The occurrence of colourless corpuscles in *Leptocephalus* identical in form and character with the Hæmoglobin-bearing corpuscles of the blood of other fish, and the apparently capricious distribution of Hæmoglobin among Invertebrata, together with the existence of the green oxygen-carrier Chlorocruorin and the pink colouring-matter of the corpuscles of *Sipunculus nudus*, suggest the hypothesis of the existence of various bodies not necessarily red, possibly colourless, which act the same physiological part in relation to oxygen as does Hæmoglobin.

DESCRIPTION OF PLATE I.

Fig. 1. *Glycera.* Red corpuscles acted on by acetic acid.
Fig. 2. *Glycera.* Red corpuscles acted on by magenta.
Fig. 3. *Glycera.* *a* to *f*, normal red corpuscles; *g*, seen laterally; *h*, *i*, testicular cell-masses; *k*, leucocyte; *j*, *l*, ova.
Fig. 4. *Solen legumen.* *a*, *b*, *c*, normal red corpuscles; *d*, *e*, leucocytes of *Solen ensis* identical with leucocytes of *S. legumen*, with nucleus stained by magenta.
Fig. 5. *Solen legumen.* *a*, *b*, *c*, red corpuscles acted on by dilute acetic acid; *d*, *e*, *f*, *g* ditto acted on by magenta.
Fig. 6. *Phoronis hippocrepia.* Red corpuscles acted on by dilute acetic acid.
Fig. 7. *Sipunculus nudus.* *a* to *g*, normal pink-coloured corpuscles of the perivisceral fluid; *b* contains a crystal; *h*, leucocyte from the same fluid; *i*, *j*, pink corpuscles (pneumocytes) acted on by dilute acetic acid.

## II. "On the Structural Composition of Urinary Calculi." By H. Vandyke Carter, M.D. Lond. Communicated by L. S. Beale, M.D., F.R.S. Received October 11, 1872.

(Abstract.)

Having occasion during his late residence in Western India to remove numerous urinary calculi from persons belonging to the indigenous population, the author was enabled to pursue an inquiry into the character of these concretions which he had begun in the year 1859 by the chemical analysis of a large number of such calculi; it remained then to make use of the microscope as a means of investigation; and since no record of a similar systematic inquiry to that now undertaken has been published, so far as known to the author, it was thought desirable that this *hiatus* in medical literature should, however imperfectly, be forthwith filled up.

The plan adopted was to submit minute fragments taken from the real or apparent nuclei, and from succeeding layers and crust, of the calculi examined to the scrutiny of average optical powers, the highest available magnifying about 300 diameters. Distilled water was the ordinary medium employed; and in all cases chemical tests were conjointly used for the purposes of detection or confirmation. After sufficient practice, it became apparent that the microscopic analysis of calculi, thus carried

out, is not only valuable, but that it is even more delicate than the simply chemical method; by it will be seen more clearly than before that no urinary deposit long retains an unmixed character, and besides will be gained a more accurate conception of the true character and structure of these hurtful concretions.

Particular attention has been given to the nature of their nuclei or first-formed ingredients, for it was obviously desirable to ascertain the material and mode of commencement of calculi; and the author regards it as not the least interesting of his results to have determined the very frequent presence of urates in a globular form at their very earliest beginnings. Stones removed from adults as well as from children may possess a nucleus thus formed, and to such origin may succeed all varieties of calculous deposit. The next most common ingredient of the nucleus is the oxalate of lime, and this, too, in a form not generally recognized, viz. as large rhombic crystals; frequently, however, octahedral, oval, and dumb-bell forms are seen, as well as spheroidal bodies originating from the latter; these last-named structures are very characteristic. The nucleus of a calculus was comparatively seldom found to consist of uric-acid crystals.

Next in importance to the observation that globular and granular urates very frequently compose the nucleus of all varieties of calculi, and have commonly associated with them the oxalate of lime, is the evidence elicited of the operation of known physical influences in determining the form which these salts assume in connexion with stone. Reference is made to the modifying influence of a colloid medium upon the process of crystallization (as so admirably illustrated in Mr. Rainey's well-known researches); and it is here found that both urates and oxalates may present the various stages of globular particles, complex globules, or spheroids, either separate or blended, and laminæ of varying thickness: there are evident signs, too, that these structures undergo, at times, more or less disintegration, which may be followed by a rearrangement of their molecules; and more especially does the calcic oxalate seem disposed to undergo these changes, the resulting forms being highly characteristic. Neither uric acid nor the phosphates were found otherwise than in a simpler crystalline form; the former, however, when liquor potassæ is added, may in combination be noticed to pass into minute globular particles, the urate of potash being seen in the field of the microscope to assume some of the characters of ordinary urates; and phosphate of lime artificially produced was also observed in the shape of dumb-bells and spheres.

The author refers to the structure of Raphides, agates, some shells, &c., and concludes that urinary calculi should not be classed with ordinary concretions or mere mineral masses; it is not, however, evident that the animal basis of calculous matter, essential ingredient though it be, presents or retains a strictly cellular character.

Some details respecting the source and other characters of the calculi

submitted to examination are added, with a Table specifying the sex, age, &c. of patients, weight and composition of the specimens, &c.

A second Table shows an arrangement of the ascertained ingredients in a form which, if not complete, may yet be useful; in it the rarer substances belonging to urinary calculi are not included.

Next follows a description of each well-known ingredient as it was observed to occur:—*Uric acid* is here crystalline, but not in the shapes prevalent in urinary deposits; free crystals (1) are comparatively rare, and open columns (2), or else compact laminæ (3), are most frequent; amidst these the very general occurrence of simple oxalate-of-lime forms is mentioned. The *Urates* are present in calculi, as (1) granules, (2) acicular crystals, (3) globules, (4) laminæ: the relation of the two latter forms is described, and the apparent character of their animal basis. *Oxalate of lime* would seem to be the most prevalent of all ingredients, and it exists as (1) granules, if the particles were really shapeless, as they appeared to be; (2) crystals—octahedral (often of enormous size), ovoid, and dumb-bell shaped; (3) spheroids, or large composite globular particles of very characteristic appearance, and originating from the last-named form; (4) laminæ, also characteristic. Some remarks are added on crystals of the oxalate artificially produced. Certain *crystals*, styled *peculiar*, are described; they are frequently admixed with the urates, and, upon grounds specified in detail, are judged to be a form of the calcic oxalate. *Phosphate of lime*: free crystals of this salt have not been seen in calculi; and compact layers, authoritatively recognized, have varied in appearance either as the result of disintegration, or possibly in consequence of some difference in chemical composition—a point amongst others needing further investigation. Respecting the *triple phosphate* and the *fusible calculus*, details of their microscopic appearance are submitted in the communication under notice.

In conclusion, figures arranged in four Plates, with descriptions, are appended.

## III. "Researches in Spectrum-Analysis in connexion with the Spectrum of the Sun."—No. I. By J. Norman Lockyer, F.R.S. Received November 6, 1872.

(Abstract.)

The author, after referring to the researches in which he has been engaged since January 1869 in conjunction with Dr. Frankland, refers to the evidence obtained by them as to the thickening and thinning of spectral lines by variations of pressure, and to the disappearance of certain lines when the method employed by them since 1869 is used. This method consists of throwing an image of the light-source to be examined on to the slit of the spectroscope.