A method that has long been used for getting rid of impurities is the extraction of the "unknown" from water-solution with $CCl_4$ or other non-miscible solvent. (Chloroform and $CS_2$ spontaneously decompose in storage and $CS_2$ is highly volatile and inflammable.) In case the partition-coefficient $CCl_4/H_2O$ is 200 or higher, some chemists have assumed that all the "unknown" is extracted with one extraction.

If the substance is colored, it may be determined directly in the colorimeter, and this is easier than getting it back into water to determine it by titration; and is just as accurate, if 10 readings of the colorimeter are made (finding the average being simply addition and moving of the decimal point). If the unknown solution is set at unit depth the colorimeter readings of the standard give the concentration of the unknown *directly,* without any calculation whatever (assuming the standard is in unit concentration).

In case the partition-coefficient, $CCl_4/H_2O$, is small enough to make repeated extractions necessary, the work becomes very laborious, owing to the fact that an infinite number of extractions are necessary to remove all the "unknown" from water-solution. If the partition-coefficient is known, the total "unknown" may be calculated from one extraction (knowing the ratio of volumes of the water-solution to the $CCl_4$). But the presence of impurities may alter the partition-coefficient to an unknown extent.

I have worked out a formula for calculating the total "unknown" from 2 extractions. It is not necessary to know the ratio of volumes of the water-solution to the $CCl_4$, but the ratio must be the same in the 2 extractions. The extraction is made in a separatory funnel and all the $CCl_4$-extract and none of the water-solution is removed. The funnel is stoppered and inverted and the water-solution in the hole in the stop-cock allowed to run back into it before admitting $CCl_4$ for the second extraction. If

$x$ = total,
$x_1$ = 1st extract and
$x_2$ = 2nd extract

the formula is:

$$x = x_1 + \frac{x_1 x_2}{x_1 - x_2} \text{ or } x = x_1 + \frac{x_2}{1 - \frac{x_2}{x_1}}$$

J. F. McCLENDON

## GROWTH RETARDATION BY THE PARTIALLY OXIDIZED SULFHYDRYL OF CYSTEINE

IN the spring of 1930, I presented before the American Philosophical Society the experimental data leading to the postulate that growth by increase in cell number is regulated by a naturally occurring chemical equilibrium comprised of sulfhydryl as the accelerating portion and its partially oxidized derivatives as the retarding. The full report was published in *Protoplasma,* Vol. 11, pp. 383–411, in the same years.

At that time I recognized that complete validation of the postulate depended upon the demonstration of cell proliferation inhibiting properties by a partially oxidized derivative of the sulfhydryl group carried by a naturally occurring sulfur compound.

Since I had found that cysteine, cystin and glutathione (a cysteine-containing compound) all accelerated cell multiplication, and since these compounds occur naturally in living growing things, the obvious thing to do was to use a partially oxidized sulfur derivative of one of these compounds.

Such a derivative was not available nor had it ever been prepared, to my knowledge. I therefore gave this chemical problem over to Dr. Gerrit Toennies, chief of the chemical division of our institute. After three years of concentrated effort he has succeeded in producing and isolating a sub-oxidized sulfur derivative of cysteine, starting with cystin. This is a notable achievement. He himself will make the report of his method and the chemical properties of the product elsewhere. Suffice it to say here that his tests show the compound to be neither an SH combination nor cysteic acid, the completely oxidized sulfur derivative, but some intermediate stage.

For practical purposes, I had postulated in the paper referred to above that the compound must be water soluble, essentially neutral and fairly stable in aqueous solution for a reasonable period. Dr. Toennies has produced a compound which meets these requirements.

With the material which he has supplied me I have tested out its action on the growth of Hydra hydranths and the embryonic development of Crepidula eggs and larvae. Uniformly have I found that definite and marked retardation is produced by this partially oxidized sulfur derivative of cysteine, a naturally occurring sulfur-containing compound. The retardation is produced by a concentration of about one part per million sulfur in the sub-oxidized state. This concentration is of the same order of magnitude as that used for sulfoxide in previous experiments and which was found similarly retardative.

This finding, therefore, demonstrates for the first time the growth-inhibiting effects of partially oxidized sulfhydryl from naturally occurring compounds and thus puts on unequivocal foundation the postulate that growth by increase in cell number is regulated by the naturally occurring chemical equilibrium comprised of sulfhydryl and its partially oxidized derivatives.

