sixth as strong. A number of physicians are attempting to treat patients with radium too weak in quality and too small in quantity to be efficient, and this will doubtless tend to discredit this new therapeutic agent.

2. The radium should be placed in a capsule, covered with lead except on one side, which is at the end of a long handle, as a protection to the physician. The capsule, over which a clean rubber cot, for each patient has been drawn for purposes of cleanliness, should then be passed slowly over the area to be treated or held over the special place for one half to three and sometimes four minutes. The exposure should be made from one to three times a week; less often after healing has begun.

3. The remedy must be used with sufficient courage to obtain results, but with care to avoid harm, for a remedy that is of any value is a two-edged sword and requires judgment and experience in its use.

When patients learn to come very early for treatment, the results should, I believe, be even more satisfactory than those obtained during the past five years. During this time cases of long duration and considerable extent have done well, but obviously we may fairly expect that healing will be more prompt and take place in a larger proportion of cases, when the more suitable, especially the early cases, are submitted to this treatment and operation or other treatment advised for those in which radium is unsuitable.

I have compared the therapeutic value of the x-rays and radium and have shown that in its own particular field radium has an advantage over the x-rays; on the other hand, radium has no value in diagnosis; but lest your minds should be diverted by the use of the x-rays in treatment from their wider usefulness in diagnosis, let me say in this connection that not only for surgical but more emphatically for medical diagnosis, particularly in diseases of the thorax, the x-rays are of great value and importance.

AN ACCURATE RAPID METHOD FOR THE QUANTITATIVE DETERMINATION OF CHLORINE IN THE URINE. A CRITICAL STUDY OF THE SHORT METHODS IN VOGUE.

BY HARRY W. GOODALL, M.D., BOSTON.

SEVERAL quantitative tests for chlorine in the urine have been devised, but chemists have only recognized the Volhard or modification of the Volhard method as accurate.

For clinical purposes the time consumed in a single determination, fifteen or twenty minutes, is a serious objection to the Volhard methods. The following determinations were made in order to test the applicability of the short methods that have been devised, control tests being made in each case by Arnold's modification of Volhard's method.

Normal urines, urines of normal individuals on a salt-free diet and the urines of chronic nephritis, containing only the slightest possible trace of albumen, were selected for the series. The

Purdy method of centrifugalization, Sutton's method and Newhavers-Salkowski's method were intentionally omitted; they require as much time for the determination as the Volhard method.

The rough silver chloride test. — The rough method of adding one drop of AgNO_3 (1:8) to a urine acidulated with HNO_3 , estimating by the compactness of the precipitated ball of silver chloride whether the chlorine is normal or diminished, cannot be applied quantitatively with any degree of accuracy, and even as a rough method it is to be condemned since the results depend upon the per cent of chlorine present in the urine rather than upon the total chlorine present in twenty-four hours.

Direct titration of diluted urine with standard silver solution. — The direct titration of a known amount of urine, acidulated with HNO_3 and diluted with water, with a standard solution of AgNO_3 until no further precipitate formed was found to be impractical as the end point could not be determined with any degree of accuracy.

Mohr's method. — Mohr's method, in which a solution of potassium chromate is used as an indicator, was found to give too high values, due to the fact that other substances which may be present in the urine are precipitated out. The results are still too inaccurate to be of value if, as has been suggested, we subtract 1 ccm. from the total amount of the silver nitrate solution used. The fact that the end point is not a sharp one would make this method undesirable even though this objection did not exist.

For comparison the results by this method are tabulated at the end of the paper, as well as those of the following method.

Rapid determination by Arnold's modification of Volhard's method. — The direct titration with Arnold's solutions without removing the silver chloride by filtration, the step which consumes most of the time necessary for the determination, can be performed in two or three minutes. The end point is so sharp and the error so small that this method can be recommended as sufficiently accurate for all clinical purposes.

The method is described in full.

Three solutions are necessary:

1. AgNO_3 solution. Dissolve 29.075 gm. of pure crystalline AgNO_3 in 1 liter of distilled water. One cubic centimeter of this solution precipitates 0.01 gm. NaCl .

