THE YEAR BOOK *of* UROLOGY

(1959-1960 YEAR BOOK *Series)*

EDITED BY

WILLIAM WALLACE SCOTT, M.D., PH.D.

Director, James Buchanan Brady Urological Institute, The Johns Hopkins Hospital; Urologist-in-Charge, The Johns Hopkins Hospital; Professor of Urology, The Johns Hopkins University School of Medicine

THE PRACTICAL MEDICINE YEAR BOOKS

This volume is one of the 15 comprising the Practical Medicine Series of Year Books founded in 1900 by G. P. Head, M.D., and C. J. Head, and published continuously since then. The complete list follows:

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INTRODUCTION

In previous years, I have presented to you an introductory article, written by myself or one of my associates, which dealt with various subjects, including visits with urologists in foreign lands, reviews of advances in our chosen field, reviews of research in our laboratory, and so on. This year, I find that none of us has journeyed outside the continental United States, that the abstracts contained within this book serve admirably to keep you abreast of current advances, that research from our laboratory during the year has either been published or is not far enough along to justify conclusions, etc. Hence, I thought it best to forgo the writing of such an article, and to simply write a few lines telling you something of how your YEAR BOOK is produced and to enlist your support in making it better.

As you know, each YEAR BOOK bears a designation, "such and such Series," this one "1959-1960 Series." Articles for the current book were selected from journals published between October 1, 1958 and September 30, 1959—October to October constituting our fiscal year. Beginning in January of each year, I am sent a batch of articles for review. Each batch contains several hundred articles from the world literature. Six batches are received at intervals of about 6 weeks. Roughly 50 articles are selected from each, making a total of somewhat more than 300 for the year. These are then abstracted by the staff of Year Book Publishers and returned to me for comment. They are then arranged under suitable headings and returned to Year Book Publishers for further editing, typesetting, proofreading and printing.

The growth of medical literature has been tremendous. This fact has placed a heavy burden on Year Book Publishers, but they have handled it in wondrous fashion. Without question, journal coverage has been excellent. However, the selection of subject matter has been largely my concern and in this matter and others I wish to enlist your help. Perhaps there are fields of interest in Urology which you feel are being slighted or neglected, or fields which are overemphasized.

With the increasing complexity of Urology, and the many disciplines which it embraces, it is becoming more difficult to comment intelligently on all articles. Whereas I have relied heavily on the publications and comments of many of my friends and associates to help me write proper editorial comments, I believe that this aspect of the book can be improved. Consequently, in making plans for the next YEAR BOOK, I propose to rely even more heavily on urologists with special interests to help me keep us all abreast of the times. So don't be surprised to receive a letter from me during the next 10 months asking for your views on a subject of special interest to you. Your cooperation will be greatly appreciated, your contributions properly acknowledged, and this teaching mechanism—the YEAR BOOK—will better serve its purpose.

Lastly, if an outstanding article appears in a journal which you think is obscure, by all means let me hear from you. A note from you will help me and your publisher make this more *your* YEAR BOOK.

WILLIAM WALLACE SCOTT

GENERAL CONSIDERATIONS

Examination of Urine

Cell Counts in Urine. William T. Wright[1] (Boston) made 500 correlations between cell counts of the urine sediment prepared in the usual fashion and simultaneous cell counts of the whole urine by use of the counting chamber. It ap-

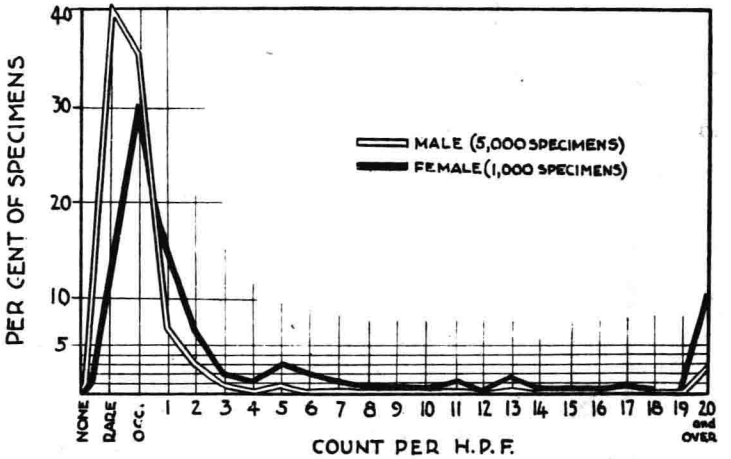

Fig. 1.—Incidence of white blood cells in urine specimens. (Courtesy of Wright, W. T.: A.M.A. Arch. Int. Med. 103:76-78, January, 1959.)

