disturbing to the eye than are the breaks in a "dashed" curve in a graph.

Ruckmick's circles are not peculiar to himself. I can confirm him in all that he says, from having seen them many times, but can add a detail or two. It is not necessary to use onion-skin paper, for if the first sheet is rather thin and translucent, the carbon copy is not too pale, and the sheets are on a white background, the white circles are very conspicuous. The formation of an arc depends upon the alinement of spaces between words, and to be noticeable at least four lines are involved, two on the ribbon copy and their two carbon copies. Because of this, the chance of seeing arcs and circles is less with two pages of dissimilar typing than it is with Ruckmick's arrangement. In a half page of double-spaced typing, with every word having 7 or more letters, so that there were only 6 spaces on a line, there were only a few arcs. In another block of single-spaced typing, with an average of 4 letters to a word, the apparent arcs were numerous. On closer inspection they were seen to be practically straight lines, yet giving the illusion of forming broken circles.

When one of the specially typed blocks and its carbon copy are in exact register, the appearance is not unusual. If the ribbon copy is moved straight up or down about 3 mm, so that the lines are parallel to those of the carbon copy and there is no shifting to right or left, the typing will be crossed by a number of white lines at right angles to the lines of typing. Now, with the lines still 3 mm out of register and parallel, a shift of about a millimeter to the right or left will make the white lines slant in the same direction. These two shifts are for pica type and would no doubt be a little less for the smaller elite type.

Another optical effect has often forced itself upon the attention when carbon copies of letters were being handled. The copies are made on thin paper which most persons call green, but which has such a strong blue tone that at times what to call it is doubtful. If one of these sheets is lying in close contact on another on which the carbon copy is quite black, the writing can be seen through the upper sheet. In bright daylight the writing is sometimes quite noticeably red, sometimes reddish brown, or more often of no color to attract attention. For the benefit of those who may wish to think up a reason for this illusion it may be said that a thin smear of carbon black on white paper has a brownish tone, and to overcome this a violet or a red "toner," or sometimes both, must be added to the mixture that forms the coating on the carbon paper.

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DESIGNATION OF LOCATIONS ON MAPS

AN able plea in SCIENCE of February 16, 1940 (91: 169), for "increasing the usefulness of maps" asserted that "relatively few people are accustomed to making any use of latitude and longitude in the interpretation of maps." Doesn't this point to a lack in teaching emphasis?

Why propose new schemes of fractional subdivision in thirds, ninths, etc. (SCIENCE, 93: 68)? Does the superiority of decimal subdivision need further argument? Surely the measurement of two angles (SCIENCE, 93: 523) from the lower left and right map corners involves as much work to arrive at the "typical designation: Lake Nokoni, Rocky Mountain National Park Quadrangle, L 51½°, R 56½°" as does sliding a decimally divided scale along the even ten-minute map coordinate lines and reading as directly and without further computation 40° − 15.8′ N., 105° − 42.6′ W.

It is slight criticism of the almost universally used latitude-longitude subdivisions in degrees (and decimals or) minutes and seconds, that for military purposes an overprint is added to give precise plane rectangular coordinates in addition to the polyconic projection network. Or that geographers in laying out the map of the world on a scale of 1:1,000,000 prefer to designate the Boston sheet as North K 19. Division into "arbitrary regions . . . does not meet present needs," but designation, in hundredths even if warranted, makes minutes of arc as explicit as desired.

When confronted in the field with actual fences marking the quarter section lines, we are painfully reminded that in terms of customary land subdivision Lake Nokoni is in the N.W.¼, of the S.W.¼, of Section 31, of Township 4 North, Range 74 West, in Grand County, Colorado. And if this were farming country local residents may readily tell us in which sections their respective farms lie.

But why do we continue to follow the calf path backwards, just as we continue to address our mail, listing first the things we wish to know last? The postman sorting mail wants to know first the state, second the city, third the street, fourth the number, etc. Possibly that is why we are needlessly confused in trying to locate this particular 40 acres.

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INTERNATIONAL COOPERATION

ON reading Dr. A. V. Hill's essay which appeared in SCIENCE for June 20, 1941, I am led to make one small comment amplifying a parenthetical statement of fact in that article.

