

with the germinal vesicle, and is connected with the periphery of the ovum by ramified offsets.

Fig. 30. Section of superficial part of ovary of a bitch pup, eighteen days old, showing gland-like connexion of egg-tubes with the surface of the ovary.

*str.* Ovarial stroma.

Fig. 31. From another section of the same ovary, showing more oblique connexion of egg-tubes with the surface.

*o. e.* Ovarial epithelium. Stroma not represented.

Fig. 32. From another part, showing two other of the gland-like connexions cut across and obliquely.

Fig. 33. A very oblique connexion, cut longitudinally.

Fig. 34. Section of superficial part of ovary of a young bitch, almost full-grown, showing some of the ovarian glands (connexions of egg-tubes with surface of ovary). Cut across and obliquely.

Fig. 35. A peculiar convoluted tube from the deeper part of the same ovary, almost filled with long, tapering columnar cells.

*a.* Either the same or a similar tube, cut across.

II. "Researches into the Colouring Matters of Human Urine, with an Account of the Separation of Urobilin." By C. A. MACMUNN, B.A., M.D. Communicated by A. GAMGEE, M.D., F.R.S., Brackenbury Professor of Practical Physiology and Histology in Owens College, Manchester. Received March 6, 1880.

(Abstract.)

In this paper an account of the spectroscopic and chemical characters of urobilin is given. Urobilin is a pigment which has been diagnosed in urine by means of the spectroscope, and which has not been hitherto isolated.

Before its discovery in urine a pigment had been obtained by Jaffé by acting on human bile with nitric acid, and on dog's bile with hydrochloric acid, and subsequent treatment, which in solution gave the same spectrum, and behaved in the same manner with reagents as urine containing urobilin. By an examination of the bile of seventeen animals, I have shown that it is present as such in the bile of all them, but in greatest abundance in the bile of the mouse; and the results are described in the paper, while the spectra are shown in Chart II.

I have also shown that human urine always gives an absorption band at F, which almost always is affected in the same manner by reagents as the pigment got by Jaffé from bile, and that if this band is not so affected another pigment called urolutein is present, which I describe and have mapped in Chart I.

I have succeeded in isolating urobilin by the following method:— Having procured some urine which by preliminary spectroscopic and

chemical tests showed a large amount of urobilin, it was precipitated by neutral and basic lead acetate respectively, and filtered; if the filtrate gave an absorption spectrum, it was re-precipitated until the band disappeared, the precipitates were united, extracted with alcohol acidulated either with hydrochloric or sulphuric acid, and filtered. The filtrate was of a fine red colour, giving the dark band at F. This fluid, in small quantities at a time, was put into a separating funnel, a large quantity of water added and then pure chloroform, the whole repeatedly shaken and then allowed to stand. The red chloroform layer was separated off and filtered, when it was again examined and found to give in every instance the original spectrum; the chloroform was now evaporated off and the residue repeatedly dissolved in chloroform, finally on evaporation a brown-red, amorphous, shiny residue was obtained, which was perfectly soluble in alcohol, chloroform, nitric acid, hydrochloric acid, acetic acid, lactic acid, acidulated water, and partly soluble in ether, in water, and in benzol, but quite insoluble in bisulphide of carbon. I fully describe the spectra of the various solutions, which are shown in Chart I, and it will be seen that the same pigment was present in every solution, and since by the action of different solvents and reagents, this pigment could not be separated into more than one, I conclude that pure urobilin was obtained and urobilin only. I have also endeavoured to show that the pigment obtained was in combination with the sulphuric acid, when prepared by the sulphuric acid method, as it was found to contain sulphur, in addition to carbon, hydrogen, oxygen and nitrogen, which was absent and replaced by chlorine when it was prepared by the hydrochloric acid method. The conclusions which this research led me to form were as follows :—

1. That urobilin had been separated from urine.
2. That by the treatment adopted it had been separated in combination with hydrochloric and sulphuric acid respectively.
3. That the spectra of solutions of urobilin obtained by these methods respectively differ in the position of certain feeble bands, but agree in all possessing a black band at F, which can be made to disappear by ammonia in excess, and which is replaced by another band nearer the red end of the spectrum on the addition of sodic hydrate.
4. Urobilin is an amorphous brownish-red pigment, which contains carbon, oxygen, hydrogen and nitrogen. It is soluble in alcohol, chloroform, acidulated water, and acids; partially in ether, benzol, and water, *i.e.*, if the pigment be separated in combination with hydrochloric or sulphuric acid.
5. Urobilin appears capable of existing in different states of oxidation.
6. It is derived from one of the colouring-matters of bile.
7. It appears to be the colouring-matter of the bile of the mouse.

Like hæmoglobin and hæmatin, urobilin appears to be a very unstable body, which easily splits up on treatment with reagents into decomposition products, each giving a peculiar spectrum.

III. "On the Coalescence of Amœboid Cells into Plasmodia, and on the so-called Coagulation of Invertebrate Fluids." By P. GEDDES. Communicated by Professor BURDON SANDERSON, F.R.S. Received March 13, 1880.

[PLATE 5.]

Whether one collects the perivisceral fluid of a sea-urchin or of a worm, or the blood of a crustacean or a mollusc, the same phenomenon is always more or less distinctly to be observed. A kind of coagulation takes place, the fluid separating sooner or later into two portions, which have considerable superficial resemblance to the clot and serum of vertebrate blood.

It is easy to watch the formation of the clot by placing a drop of fresh-drawn fluid upon a cover-glass and inverting this above a glass cell, of which the edge is oiled to prevent evaporation. The drop thus hangs freely and the coagulation can go on without interference.

The phenomena observed in various invertebrates are best understood by reference to the plate. Fig. 1 represents some of the groups into which the amœboid corpuscles of the perivisceral fluid of the earthworm run immediately after drawing. In fig. 2 we have a few adjacent corpuscles from the gill of *Pholas*; in fig. 3 they are commencing to adhere; in 4 and 5 their adhesion is complete; in fig. 6 they have all but completely merged into one mass, which is about to absorb a new-comer; in figs. 8 and 9 the mass is now completely homogeneous, is altering its form and throwing out pseudopodia in all directions. Figs. 10—12 represent the similar union of corpuscles of *Patella*, and figs. 13, 14 those of *Buccinum*.

In *Pagurus* the corpuscles are of two very markedly different kinds, the coarsely and the finely granular. The former are much elongated when freshly drawn, but rapidly become oat- or egg-shaped, and then throw out blunt pseudopodia from any part of their surface. These stages are represented in fig. 15. The finely granular corpuscles, drawn separately at fig. 16, send out filamentous pseudopodia, and alone possess the power of union. Fig. 17 represents a small clot, formed by the union of the finely granular corpuscles, and containing a number of coarsely granular corpuscles, which do not merge into the surrounding mass. The large pseudopodial process of hyaline ectoplasm on the left of the figure is worthy of notice.

Figs. 18—23 show the union of five of the finely granular corpuscles