peared that Addis' figures must correspond to 1 or 2 white cells per high power field and to 1 red cell to every 2 or 3 high power fields, which the author termed "occasional." This correlation was confirmed by cell counts in the sediments of 5,000 consecutive specimens from men and 1,000 consecutive specimens from women who were insurance applicants.

Insurance experience indicates that most of these specimens would have to be normal. Since clinical correlation was impossible, it was postulated that a sharp break in the pattern might mark a limit for normal. Such a break does

(1) A.M.A. Arch. Int. Med. 103:76-78, January, 1959.

occur for white cells (men and women) at about 1 or 2 cells per high power field and for red cells (men and women) at occasional. The breaks, however, are not wholly complete but fade through an equivocal range of several cells per

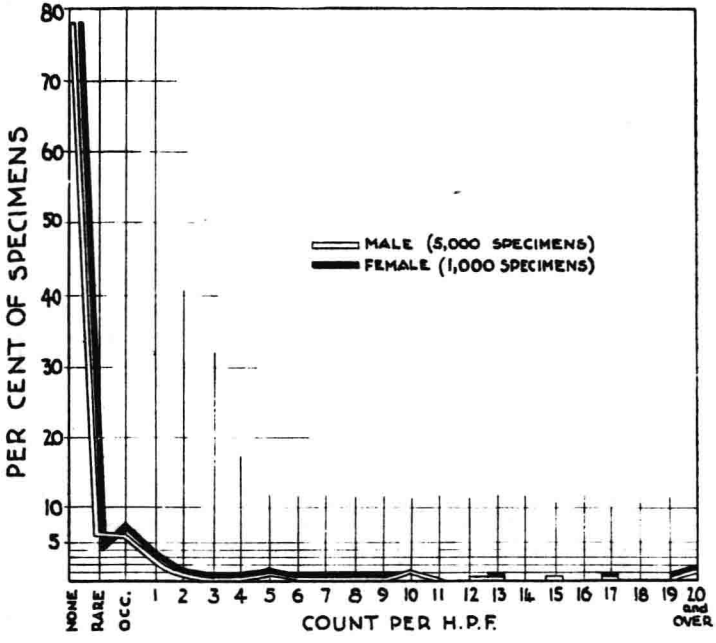

Fig. 2.—Incidence of red blood cells in urine specimens. (Courtesy of Wright, W. T.: A.M.A. Arch. Int. Med. 103:76-78, January, 1959.)

high power field, more obvious with respect to white cells in the urine of women.

Figures 1 and 2 show the breaks dramatically, though the small scale minimizes the fade-out areas. In Figure 1, a slight rise at 5 cells per high power field has no significance; it is merely an artifact resulting from an unsuspected idiosyncrasy, a habit of reporting 4-6, which averages 5. A similar artifact occurs in Figure 2. In this chart it appears that despite a significant break most specimens show no red cells at all. However, the break occurs after occasional cell.

► [It has been the experience of many that Addis' method is too cumbersome for general use. In the simplified method advocated in this article,

15 ml. urine is centrifuged for 5 minutes at 2,000 rpm, the supernatant poured off, the sediment shaken up and 1 or 2 drops poured onto a slide, covered with a 7/8 in. cover glass and examined under high dry power. Ed.]

Simultaneous Separation and Concentration of Corpuscular Elements and Bacteria from Human Urine by Means of New Type of Centrifuge is described by Selahaddin Rastgeldi[2] (Karolinska Hosp., Stockholm).