Dr. Hill remarks, with reference to the International Union for Mathematics, that "this last no longer exists." I have always understood that this Union lost the effectiveness it might have had and in the end went out of existence (in 1936, I believe) chiefly because the majority of mathematicians did not approve the political origins and development of the Union. However that may be, there is no question that the mathematicians of the world had every reason to be pleased with the effectiveness of that rather informal but close cooperation which, among other things, made possible their successful and important quadrennial international congresses. It would be unfortunate if any of Dr. Hill's readers should draw a contrary inference.

MARSHALL H. STONE

SCIENTIFIC BOOKS

VITAMINS

The Avitaminoses. By WALTER H. EDDY and GILBERT DALLDORF. xii + 519 pages; index, 41 plates and 28 figures. Baltimore: The Williams and Wilkins Company. 1941. $4.50.

THE first four chapters are essentially introductory in character. Chapter I, a very short chapter of eight pages called "Vitamins and Disease," is clearly and sensibly written and is admirably adapted for the orientation of the beginner seeking knowledge about vitamins. Chapter II, "The Chemical Nature of the Vitamins," and Chapter III, "Vitamins and Cellular Oxidation," are concisely and clearly expressed and adapted to the understanding of those pathologists and clinicians without profound knowledge of chemistry. Chapter III is, on the whole, a stimulating and clever job of exposition in outlining the achievements of biochemists in tracing processes involving complex compounds or systems in living tissues. Chapter IV on "Vitamin Requirements" is a seventeen-page condensed account of current information regarding human vitamin requirements, adequately documented.

Chapters V to XXII, inclusive, deal with the nature and functions of the various vitamins and the pathologic states arising from vitamin deficiencies.

Each chapter devoted to the nature and functions of a vitamin is succeeded by a chapter dealing with the respective avitaminosis as naturally occurring in man and animals, and as produced experimentally. The chapters on the avitaminoses contain very fair historical accounts of each subject and quite detailed clinical and pathological descriptions.

This arrangement or plan of the book, while a bit clumsy and leading to some unnecessary repetitions, is, on the whole, a very satisfactory device for covering a wide range of factual knowledge in an interest-sustaining manner. In the vitamin B group, pairs of chapters deal with vitamin B_1, vitamin B_2 or G or riboflavin and vitamin P-P or nicotinic acid, the anti-human pellagra—the anti-black tongue factor for dogs. "The nature and function of other members of the B-complex" and "Deficiency diseases related to the vitamin B complex" are covered in Chapters XI and XII—both rather brief though documented by satisfactory bibliographies. These two chapters require careful reading and seem less well done than those dealing with other vitamins, in part due to great condensation by the authors and in part due to the present undeveloped stage of knowledge, but on the whole they suffice to acquaint the reader with what is known about the subject-matter. Part I concludes with Chapter XXIII on "The Vitamins and Infectious Diseases," happily a short chapter, a bit speculative and not sufficiently analytical in appraisal of work cited.

Part II of the book, a total of thirty-eight pages, consists of Appendix A, on "Laboratory Tests Useful in the Diagnosis and Study of Deficiency Disease," and Appendix B, on "The Vitamin Content of Foods."

The procedures discussed in Appendix A do not represent a critical selection from the methods now available but are those, as stated in the preface, with which the authors have had experience. An expansion of this appendix with a good bibliography covering the field would have increased the value of the book.

Appendix B is composed of an impressive array of tables and apparently is adequately documented.

This book—"planned to be a helpful manual rather than a complete treatise"—achieves its purpose admirably in presenting "the field from clinical, chemical and pathological points of view." A critical reading of the book reveals many minor defects and gives the impression of having been hastily put together, somewhat carelessly in places, but nevertheless, with great ingenuity. As a compilation of factual knowledge, it is an outstanding book on the avitaminoses. As a scientific review it is inadequate in places and gives indication of the personal interests and biases of the authors.

The minor defects referred to could have been eliminated by careful reading of the manuscript by an intelligent secretary. The illustrations of the pathology, had the authors been willing to go beyond their personal work more freely, could have been much better chosen. It is to be hoped that in future editions