2. Ammonium sulphocyanate solution. Dissolve 12.9 gm. of ammonium sulphocyanate in 1 liter of distilled water. One cubic centimeter of this solution equals approximately 1 ccm. of the AgNO_3 solution (Solution 1).¹

¹The accurate strength of this solution should always be determined by standardizing it with the silver solution in the following manner: To 10 ccm. of Solution 1 in a small beaker add 20 or 30 drops of concentrated HNO_3 , 30 to 50 ccm. distilled water and 2 ccm. of the indicator, Solution 3 (cold saturated iron ammonium alum solution). Titrate with the ammonium sulphocyanate solution until a permanent brown color develops, which marks the end point. This should be done at least three times and the average taken, that the error may be as small as possible.

If 12 ccm. of Solution 2 is required to precipitate 10 ccm. of Solution 1, the sulphocyanate solution is weaker than the silver solution, and in actual chlorine determination the solutions must be reduced to terms of equality. This is done by multiplying the number of cubic centimeters of the sulphocyanate solution used by the factor. This factor is determined by dividing 12 by 10 and in this particular example equals 1.200. When these solutions are kept for some length of time they should be occasionally standardized in this manner.

3. Cold saturated solution of iron ammonium alum as the indicator.

To 10 ccm. urine in a small beaker add 20 to 30 drops HNO_3 and 30 to 50 ccm. of distilled water.

An excess of the standard silver solution (No. 1) is now slowly added from a burette, stirring constantly with a glass rod. It is usually safe to add

20 ccm. of this solution but with low chlorine values; 10 ccm. are sufficient.

With a little experience one can judge from the amount of white silver chloride precipitated whether 10 ccm. or 20 ccm. should be added. Two cubic centimeters of the indicator (Solution No. 3) are now added.