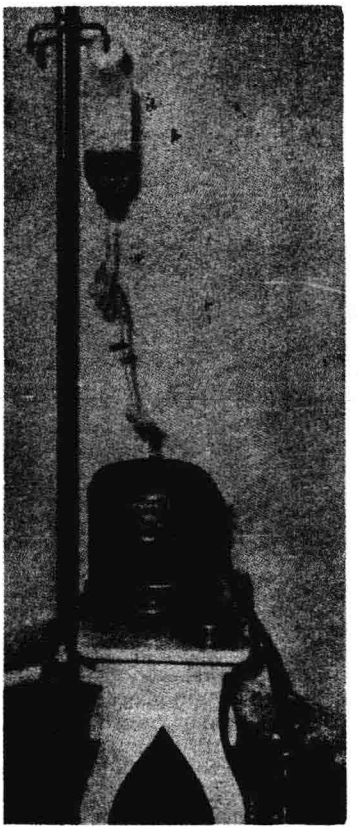

Fig. 3.—Arrangement for collection and continuous centrifugation of urine. At 6,000-8,000 rpm ordinary urine sample is centrifuged within few minutes. Capacity of 20-30 L./hour can be attained. Urine cleared of solid particles can be collected in bottle connected to outlet of centrifuge. After centrifuging of sample, tubing is removed from rotor and its proximal end can be used for cytologic examination and distal end, showing thin, semitransparent film on peripheral wall, for bacteriologic examination. (Courtesy of Rastgeldi, S.: Acta chir. scandinav. 116:315-324, 1958-59.)

(2) Acta chir. scandinav. 116:315-324, 1958-59.

Apparatus.—The centrifuge is based on a new principle. A suspension is run continuously through many intercommunicating shallow centrifuge tubes arranged perpendicular to and/or coaxial with the center of rotation. A channel communicating with the center of the centrifuge rotor is obtained by laying a length of plastic tubing in a spiral or circular groove or winding it around a coaxial cylinder. The peripheral wall of the groove or the inner wall of an outer casing (depending on the construction of the centrifuge) is provided with a number of ridges or thresholds. These ridges press the corresponding points on the peripheral wall of the tubing toward the center and thus divide the tubing into many chambers or compartments, corresponding to many intercommunicating shallow centrifuge tubes. When a suspension is continuously run through any one of the models, the heavier and larger particles sediment at the beginning of the tubing and the lighter and smaller particles are carried further away and deposited more distally or peripherally. The rotors contain many chambers or compartments and are constructed so that no particles escape from the peripheral open end of the tubing. All particles are caught and differentiated within a short time. The capacity of any model is not limited by the volume of a suspending agent, but only by the volume of the suspended particles. For the same reason, the concentrating capacity is unlimited.

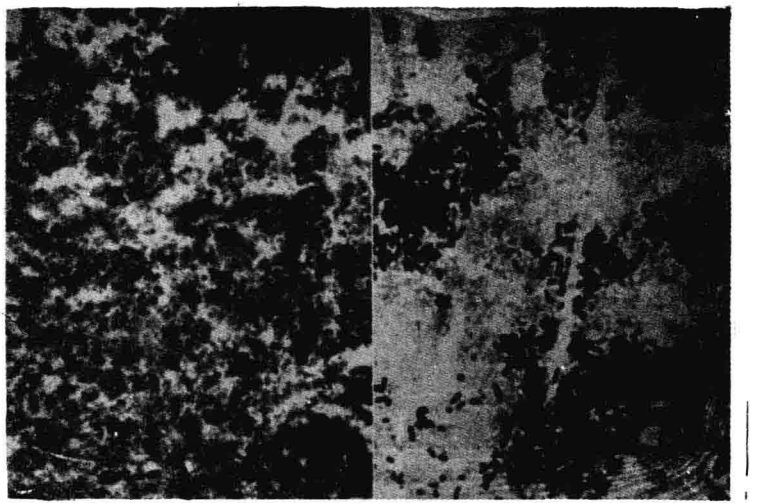

Fig. 4.—Case of papillitis necroticans; 300 ml. lightly turbid urine centrifuged without dilution. *A*, proximally, only deteriorated cells and cell remnants; reduced from ×240. *B*, distally, abundant gram-negative bacilli; reduced from ×1500. (Courtesy of Rastgeldi, S.: Acta chir. scandinav. 116:315-324, 1958-59.)

