ORIGINAL COMMUNICATIONS.

HISTOLOGY OF MUROID EVACUATIONS IN DIARRHOEA, DYSENTERY, AND CHOLERA.

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THE subjoined rough notes on the histological and chemical characters of mucoid discharges in a few cases of diarrhoea, dysentery, and cholera, which have fallen under my observation within the last few years in general hospital and asylum practice, are intended to illustrate the following points (which, not having time at present fully to consider, I have thrown together in a tabular form).

I. The frequent similarity between the alvine evacuations in these three diseases, both in

- a. General physical characters.
- b. Histological characters.
- c. Chemical characters.

The chief points of analogy or resemblance are—

1. General characters—

- a. Colour.
- b. Consistence.
- c. Low specific gravity.
- d. Absence of fœtor.

2. Histological characters, chiefly regarding the presence of

- a. Mucus and
- b. Mucus-corpuscles; but also
- c. Food-débris,
- d. Fatty matters, etc.

3. Chemical characters—

- a. Alkalinity.
- b. Albuminosity.
- c. Biliary reaction with nitric acid, aided or not by heat.

The chief elements of the differential diagnosis between the alvine evacuations of cholera and those of diarrhoea and dysentery are—

- a. Amount of fluid excreted within a given time.
- b. Relative amounts of fluid and sedimentary portions.
- c. Amount and nature of saline and other chemical constituents.
- d. Absence of fœtor.
- e. Whey-like colour.
- f. Low specific gravity.
- g. Lower stage of development of the mucus-corpuscles.
- h. More frequent absence of food débris.

II. Frequency of intestinal disorders, accompanied by mucoid discharges, in the insane.

a. Anomalous characters of these discharges.

1. Difficulty in distinguishing between the stools of diarrhoea, dysentery, and cholera.

III. Anomalous characters of cholera discharges in the insane.

a. Rice-water evacuations not essential to cholera.

- b. Similarity in character to the discharges of diarrhoea and dysentery.

IV. Frequency of intestinal disorders, accompanied by mucoid discharges, in connexion with the strumous diathesis and with scrofulous disease, both in the sane and insane.

V. Impossibility of distinguishing, by microscopical evidence alone, and in mixed fluids, between mucus and pus corpuscles; and the errors in prognosis to which this is liable to give rise.

VI. Fallacies attachable to the application of chemical tests to the quantitative determination of mucus and pus in mixed animal fluids.

VII. Variations in the histological character of the mucus-corpuscle, as occurring in the mucoid discharges of diarrhoea, dysentery, and cholera—chiefly regarding

- a. Form.
- b. Size.
- c. Nature of margin.
- d. Amount or nature of granularity or opacity.
- e. Presence or absence of a nucleus.

1. Centricity or eccentricity.
2. Form.
3. Size.
4. Single or compound.
5. Granularity or opacity.
6. Distinctness of outline.

f. Effects of action of water and acetic acid on

1. Cell-wall.
2. Cell-contents, viz.,
 - a. Nucleus and
 - b. Granules.

Occasional absence of mucus-corpuscles. Corpuscular element not essential to constitution of mucus.

VIII. Frequent presence of hyaline globules (non-oleaginous) as a histological element of intestinal mucoid discharges.

The resemblance between the evacuations of the three important intestinal affections above mentioned is best marked in comparing the reaction or fever stools of cholera with those of many cases of ordinary diarrhoea. In exceptional or comparatively rare cases, cholera stools have resembled those of dysentery, as in Case I. It is important to bear in mind that cholera is sometimes rapidly fatal without any "rice-water" discharge: the normal fœcal contents of the intestines, at the time of seizure, may alone be expelled in a more fluid form than usual, and then resemble the stools of diarrhoea: occasionally such stools contain small scybæ. [Vide Case II.] It is further of interest to know that the viscid mucus discharged in some cases of dysentery may, by being broken up and agitated, or intermixed with water, be made to assume a "rice-water" appearance.

The colour of the fever stools of cholera, which are most similar in general characters to those of diarrhoea, resembles that of pea-soup: the consistence is usually that of very thin gruel, oat-meal, peas-meal, or linseed-meal and water, the mass consisting essentially of two parts, fluid and sediment, of which the latter contains a large amount of mucus. The specific gravity of the unfiltered fluid averages about 1010. Fœcal odour is seldom absent from the stools of diarrhoea and dysentery; but it sometimes is in the latter disease in proportion as the discharge consists of pure mucus. [Vide Case VIII.]

