and a deposit occurs. Uric acid, creatinine, and other constituents, may occasion this. But this is very different, and cannot be mistaken for the orange or red suboxide or copper which is quickly precipitated when diabetic urine is tested.

Phenylhydrazin Test.—Since the elaborate researches upon the sugars by Emil Fischer, this test has come into prominence. It is considered reliable for the purpose of distinguishing urine containing traces of sugar from those containing excessive amounts of other reducing bodies, such as uric acid, etc. As modified by Richter, this test is as follows: Phenylhydrazin hydrochlorate, 2 parts; sodium acetate, 3 parts; water, 20 parts. Mix equal volumes of the urine, and test and digest for 1 hour on a water-bath, replacing water lost by evaporation. After fifteen to twenty minutes there is a separation of slender yellow needles, and at the expiration of an hour about 80 per cent. of the glucose has been converted into the phenylhydrazin compound. The needles may be filtered off, washed, dried, and dissolved in boiling alcohol and reprecipitated by water. They melt at about 204-205°C., and their feathery appearance under the microscope is very characteristic.

Biliary Salts and Pigments.—The presence of bile in urine usually communicates a dark-brownish color to the excretion, which is made deeper brown by the addition of alkali. Commercial peptone, consisting largely of albumoses, is a delicate test for bile salts.

Flesh peptone should be dissolved in distilled water, in about the proportion of 2 grammes in 250 cc., with a trace of salicylic acid to preserve it. If filtered bright, it is permanent. Dr. Oliver, who recommended the test, suggests the dilution of the urine before applying the test, but this is only necessary where a slight haze would be obscured by the depth of color in the sample. Bile pigment may be detected by the reaction with iodine. A drop or two of the B.P. solution of iodine should be poured down the side of a test-tube half-filled with urine. If bile pigment be present, a fine green color appears, whilst, if absent, only a pale yellow coloration is seen.

Urinary Sediments.—Besides mucus and urates, which are commonly deposited in healthy urine, phosphates may appear in ammoniacal or stale urine, or after the ingestion of alkaline salts. Pus, uric acid, and oxalate of calcium may occur in morbid urine, and when albumin is present diligent search must be made for renal casts. The sediment should be collected in a conical vessel and a small quantity withdrawn, by means of a pipette, with as little of the supernatant liquid as possible. A drop may thus be placed upon a slide, the cover slip gently pressed over it, superfluous liquid oozing out removed by clean blotting paper. A ¼ or ⅙ inch objective will be found a very useful size for the microscopical examination.

Urates.—Readily detected by their dissolving when gently warmed. They are frequently pink-colored from the urinary pigment, uroerythrin. They have no special significance, as they occur whenever there is diminished secretion from any cause. Urates in urine are acid urates of sodium, potassium, or ammonium.

Uric Acid, often accompanied with urates, is recognizable to the naked eye from its similarity to cayenne pepper. It is insoluble when heated, but dissolves in a few drops of solution of potash, reprecipitated by acids. Its appearance under the microscope varies, the common forms being lozenge-shape, rosettes, or dumb-bells.

Phosphates appear as a white deposit, and may be recognized by their solubility in acetic acid. The acid solution can then be tested for phosphates in the ordinary way, either by molybdic acid or magnesium mixture.

Oxalate of Calcium is insoluble in acetic acid or in alkalies, but dissolves in hydrochloric acid. It generally occurs as octahedra, or dumb-bell crystals, with mucus.

Mucus is thin in acid urine, ropy in alkaline. Mucin is precipitated by acids, alcohol, or alum, but dissolved by alkalies, and not affected by mercuric chloride. Microscopically examined, mucous corpuscles resemble leucocytes.

Pus always renders urine turbid, but in acid urine it separates as a white deposit somewhat similar to phosphates. The addition of alkali turns it into a gelatinous mass, and if the urine is alkaline the deposit will have this appearance. It is precipitated by mercuric chloride. A drop of acetic acid renders the nuclei of pus cells much more distinct under the microscope, and the granular corpuscles are colored mahogany-brown by iodine solution, whilst epithelial cells are only tinged yellow.

Renal Casts are cylinders which have received their shape from the renal tubules. They are absolutely confirmative of the presence and significance of albumin, and indicate disease of the kidneys. There are several varieties, the principal being blood-casts, granular, and hyaline casts. Blood-casts are recognizable from the number of red-blood corpuscles. Granular casts are opaque, with sharp outline and irregular granules. These consist of degenerated epithelial cells or blood corpuscles. Hyaline casts are more easily overlooked as they are colorless, long and narrow, with crystals and phosphates frequently embedded in them. They are frequently described as of "ground-glass" appearance, and are constantly present in chronic Bright's disease.

Blood.—In highly-colored urine blood may be detected from the presence of corpuscles under the microscope. If a large quantity be present, the urine will be alkaline and albuminous. The hæmin reaction is useful for the detection of blood in the sediment. It is applied as follows: A little of the sediment is placed on a slide with a drop of glacial acetic acid, and a few crystals of chloride of sodium. Heat is cautiously applied until all the liquid has evaporated, and oblong red-brown crystals of hæmin will be easily recognized under the microscope if blood be present.

Report.—It may be useful to give here a form of report which is often employed by analysts after the qualitative examination of urine according to the above scheme. It should be modified or amplified as the case may require, and sometimes it is as well to give a full account of the microscopical appearance of the deposit, and adding a few remarks at the end of the report upon any of the abnormal features. A sample of diabetic urine will, perhaps, be best taken as an illustration. It would run somewhat as follows: "I beg to report the result of my examination of a sample of urine received from on the inst. The urine was of a light yellow color and measured 1,800 cc. or 64 fluid ounces.

Specific gravity, at 60° F., 1.030
Reaction, faintly acid.
Albumin, absent.
Sugar, present in large amount.
Biliary salts and pigments, absent.
Deposit, mucus.
Microscopical examination revealed nothing abnormal.

(Signed)———."

Quantitative Determinations.

Acidity.—Certain gout specialists, in particular, lay great stress upon the determination of the acidity. This is because, under the administration of salicylate of sodium, the uric acid which has accumulated in the blood and tissues is excreted, and the rise in acidity considerable. As the acidity is diminished after meals, it is advisable to be supplied with the whole excretion of twenty-four hours, *i.e.*, from 9 a.m. to 9 a.m. Acidity should be determined volumetrically in 100 cc. of urine by means of standard caustic soda solution, using a few drops of a proof-spirit solution of phenol-phtalein as indicator. Each cc. of the solution should be equal to 0.010 gramme of oxalic acid, and it should be reported in terms as equivalent to parts per thousand. Normal urine has an acidity equivalent to 2.5 to 3.0 grammes of oxalic acid ($C_2H_2O_4.2H_2O$) per litre. In gout, under the influences mentioned, and in acute febrile diseases, it rises to 6 grammes, or even more. Many medical men prefer statements of acidity, uric acid, and urea in the number of grains excreted per twenty-four hours.

Albumin.—The most satisfactory method of determining the amount of albumin in urine is by means of Esbach's albuminometer. The instrument consists of a test-tube with special graduations to mark the proportions of albumin. The urine is poured into the mark U, and a saturated solution of picric acid added to the mark R, the tube well shaken, and allowed to stand at rest for 24 hours. At the end of that time the