TECHNIC.—After placing a length of empty, clean, plastic tubing in the rotor, the centrifuge is started and all or part of a urine sample is run through the tubing. The ideal way for collecting and separating cells and bacteria from human urine is to let the patient void urine directly into a funnel connected to the centrifuge in operation (Fig. 3). The author collected urine samples in sterile bottles that were transported to the laboratory as soon as possible. After the urine sample is centrifuged, the tubing is removed from the rotor and cut into pieces corresponding to one or more chambers or compartments. These pieces are then cut longitudinally in the proximal segments, the sediment is exposed and mixed with a small amount of a mixture of 50% fresh egg white and 50% glycerin and a slide is made, fixed and stained by Papanicolaou's method. In the distal segments where free bacteria are found, Gram's or Ziehl-Neelsen stain may be used.

Some microscopic findings are illustrated in Figure 4.

► [Separation and concentration of cells from different body fluids is of the utmost importance in exfoliative cytology.—Ed.]

Urinary Osmolality and Specific Gravity were studied by L. C. Isaacson[3] (Univ. of Pennsylvania). Though urinary osmolality is a more exact method than specific gravity for measuring the concentrating power of the kidney, correlation between the two is close enough to insure continued use of specific gravity in everyday clinical medicine, if not in the laboratory.

Urine is largely a solution of common inorganic salts, urea and small amounts of other organic matter. The last fraction accounts for only 20-30% of the total specific gravity. As the inorganic salts ionize readily, the osmolality of a urine sample is determined largely by the concentrations of these salts. The relation between osmolality and specific gravity was determined for each of a number of dilutions of the common urinary inorganic salts, urea and glucose (Fig. 5). Within the limits shown, the osmolality-specific gravity ratio remains constant for all salts, regardless of their concentration. The osmolality of a urine sample can thus be regarded largely as the sum of osmolalities of individual solutions of the various inorganic salts and urea.

Urinary specific gravity is invalid as measure of renal concentrating power in presence of glycosuria. The sameness of the specific gravity of plasma ultrafiltrate and urine in chronic renal insufficiency can be recognized as fortuitous. As individual osmolality-specific gravity ratios differ greatly

(3) Lancet 1:72-73, Jan. 10, 1959.

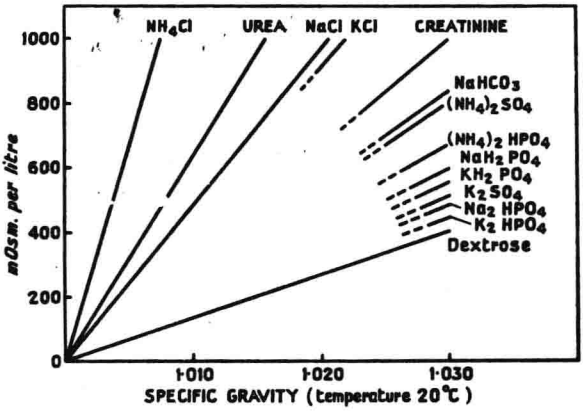

Fig. 5.—Specific gravity (temperature 20 C.). (Courtesy of Isaacson, L. C.: Lancet 1:72-73, Jan. 10, 1959.)

only at high concentrations, the proportion of one salt to another can differ considerably without much affecting the final specific gravity in mixtures with a total osmolality of 300-400 mOsm./L. or less. This is particularly so when NH_4 and urea are present in low concentration, as in the urine of patients with renal insufficiency. The "fixed" specific gravity of such a urine and its closeness to the specific gravity of plasma ultrafiltrate are therefore no indication of chemical similarity or proof of its "glomerular-filtrate-like" composition.

► [Osmolality-specific gravity ratios provide a better understanding of some apparent discrepancies between urinary osmolality and specific gravity.—Ed.]

Urinary Specific Gravity Versus Total Solute Concentration; Critical Comparison: I. Studies in Normal Adults were carried out by Edgar J. Schoen, George Young and Arthur Weissman[4] (Oakland, Calif.). The measurement of urinary specific gravity as an indication of renal concentrating and diluting ability is valid only as it reflects urinary total solute concentration (osmolarity). In normal subjects without glycosuria or proteinuria, the urinary specific gravity in the high range (above 1.020) reflects well the urinary osmolarity and represents a urinary total solute concentration above

(4) J. Lab. & Clin. Med. 54:277-281, August, 1959.