ihnen den Namen *Plasmodium malariae* zu geben.'' The name was italicized and unquestionably intended as a formal scientific name. This proposal of *Plasmodium* as a new generic name has been accepted, but the new specific name has apparently been quite generally overlooked.

Of the three identical specific names, it is now generally agreed that *malariae* Laveran applies only to the parasite of *falciparum* or malignant malaria. *Malariae* F. & G., which originally included both quartan and tertian parasites, was later restricted by Grassi and Feletti (*Arch. ital. biol.*, 1890, 13, 300) to the quartan parasite, at which time they named the tertian parasite *vivax*.

The situation is not so clear, however, with reference to the *malariae* of Marchiafava and Celli (1885). Their detailed descriptions, case histories, and figures in Plate VI have been critically analyzed by Martin Young, of the National Institute of Health, as follows:

''It seems to me definitely that most of the infections that they saw were *falciparum*. However, they seem occasionally to have run across a *vivax* infection. Some of the descriptions are definitely of *vivax* segmenters while others of the descriptions, especially where they mention the finding of crescents, are definitely *falciparum*.

''The generalized figures on the plate are difficult to identify, with some suggestive of both *vivax* and *falciparum*. The confusion arises from the fact that some of the cases they were looking at were very severe infections of *falciparum*. In such cases, it is not uncommon for the developmental forms of *falciparum* to be found in the blood stream. Therefore, from pictures with so little detail, it is hard to tell whether the forms shown are young stages of *vivax* or older stages of *falciparum*.''

Throughout the paper, Marchiafava and Celli referred frequently to such characteristics of *falciparum* or malignant malaria as the comatose fever, rapid onset of death, remarkable numbers of parasites (especially in the capillaries of the brain), and the presence of crescents. Besides this evidence, it may be noted that their cases originated during a very severe epidemic in Rome and the Pontine Marshes, where *falciparum* is the principal species of malaria.

There seems little doubt, therefore, that *Plasmodium malariae* M. & C. was based mainly on the malignant tertian parasite (*falciparum*). The benign tertian parasite (*vivax*) was seen, but there is no evidence of quartan.

If *malariae* M. & C. be considered to represent one species only, then the malignant tertian form would have to be considered the genotype of *Plasmodium*, in which case *Oscillaria* Lav., *Plasmodium* M. & C., and *Laverania* F. & G. are isogenotypic, all based on the same species (properly called *malariae* Lav. under strict interpretation of the Rules of Nomenclature, but generally known as *falciparum*).

On the other hand, if *malariae* M. & C. be regarded as originally composed of two species, it would then appear that the type has never been restricted to a single entity because the species name has been so long overlooked. Even though the malignant tertian parasite is unquestionably the major basis of Marchiafava and Celli's description, it appears that at this late date considerable confusion could be avoided by restricting the name *malariae* M. & C. to the benign tertian form. If such action were taken, and considering that all the human malaria parasites are congeneric (as they are usually regarded), the name would then be a homonym, and the correct name would be the next valid and available name, hence *vivax* G. & F., 1890 (= *malariae* M. & C., 1885, nec *malariae* Lav., 1881). Thus (1) *vivax* would become the genotype of *Plasmodium* M. & C.; (2) it would not be necessary to suspend the Rules of Nomenclature in order to designate a type for *Plasmodium*; and (3) the status of *Laverania* as a possible generic name for the malignant parasite (if segregated) would not be disturbed.

In order not to complicate any other action by the International Commission on Zoological Nomenclature, formal designation of the above is withheld, and it is presented as a suggestion to be considered as a part of the whole problem.

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### Radioactive Hydrocarbons

In connection with our studies involving Carbon 13, we became interested in the radioactive carbon isotope of long half-life, C 14 (S. Ruben and M. D. Kamen. *Phys. Rev.*, 1941, 59, 349–354). Through the kindness of J. R. Dunning, of Columbia University, we received a small amount of C 14 prepared by bombarding C 13 with deuterons or N 14 with neutrons from the Columbia cyclotron. Subsequently, very much larger quantities prepared in the Oak Ridge uranium pile were made available to us.

Among the various types of radiocarbon compounds prepared were radioactive hydrocarbons. In view of their interest for the study of hydrocarbon reactions, the synthesis of *radiomesitylene* is described herein.

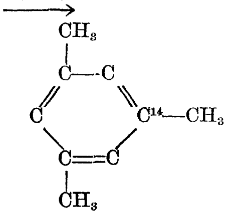
Starting with $BaC^{14}O_3$ the sequence of reactions was the following:

(1) $C^{14}O_2 + CH_3MgI \longrightarrow CH_3 \cdot C^{14}OOH$

(2) $CH_3 \cdot C^{14}OOH + Ba(OH)_2 \longrightarrow Ba(C^{14}O_2 \cdot CH_3)_2$

(3) $Ba(C^{14}O_2 \cdot CH_3)_2 \xrightarrow[500° C.]{vacuum} CH_3 \cdot C^{14}O \cdot CH_3 + BaC^{14}O_3$

(4) $CH_3C^{14}OCH_3 + 2\ CH_3CO \cdot CH_3 \xrightarrow{H_2SO_4}$



This radiomesitylene may appropriately be called *1,3,5-tri-methyl-radio-1-benzene*. The probability of forming the di- and tri-radiobenzene was negligible with our concentration of C 14.