Dr. Toennies' brilliant success puts in our hands a compound of inestimable practical and theoretical value, the outcome from which no one can predict.

FREDERICK S. HAMMETT,
*Scientific Director*
MARINE EXPERIMENTAL STATION OF
THE RESEARCH INSTITUTE OF THE
LANKENAU HOSPITAL,
NORTH TRURO, MASSACHUSETTS

## EOCENE LAGOMORPHA

AMONG the discoveries made by the Carnegie Museum field party during the field season of 1932 which are of interest to the paleontologist was that of remains of Lagomorpha in the Upper Eocene of the Uinta Basin in northeastern Utah. This material will add considerably to our knowledge of the phylogeny of this group and will probably have considerable bearing upon Eocene and Oligocene stratigraphy as well.

Actually, the first discovery of Lagomorph fossils in the Uinta Eocene was made in 1923, when a Carnegie Museum field party, consisting of O. A. Peterson and J. LeRoy Kay, found a fragmentary lower jaw in Horizon C at Little Pleasant Valley, about six miles east and south of Myton, Uinta County, Utah. The poor condition of the specimen made it undesirable for a type, and its description was deferred, pending the discovery of better preserved diagnostic material. During the field season of 1931 members of our party obtained a single inferior cheek tooth of a Lagomorph from a horizon in the Duchesne Oligocene series very near the base of the latter beds, about two miles east of Randlett, Uinta County, Utah. In 1932 the Little Pleasant Valley locality near Myton was revisited and a number of excellent specimens, representing at least three species of Leporidae, were found in Horizon C of the Uinta Eocene series, approximately three hundred feet below the base of the Duchesne Oligocene.

This material is being studied by the writer at the present time and will be described shortly in the *Annals* of the Carnegie Museum.

J. J. BURKE
CARNEGIE MUSEUM

## BLUE EYES FOR BROWN

FEW nowadays underrate the value of the press in the spread of knowledge. Cheering to certain minds will be in that connection extracts from a correspondence which began when *Collier's Magazine* for July 16, 1932, published in Freling Foster's column "Keeping Up With the World" the statement that:

> After a prolonged absence of sunlight, men on polar expeditions find that their eyes, irrespective of previous color, have turned blue.—*By C. G. Matson, Los Angeles, California.*

*Collier's* pays $5.00 for contributions such as Mr. Matson's. Under date of July 13 I accordingly tried to sell them the idea that:

> After a prolonged absence of sunlight, men on polar expeditions find that their eyes, irrespective of previous color, are still of the same color.

There came in reply a form letter, saying that my contribution was under consideration. Then, under date of September 7, Freling Foster wrote, declining (by inference) to purchase from me and defending Mr. Matson:

> This contribution was not only accompanied by confirmatory data but it checks with our reference books which describe how the human body is affected by the long polar night.
>
> One book that I can recall offhand is ''Sunlight and Health,'' by Dr. C. P. Saleeby, which was published a short time ago by Putnam.

I checked up the reference and found that on pp. 59–60 of "Sunlight and Health" (N. Y., 1924) Dr. Saleeby says:

> Polar explorers record that, after prolonged absence of sunlight, all the eyes of their men are blue.

Dr. Saleeby did not mention the names of these explorers, and so I wrote him, quoting his own statement and asking further details. On November 24, he replied:

> I wish I could help you, but I know no other reference to the subject than the one which I refer to in my book—taken from the journal of Captain Scott, if I remember aright after all these years.

Here was a clue and I followed it up by writing to Frank Debenham, geologist of Scott's second expedition, now professor of geography in the University of Cambridge and director of the Scott Polar Research Institute. I gave a summary of the correspondence, adding:

> In the book itself I noticed no sign that Dr. Saleeby had relied . . . on the journals of Captain Scott. I am trying to make a rather thorough job of tracing down the belief or fact that eyes change color during the absence of the sun, and surely you at the Institute must have the best command of all the Scott material. I hope, then, that the Institute will be able to give me, first, proof or disproof that comes from the records of any member of the Scott expeditions and, second, any other evidence for or against that may be within your reach.

On December 18, Professor Debenham replied:

> Following up your query about the change of colour of eyes during the polar darkness, a phenomenon which I find it hard to believe, I wrote to our Dr. Levick. . . . I have certainly noticed no such effect.

Surgeon-Commander G. M. Levick, medical officer