ARNOLD'S MODIFICATION OF VOLHARDT'S METHOD.						MOHR'S METHOD.		
Urine. Ccm.	WITH FILTRATION.		WITHOUT FILTRATION.		Error in Gm.	Ccm. AgNO_3 .	Gm. Cl.	Error in Gm.
	Ccm. AgNO_3 .	Gm. Cl.	Ccm. AgNO_3 .	Gm. Cl.				
4,090	10.5	25.7	10.6	26.0	+0.3	11.1	27.2	+1.5
2,200	8.0	10.5	8.1	10.6	+0.1	8.8	11.5	+1.0
1,400	12.2	10.2	12.2	10.2	0.0	13.3	11.1	+0.9
1,640	11.2	11.0	11.1	10.9	-0.1	11.5	11.3	+0.3
1,350	9.8	7.9	9.9	8.0	+0.1	10.6	8.5	+0.6
1,900	10.5	11.9	10.7	12.1	+0.3	11.2	12.7	+0.8
920	16.0	8.8	16.0	8.8	0.0	16.5	9.1	+0.3
3,470	6.7	13.8	6.8	14.1	+0.3	6.9	14.3	+0.5
1,750	9.9	10.3	10.0	10.5	+0.2	10.2	10.7	+0.4
1,500	9.2	8.2	9.1	8.1	-0.1	9.9	8.9	+0.7
2,820	3.0	5.0	3.1	5.2	+0.2	3.2	5.4	+0.4
1,750	7.0	7.2	7.0	7.2	0.0	7.8	8.1	+0.6
2,505	4.3	6.4	4.2	6.3	-0.1	4.5	6.7	+0.3
1,460	8.4	7.3	8.5	7.4	+0.1	9.1	7.9	+0.6
2,625	3.6	5.6	3.5	5.5	-0.1	3.3	5.1	-0.5
1,570	5.0	5.2	5.1	5.3	+0.1	5.5	5.1	+0.8
2,820	3.0	5.0	2.9	4.9	-0.1	3.9	5.9	+0.9
950	12.1	6.8	12.1	6.8	0.0	13.2	7.3	+0.5
1,200	7.8	5.6	7.8	5.6	0.0	8.4	6.0	+0.4
1,530	5.6	5.1	5.7	5.2	+0.1	5.4	4.9	-0.7
1,310	6.6	5.1	6.7	5.2	+0.1	7.3	5.7	+0.6
1,720	5.3	5.4	5.2	5.3	-0.1	5.5	5.6	+0.2
1,770	7.5	7.9	7.4	7.8	-0.1	8.7	9.1	+1.6
5,520	1.8	5.9	1.7	5.6	-0.3	2.2	6.8	+0.9
1,530	5.6	5.1	5.7	5.2	+0.1	6.2	5.6	+0.5
1,680	5.2	5.3	5.2	5.3	0.0	5.8	5.7	+0.4
1,340	7.3	5.8	7.3	5.8	0.0	6.8	4.8	0.0
4,600	0.5	1.3	0.5	1.3	0.0	0.4	1.1	-0.2
3,720	2.2	4.9	2.3	5.1	+0.2	2.8	6.0	+1.1
4,050	0.5	1.2	0.5	1.2	0.0	0.8	1.9	+0.7
3,210	1.8	3.5	1.9	3.6	+0.1	2.0	3.8	+0.3
3,510	0.6	1.2	0.6	1.2	0.0	0.4	0.8	-0.4
3,940	1.6	3.7	1.5	3.5	-0.2	1.7	4.0	+0.3
3,210	1.5	2.8	1.4	2.7	-0.1	2.0	3.8	+1.0
2,650	2.6	4.2	2.6	4.2	0.0	2.6	4.2	0.0
2,445	3.1	4.5	3.0	4.4	-0.1	2.7	3.9	-0.6
2,775	3.0	4.8	3.0	4.8	0.0	2.7	4.5	-0.3
2,535	3.1	4.7	3.1	4.7	0.0	3.6	5.4	+0.7
2,475	3.1	4.5	3.2	4.7	+0.2	4.5	5.1	+0.6
1,810	1.3	1.4	1.3	1.4	0.0	2.0	2.1	+0.7
1,400	1.3	1.1	1.1	0.9	-0.2	1.9	1.5	+0.4
670	2.6	1.0	2.6	1.0	0.0	3.4	1.3	+0.3
510	7.3	2.3	7.3	2.3	0.0	7.8	2.4	0.1
5,280	1.4	4.4	1.3	4.2	-0.2	1.7	5.3	+0.9
1,000	5.3	3.1	5.4	3.2	+0.1	5.8	3.4	+0.3
920	7.8	4.3	7.8	4.3	0.0	8.0	4.4	+0.1
3,750	1.5	3.3	1.4	3.1	-0.2	1.6	3.6	+0.3
980	7.8	4.6	7.7	4.5	0.1	7.8	4.6	0.0
3,190	0.5	0.95	0.6	1.14	+0.19	0.6	1.14	+0.19
360	0.2	0.43	0.3	0.64	+0.21	0.4	0.84	+0.41
1,340	0.6	0.48	0.8	0.64	+0.18	1.1	0.88	+0.40
1,190	0.9	0.64	0.9	0.64	0.00	0.7	0.49	-0.15
1,250	0.6	0.45	0.7	0.52	+0.07	0.9	0.67	+0.22
1,730	0.6	0.62	0.6	0.62	0.00	1.1	1.14	+0.52
1,360	0.3	0.24	0.4	0.32	+0.08	0.6	0.48	+0.24
1,540	0.3	0.27	0.5	0.46	+0.19	0.5	0.46	+0.19
1,400	0.2	0.17	0.3	0.25	+0.08	0.5	0.42	+0.25
3,180	0.2	0.38	0.2	0.38	0.00	0.4	0.76	+0.38
3,120	0.2	0.37	0.3	0.56	0.19	0.3	0.57	+0.20
3,750	0.2	0.45	0.2	0.45	0.00	0.3	0.67	+0.22

Titrate from a burette with the ammonium sulphocyanate solution (Solution No. 2), stirring with a glass rod. This precipitates the excess of silver nitrate. A permanent brown tint due to iron sulphocyanate marks the end reaction.²

Of the 60 urines examined in the table on the previous page the variation by this method when present is so small as to practically fall within the limits of error in technic.

MYSTICISM AND MEDICINE.