The first three steps gave yields of 94, 100, and 95 per cent, respectively, or an over-all yield of 89 per cent. The 432 mg. of radio-2-acetone thus obtained were diluted with 1.20 gram of ordinary acetone as a carrier and condensed with sulfuric acid essentially according to the procedure in *Organic syntheses* (Collective Vol. I. New York: Wiley, 1941. P. 341), adapted to small quantities. The 296 mg. of distillate were diluted with 865 mg. of ordinary mesitylene as a carrier, purified by preparation and recrystallization of the monosulfonic acid (melting point, 74–75° C.), which was then decomposed with HCl, and steam-distilled. The distillate was finally distilled in a high vacuum over sodium. The product weighed 672 mg. and had a n D/20° = 1.4976, as against a recorded value of 1.4967.

The radioactivity was measured in a thin-window, scale-of-64 Geiger counter. The values obtained, corrected for absorption and geometry, were: for radio-1-acetic acid, $270 \cdot 10^6$ disintegrations per minute and per gram carbon; for radiomesitylene, $6.3 \cdot 10^6$ disintegrations per minute and per gram carbon. The radioactivity of the mesitylene indicates a 10-per cent yield, based on acetone.

Part of the mesitylene was converted into *1,3,5-trimethyl-radio-1-cyclohexane* by catalytic hydrogenation (by W. Fowkes) under pressure in a microbomb.

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# Book Reviews

***The electron microscope: an introduction to its fundamental principles and applications.*** **(2nd ed.) E. F. Burton and W. H. Kohl. New York: Reinhold, 1946. Pp. 325. (Illustrated.) $4.00.**

Prior to the late 1930's the development of the electron microscope was confined to Germany and Belgium, and as a consequence we find that the early books treating this instrument are written in German. The University of Toronto was the first institution on this continent to attempt to duplicate and improve upon the work of the European physicists, and the guiding force behind this successful effort at Toronto is the senior author of the present volume, Prof. Burton. With the exception of certain treatises on electron optics, the first book in English devoted to electron microscopy was the first edition of *The electron microscope,* published in 1942.

In the intervening four years there have appeared in this country two other books on electron optics and microscopy: *Seeing the invisible,* by Gessner G. Hawley, and *Electron optics and the electron microscope,* by Zworykin, Morton, Ramberg, Hillier, and Vance, all of the RCA staff. The former volume is so elementary as to be of interest only to the generally curious and uncritical reader, while the latter is very thorough and mathematically rigorous. The second edition of Burton and Kohl's *The electron microscope* is nicely balanced between these two extremes and should be of use and interest to those whose work is connected with electron microscopy but whose training in mathematics and physics is not advanced. There are many persons working either directly or indirectly with the microscope, or contemplating the use of the instrument, who would like to know enough about it to comprehend its possibilities and limitations but who do not care to become experts in the theory, construction, and operation of such a highly specialized instrument. It is to these persons, as well as to those of training sufficient to afford them a genuinely intelligent curiosity about the electron microscope, that the book is directed.

For the most part the book rearranges and enlarges upon the material contained in the first edition. Electron microscopy has advanced rapidly in America since 1942, and the authors have expanded certain chapters and have written new ones in a conscientious effort to keep up with current research. The chapters on electrostatic lenses and microscopes have been reduced in length, and those on magnetic microscopes have been extended to reflect the relative success in this country of the magnetic type of instrument.

The contents of the book can be reviewed under four major divisions. In the first the principles of geometric and physical optics are developed with particular reference to the compound light microscope and to the meanings of magnifying power and resolving power. In the second division the wave nature of the electron is introduced and discussed, and the fundamentals of electron optics are elaborated. The geometry of the focusing action of electrostatic and magnetic lenses is derived from elementary notions, with constant reference to analogies with the light microscope. The third general division is given to an explanation of the construction and operation of the complete electron microscope, the University of Toronto microscope of 1944 being used as an example. Here the authors may be accused of myopia, since all instruments in use on this continent, with the exception of three, are those made by RCA. A detailed description of the commercially available microscope would have been more generally useful to the readers. In the last section of the book one finds an excellent résumé of the research work which has been done with the aid of the electron microscope. This discussion is ample for a book of this size, and it has been critically written and profusely illustrated with about 50 half-tone plates. As an appendix to the book there is reprinted the bibliography of electron microscopy by Marton and Sass, brought up to date to the end of 1944.