The knowledge of the specific gravity of a few ounces of urine is a matter of little value. To render the observation in any way serviceable, the whole quantity passed in the 23 hours must be collected and mixed, and the specific gravity of a small amount of this taken. A rough estimation of the solid matters passed may be made from the specific gravity in the following way; the two last figures are multiplied by 2 (in diabetes by 2·33) which gives the amount of solid matters in a 1,000 parts of urine; if, for exemple, the specific gravity of the urine be 1,020 1,000 grains of urine will contain 2 × 20 *i.e.* 40 grains of solids.

Clinical Import Sugar in the urine is the most common cause of a high specific gravity; if this substance be not present, excess of urea will be the probable cause.

A low specific gravity, below 1,010 occurs after fluid has been ingested in quantity. A low specific gravity is also noticed frequently in chronic Bright's disease, in hysteria, immediately after the paroxysm, in anæmic conditions, and in diuresis from any cause, such as mantal emotion, or exposure to cold.

A high specific gravity with a pale colour, and a low specific gravity with a deep tint, are equally signs of disease.

A new urinometer should be carefully tested since those sold by the instrument makers give results, varying as much as 10 or 12 degrees. The urinometers in common use in Hospitals are very rarely correct.

REACTION.

The urine is almost always secreted acid, thought it may become alkaline within a very short time of emission. In the majority of cases in which the urine is said to be alkaline. as in paraplegia and cystitis, the alkalinity is really due to decomposition after being passed. If the urine, then, be found to be alkaline, a fresh specimen should be tested immediately after it has been voided. In cases of retention, the urine sometimes becomes alkaline in the bladder; and, in health, can be made alkaline, by the administration of drugs.

The urine is rarely neutral to test paper; so that many observers have denied its occurrence. Occasionally the urine as an equivocal reaction, reddening to reddened litmus paper.

The cause of the acid reaction of the urine is the presence of the acid phosphate of soda; and according to some observers, of free lactic and hippuric acids. Very shortly after emission, the acidity increases, and lasts, in health, for days, free uric acid being often deposited.

Sooner or later however, the alkaline fermentation sets in, and the urine becomes ammoniacal and fœtid from the conversion of urea into carbonate of ammonia, and the formation of sulphide of ammonium, while the phosphates and the urate of ammonia are deposited as a white sediment.

Clinical Import. The acidity of the urine is decreased during digestion, and increased by fasting or perspiration. A very acid, high-coloured urine is associated with the "uric acid diathesis."

Alkalinity of the urine is nearly always due to decomposition of the urea into carbonate of ammonia. It is frequently present in some diseases of the spinal cord, and in chronic affections of the bladder and urinary organs, as a few drops of urine, which has undergone the alkyline fermentation, will rapidly produce the same change in perfectly fresh urine.

When the alkalinity is due to ammonia, the brown colour of the turmeric disappears whe the paper is exposed for some time to the air, or gently heated; but the change from yellow to brown is permanent, if the alkalinity be owing to either potash, or soda.

EXAMINATION FOR ALBUMEN.

This is the first and most important step in the chemical examination of the urine; the presence or absence of albumen must always be determined before proceeding to test for any other substance, and the search much never be omitted in the examination of any urine.

The best way of testing for albumen, is to fill a test tube about two-thirds full of the urine to be examined, and to heat the upper layer of the fluid over the flame of a lamp, the lower end of the tube being held between the thumb and forefinger of the observer. By employing this method, two strata of fluid are obtained for comparison.

The heat is applied until the upper portion of the urine begins to boil, for although albumen, when in large quantity, coagulates far below boiling, yet the presence of a small quantity gives no precipitate below 212° F. The bottled stratum of fluid should now be carefully compared with the cool layer in the lower part, by holding the test tube against the light; if any cloudiness or opacity be seen, it must not at once be concluded that albumen is present; but a drop or two of dilute nitric acid should be allowed to flow gently down the side into the urine; the cloud is permanent, if due to albumen; but disappears immediately if due to the earthy phosphates. This addition of acid after boiling should never be omitted, since the most practised eye cannot distinguish, by appearance only, between the cloud produced by albumen, and the phosphate of lime.

Cautions. (*a.*) The addition of the nitric acid not unfrequently carries down some of the coagulated albumen into the unboiled laper of urine, and thus causes the cloud to be less thick than before; such an appearence is never produced by phosphates; when they are the cause of the turbidity, the urine becomes absolutely clear, as before boiling; slight brown coloration only, occurring from the addition of the nitric acid.

(*b.*) Should the urine be turbid from the presence of urates, it quickly becomes clear on the application of slight heat; and as it is desirable before testing for albumen to have a clear solution, the whole of test tube should be passed two or three times through the flame of the lamp, until the urates are dissolved; the upper stratum of the urine should then be boiled, and compared with the lower, as above.

(c.) If the urine be neutral or alkaline at the time of testing, the albumen will not be precipitated by heat; the acid reaction must therefore be restored