BY JOHN E. DONLEY, M.D., PROVIDENCE,
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WHATEVER opinion one may entertain concerning the uses and abuses of psychotherapy, its widespread influence upon contemporary thought is obvious. Indeed, it may be said with truth that we are already in a fair way to behold that "beautiful word Psychotherapy" supplant completely its ancient predecessor derived from the Greek. Among physicians there is manifest a dignified interest inspired by a becoming conservatism, while among the laity and some of the clergy the subject has become a veritable obsession, characterized more often by the zeal and vigor of its propaganda than by the profundity of its wit. Intermingled with some sound reason and practical good sense appears a vast amount of more or less pompous inanity togged out in the suits and trappings of psychology and tending most assuredly to obstruct the progress and to interfere with the legitimate province of scientific medicine. As was to be expected in a thing so human, the extremists have long since appeared in battle array: on the one side those who can see little, if anything, in psychotherapy; on the other, those who profess to see everything in it. The former proclaim with some animation (as though warmth of utterance can ever make up for solidity of argument) that "psychotherapy is as old as the hills," a most delicately graceful, because doubtless unconscious, compliment to its complete modernity. The hills are quite perennially new. Those of the other extreme would lead one to think psychotherapy the discovery of the present age, a more than presumptive bit of evidence that it is probably very old. For in philosophy and morals and religion there is scarcely anything fundamentally recent. Even Protagoras was a pragmatist and the young-oldest member of our most fashionable philosophic set. The spectacle is interesting, not a little perplexing and well worth one's efforts at orientation, which ought to result, if experience be any criterion, in producing yet further confirmation of that wise old Roman's saying, "*In medio stat virtus.*"

Man is an incurable mystic; he is also an incurable rationalist. By preference he is mystical,

² The calculation is performed as follows:
Assume the twenty-four-hour amount of urine to be 1,500 ccm. To 10 ccm. of urine, 20 ccm. of the silver solution (Solution No. 1) and 12 ccm. of the ammonium sulphocyanate solution (Solution No. 2) of the strength previously mentioned (factor 1,200) have been added. Then $12 \times 1,200$ reduced this solution to the equivalent of the silver solution and equals 14.4 ccm. Then $20 - 14.4 \times .01 \times \frac{1}{100} = 8.4$ gm. NaCl.
1 gm. NaCl contains 0.6065 gm. Cl.; therefore, $8.4 \times 0.6065 = 5.09$ gm. chlorine.

by compulsion rationalistic; sometimes one, sometimes the other, on occasion both; and in proportion to the quantity and quality of these ingredients in his complex personality will he admire Mr. Wordsworth and St. Augustine or Mr. Herbert Spencer and Prof. Ernest Haeckel. So that in practical life we may divide men roughly into the mystics and the rationalists. Each of these, if he be sincere, will live his own life in his own way and is not unlikely to misjudge the aims and misunderstand the motives of the other. Since, also, life implies motion, and motion necessarily demands movement toward something, we should expect to find the mystic traveling toward the object of religion and the rationalist headed straight for exact science. Furthermore, we ought to count more mystics than rationalists, because both in phylogenetic and in ontogenetic development the mystical sense is anterior to discursive reason. Now some such thing as this we do actually observe in the society about us, and hence it is not difficult to understand why a religious movement like that embraced under the contemporary name of psychotherapy should appeal immediately and widely to the popular mind; for this psychotherapy as practiced by the clergy is, in its last analysis, a form of mysticism. There is thus a certain ambiguity attaching to the word "psychotherapy." As the name of a religious movement it means one thing and as the name of a scientific procedure it signifies quite another and a different thing. While there is no necessary antagonism between the two, nevertheless the use of the same word with a different connotation is a sin against the most elementary canons of logical method. It has led in the past, and in the future is bound to lead, to confusion and misunderstanding. Nay more, signs are not wanting that it may lead to loss of temper, with crimination and recrimination. Physicians, in the nature of things, will not understand, nor will they extensively practice, mystical psychotherapy; clergymen, as a class, will not practice, nor will they understand, scientific psychotherapy.

In attempting thus to distinguish somewhat sharply between two varieties of so-called psychotherapy, no one is more conscious than the writer of their mutual relations and possible usefulness, one to the other, when there is question of their practical application in concrete daily life. Human personality is not a mere mechanical aggregate of unrelated elements; it is an organic unity endeavoring to consummate certain more or less conscious interests and purposes. But when we have granted so much we have by no means admitted that in so far forth as man is a social being requiring assistance he should look for this assistance solely to one source. Life is too complex for that; and hence we have of necessity a division of labor. When man's interest is legal, he seeks the advice of a lawyer; when it is medical, he goes to a physician; when it is ethical or religious, he asks the sympathetic co-operation of the clergyman. The very breadth and profundity of the knowledge required of each precludes the