases of ever more distant clouds. The well-formed cumuli in the nearer distance appear to indicate that conditions weren't right for roll-type cumuli just then. The strato-cumulus in Figure 34, on the other hand, could scarcely be finer. Figure 41, "Cumulus," pictures very prettily the grounds of the U. S. Department of Agriculture in Washington. In Figure 42 the sky is quite too crowded with irregularly disposed cumulus bases to leave any just impression of the *en echelon* arrangement it was desired to portray.

Such comments relate after all, however, to failings which are not of major importance. One will have to go far to find a volume more serviceable to its purpose, or better adapted to making us familiar with the names and habits and vagaries of form of these transient visitors to our skies.

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SPECIAL ARTICLES

THYROXIN AND COAT COLOR IN DILUTE RACES OF MICE AND RATS[1]

IN the course of investigations of thyroid function, begun in 1921 on the domestic fowl, one of the most striking effects of experimental hyperthyroidism to be observed was the darkening of the plumage in such pigmented races as Rhode Island Reds, Barred Plymouth Rocks, Silver Campines and Brown Leghorns.[2] The addition of desiccated thyroid to the dietary of growing chicks, and the parenteral injection of thyroxin itself, led quickly to an increase both in quantity and extent of plumage melanins. This not only revealed a definite influence of the thyroid hormone on melanin production in these birds, but suggested a possible means of exploration by thyroxin of the pigment-forming mechanism itself, not only in birds but in mammals as well.

Accordingly, experiments were begun on several color varieties of mice and rats. Representatives of six varieties of mice, namely, piebald, pink-eyed, chocolate, dilute chocolate, dilute black and albino, and one variety of rat, namely, dilute black-hooded, received systematic abdominal injections of thyroxin. The dose for all ages was approximately 1 mgm. of thyroxin to every 500 grams of body weight, administered at intervals of three or four days. Interest centered chiefly about the behavior of naked or nearly naked young, to which thyroxin could be given as the coat developed from birth onward. When adults were given thyroxin, a patch of hair was clipped from the rump in each case.

In sharp contrast with the response of the domestic fowl, the administration of thyroxin under the conditions of the experiments produced no effect whatever on the coat color of the rats and mice, young and old. The facts will be sufficiently established by a brief review of four typical experiments.

1. To 5 dilute chocolates, 2 dilute blacks, and 6 piebalds, all well grown, thyroxin was administered as follows:

June 28	.03 mgm. each	
30	.03 " "	
July 2	.03 " "	
5	.04 " "	Hair clipped from area on rump.
9	.04 " "	
14	.05 " "	
16	.05 " "	
19	.05 " "	
21	.05 " "	
23	.05 " "	
26	.05 " "	
28	.05 " "	
30	.05 " "	
2	.05 " "	
6	.06 " "	
9	.10 " "	Injections discontinued.

In none of these animals, either during the period

[1] This inquiry was aided by a grant from the Carnegie Institution of Washington. The stock used was obtained through the kindness of Dr. W. E. Castle and Dr. M. R. Curtis.

[2] Anat. Rec., xxiv, 395; Proc. Soc. Exp. Biol. Med., xxiii, 536; Biol. Bull., in press.

of the injections or for six months thereafter, were any changes noted in the coat color that could be attributed to thyroxin.

2. To 1 albino and 5 chocolate mice, forming one litter from a chocolate mother and weighing about 3 gms. each, thyroxin was administered as follows:

June 24	.005 mgm. each	
28	.006 " "	
30	.006 " "	
July 2	.012 " "	
5	.016 " "	Hair clipped from rump area.
9	.020 " "	
10	.024 " "	
14	.030 " "	
16	.030 " "	
19	.030 " "	
21	.030 " "	
23	.030 " "	1 chocolate died.
26	.036 " "	1 chocolate died.
28	.036 " "	1 chocolate died.
30	.036 " "	
Aug. 2	.040 " "	
6	.050 " "	
9	.060 " "	Injections discontinued.

As in the case of the adults just considered, thyroxin produced no apparent effect on coat color of either chocolate or albino during or after the series of injections.

3. To 5 dilute black-hooded rats, of the same litter, weighing about 15 gms. each, with eyes unopened, hooded pattern visible, hair very short except for a few long hairs, thyroxin was given as follows:

April 24	.05 mgm. each	
30	.05 " "	Hair well out. Pattern marked.
May 6	.05 " "	
12	.05 " "	
7	.05 " "	Injections discontinued.

Results as in the preceding cases.

4. To 5 dilute black-hooded rats, weighing about 6 gms. each, and naked, thyroxin was given as follows:

June 24	.008 mgm. each	
28	.010 " "	
30	.010 " "	
July 2	.014 " "	2 dead
5	.018 " "	1 dead
9	.024 " "	
10	.026 " "	
14	.034 " "	
16	.040 " "	
19	.040 " "	
21	.044 " "	
23	.050 " "	
26	.050 " "	
28	.050 " "	
30	.050 " "	Injections discontinued.

Results as in preceding cases.

This failure of the mice and rats to respond to thyroxin indicates a marked difference between the mechanisms involved in feather and hair pigmentation in the birds and mammals observed. Large amoebid melanophores play a peculiar and conspicuous rôle in the development and distribution of feather melanin, a process that appears to have no counterpart in the developing hair. It is unlikely, however, that this or any other such histological difference is of fundamental importance in this connection. The simplest assumption to account for the observed facts is that these unresponsive varieties do not possess the factors essential, with or without thyroxin, to a deepening of their coat color beyond its typical limit. Dilute chocolate and dilute black do not appear merely as less intense color varieties of chocolate and black respectively, but differ from the latter in the absence of factor or factors necessary to the production of their characteristic coloring. The result of the physiological test with thyroxin thus accords with the well-known facts of their genetic behavior and current conceptions of their genetic constitution.

HARRY BEAL TORREY

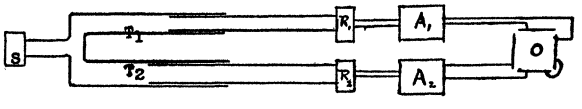
ON THE VELOCITY OF SOUND

THE velocity of sound as a function of tube diameter has received consideration from time to time. Helmholtz, in 1863, proposed, without demonstration, the following as the governing relative,

$$V = V_0\left(1 - \frac{c}{d\sqrt{n}}\right)$$

where V_0 is the velocity in free air at 0° C., d is the diameter of the tube, n the frequency and c a constant. Later Rayleigh derived this relation from certain dynamical considerations but the experimental support for it has been meager and not satisfactory, due to lack of sufficient accuracy in velocity measurements.

Some years ago, Wold carried out some measurements by a method illustrated in the figure. Sound-waves from a tuning-fork or diaphragm at S travel down tubes T_1 and T_2 of variable length. The waves



are picked up by receivers R_1 and R_2 of the condenser transmitter type. The outputs are amplified by six stage amplifiers A_1 and A_2 and impressed on