Cyanurine gives a blue colour to urine; it deposits as a blue powder, which may be separated by filtering; freed from mucus, urates, and phosphates, by washing with water, and digested with hot sulphuric acid, from which it must be carefully precipitated by magnesia; or it may be obtained by boiling the blue deposit in alcohol, and evaporating it to dryness. It is insoluble in water; moderately soluble in boiling alcohol; soluble in diluted acids, which become brown or red. The solution, in sulphuric acid, leaves, by evaporation, a carmine-red extract, soluble in water. It is precipitated, unchanged, from an acid solution by ammonia, lime-water, and magnesia. It forms a red colour by dissolving in a hot solution of alkaline carbonates, and a brown one in pure alkalies. Distinguished from indigo by not sublimating when heated in a tube, and from percyanide of iron by not yielding sesquioxide of iron, when treated with carbonate of potass; very rare.

Indigo gives a dark-blue colour, which deposits by repose in urine, and may be collected on a filter. It dissolves in strong sulphuric acid, forming a purple solution. Nitric acid converts it into nitro-picric acid; carefully heated in a tube, it sublimes in purplish red crystals. The best test is, to heat the deposit in a tube, with a little grape-sugar, in a mixture of equal parts of alcohol and liquor potassæ; the blue colour disappears and it becomes yellow. By agitation and exposure to the air it becomes red, and at last green—from the reproduction of blue indigo. This also is rarely met with.

Percyanide of iron, or Prussian blue, now and then occurs when iron has been taken some time as a medicine, by combining with cyanogen—the result of the re-arrangement of the atoms of urea. It consists of a blue powder, insoluble in water and alcohol. Digested with liquor potassæ its colour is destroyed, sesquioxide of iron being liberated, and a yellow solution of ferrocyanide of potassium being formed. This solution is precipitated blue by sesqui-salts of iron, and brown by sulphate of copper.

Melanourine and melanic acid are rarely found in urine; their chemical composition is not yet sufficiently known.

Hæmaphacin is the yellow colouring matter of the urine, which gives to urate of ammonia its yellow colour.

Cholesterine is a substance very rich in carbon, is supposed partly to give the colouring principle to the bile, and is often detected in urine in the form of bile.

ORGANIC DEPOSITS.

In addition to the former substances found in urine, the elements of blood, albumen, hæmotosine, and blood-discs, pus, mucus, organic globules, epithelium, milk, fat, sugar, bile, spermatozoa, and vibriones, are often discovered. Very few remarks on each of these substances may suffice.

Blood.—Urine containing blood coagulates into blackish masses, like currant jelly, and often comes from the urethra in pieces like leeches. The urine containing the liquor sanguinis coagulates spontaneously, and looks like blanc-mange, owing to the fibrin in it. To detect blood, boil and filter the urine; brown coagula of hæmatosine and albumen will remain on the filter. Add liquor potassæ, and if blood be present, a greenish solution will pass through, from which white coagula of protein may be precipitated by hydrochloric acid.

Urine containing blood becomes darker in colour by boiling, but not so if the colour is owing to purpurine. Uric acid is not affected by heat, and is distinguished by the microscopic character of the deposit; bile, by its characteristic tests; hæmatoxylon, by the dark precipitate produced by sulphate of iron, and absence of coagulation by heat.

The blood-corpuscles, particles, discs, or globules, are shown most distinctly by the microscope, as little rings; but, by minute examination, are really double concave discs, of a uniform size, and yellow colour.

Albuminous urine is clear, straw-coloured; sometimes a dingy red, from blood, and then it contains less albumen. Its specific gravity ranges from 1.008 to 1.012. It may be detected by heat, nitric acid, bichloride of mercury, ferrocyanuret of potassium with acetic acid, and caustic potass.

1. Put the urine into a test tube, hold it over a spirit-lamp, and, if the urine is acid, and contains albumen, it will become opaque without boiling; and the more albumen it contains, the more solid will the urine become as the heat is increased. If the precipitate is owing to the earthy phosphates, it disappears by adding any acid. Sometimes heat, long continued to ebullition, will produce a deposit from urate of ammonia, but this only occurs from the long continuance of the ebullition. If the urine is alkaline, heat will not deposit albumen, but nitric acid will.

2. By adding *strong nitric acid* to albuminous urine in a test tube, an immediate coagulation of albumen occurs; but this happens sometimes in patients under the influence of copaiba, cubebs, and other resinous drugs; and is distinguished from albumen by not being deposited by heat.

3. A saturated solution of *bichloride of mercury* precipitates albumen a dense white.

4. *Ferro-cyanuret of potassium* gives a flocculent precipitate (white) with albuminous urine, to which a few drops of acetic acid has been added.

5. A solution of *caustic potass* produces a white precipitate of gelatine.

Pus.—This urine is generally acid or neutral, and slow to become putrid; by repose, pus falls to the bottom, like cream, of a greenish colour, not hanging in ropes like mucus, and mixing with the urine on agitation, acetic acid having no effect on it. On mixing the deposited pus with an equal quantity of liquor potassæ, a dense, semi-opaque, gelatinous mass is formed, which can scarcely be got out of the tube. Albumen can always be detected in the urine containing pus. Agitated with æther, fat is dissolved; which, on evaporation, is found in globules. Alkaline urine requires great care in detecting pus. Phosphatic deposits sometimes resemble pus very closely; but by microscopic examination the pus particles are distinctly seen floating in liquor puris, which is coagulated by heat and nitric acid; they are white, round, roughly granulated outside, and much more opaque than blood corpuscles. By adding a drop of acetic acid to them while under the microscope, the interior of the particles becomes visible, and is found filled with several transparent nuclei. The earthy phosphates give their usual crystalline appearance.

Mucus.—Urine depositing mucus is generally alkaline; it soon putrefies; becoming almost ammoniacal in the bladder. It is very viscid and tenacious, forming a continuous rope when poured from one vessel to another. If the upper stratum of urine is acid, the mucus is always alkaline. Mucus will not mix with urine as pus does.

Acetic acid corrugates the mucus into a thin, semi-opaque membrane, which at once distinguishes it from pus. Mucus urine contains no albumen. Æther dissolves scarcely any trace of fat. When the urine contains a large quantity of earthy phosphates, it is difficult to distinguish between pus and mucus, except by the microscope. The microscopic appearance of mucus granules is very like pus, but they float in a viscid glairy fluid, (liquor muci,) which does not coagulate by heat or nitric acid.

Organic globules, large and small, can only be detected by the microscope; they are larger than pus and mucous granules, and have a darker colour. They are very common in albuminous urine.

Epithelium.—These are a part of the mucous membrane of the genito-urinary organs. Under the microscope, they appear like oval or angular flattened cells, with a centre nucleus.

Milk.—In utero-gestation, I have found milk in the urine: and Dr. G. Bird gives very clear and satisfactory proofs of its frequent occurrence. To detect it, allow the suspected urine to repose in a cylindrical vessel, exposed to the air, for several days, and the milk (kiestein) will rise to the surface in a fat-like scum, remaining permanent for three or four days.