The mucoid matter, whether in the form of minute flocculi, or constituting the bulk of the intestinal discharge, in certain cases of diarrhoea and dysentery, exhibits under the microscope, as it does in cholera, mainly delicate hyaline bands of fibrillated mucus, besides large numbers of mucus-corpuscles, having the characters which I shall immediately describe. But, between the histological characters of the mucus-flocculi of the "rice-water" evacuations of cholera and those of diarrhoea or dysentery there usually exists this appreciable difference, that, in the latter, the mucus-corpuscles, though abundant, are large and well-formed, exhibiting distinctly their normal structural characters and reactions; while, in the former, they are very small, and mixed with much granular matter. They seldom, in cholera stools, show nuclei, or the usual reactions of fully matured mucus-corpuscles: in fact, they are presented at a very early stage of development; they are thrown off with great rapidity, and to an enormous extent by the mucous membrane of the alimentary canal; and are discharged almost immediately after birth, or long ere they have reached maturity. This distinction, however, requires close examination for its discrimination. The elements of the food débris are similar or identical in the stools of all three diseases, consisting chiefly, and to various extents, of muscular fibre, fragments of the tissues of plants, and granular matter—the result of advanced disintegration—accompanied usually by triple phosphates, often in large and very regular prisms. I have elsewhere mentioned that fatty and oily matters of various kinds, and in various forms, occur in cholera evacuations.* I have also found them, to a less extent, however, in some diarrhoea stools.

* Edinburgh Monthly Journal of Medical Science, August 1884.

Alkalinity is a common character of *feces*. I have already shown, in a former number of this JOURNAL,* that the presence of albumen, frequently to a considerable extent, is met with, not only in the stools of diarrhoea and dysentery, but in those of other diseases; and it probably frequently occurs in healthy *feces*. In many cases of dysentery especially, it is undoubtedly due in great measure to the presence of pus; the liquor puris being much richer in albumen than mucus. The biliary reaction of the fluid portion of the stools in diarrhoea and dysentery is frequently similar to that exhibited by the "rice-water" stools of cholera,† viz, with nitric acid, in the cold, or added *guttatim* to the fluid previously gently heated or boiled, a pinkish, reddish, or greenish colour, is developed. These colours seem to depend on different chemical states of the bile, and are convertible into each other by varying the amount of acid and the application of heat.

In the cases (to which I have above alluded) of resemblance in character between the evacuations of cholera and diarrhoea or dysentery, one or more of the following points of distinction may be noticed on close examination. The quantity of fluid evacuated in cholera within a given time—for instance, during the first twenty-four hours succeeding the seizure—is usually enormous, compared with that excreted in ordinary diarrhoea or dysentery; but to this general rule there are the following exceptions or sources of fallacy:—

I. Cases of cholera undoubtedly occur without any rice-water evacuations: nay, it does not appear essential to cholera that there should be intestinal evacuations of any kind. I have formerly pointed out that, in the cholera of the *insane*, anomalies of this kind are likely to occur.

II. In many cases of diarrhoea, the quantity of fluid feculent matter excreted far exceeds that in many cases of cholera; and again,

III. In many cases of diarrhoea, and more especially of dysentery, where the stools are partially or wholly mucoid in their nature, the amount excreted is abnormally small. Scanty stools, accompanied by tenesmus and other symptoms, are a well-known frequent phenomenon of ordinary dysentery.

Again, in cholera evacuations, the relative proportion of fluid and sediment is usually different from that in the discharges of diarrhoea or dysentery; the amount of fluid greatly preponderating in the former, and of solid matter in the latter, though the histological elements in both may be very similar or identical. Chemical analysis almost always succeeds in establishing a marked distinction; the nature and amount of the salts and other constituents being different in the two classes of cases. But the practitioner has seldom or never time or opportunity to subject these fluids to chemical investigation, especially of a quantitative nature. The absence of fœtor in cholera stools only applies to the rice-water evacuations, which, being devoid of fecal intermixture, are destitute of ordinary fecal odour; but the fever stools are usually very fœtid, frequently much more so than the stools of diarrhoea. The darker the colour, the greater the amount of biliary intermixture, the more they approach the characters of normal feces, the more fœtid do the stools become, alike in cholera, diarrhoea, and dysentery: and, on the other hand, the more purely mucoid are the stools, the less fœtor do they usually possess. In some cases of dysentery, therefore, where the stools consist wholly of mucus, we find merely a faint mawkish smell, such as exists in the rice-water stools of the collapse of cholera. The whey-like colour and low specific gravity likewise apply chiefly to the rice-water evacuations or collapse stools, since I have already fully explained that, in subsequent stages of cholera, the stools usually cannot be distinguished by ordinary physical characters from those of diarrhoea. The histological characters of the mucus-corpuscles contained in the mucus flocculi of the rice-water evacuations, their much lower stage of development,

their smaller size and frequently greater number, the usual absence of nuclei, and the different effects of water and acetic acid, may frequently serve as corroborative distinctive features; but they cannot be implicitly relied upon *per se*, inasmuch as these characters are not invariable. The more frequent absence of various forms of food *débris* also applies chiefly to the rice-water stools, and is probably due to the fact that the enormous quantity of fluid matter thrown out by the gut has served to wash out all traces, or all but traces, of ordinary feculent matter or food. In the later stools, food *débris* may be discovered in abundance; and its elements are the same in nature, if not in amount, as those of the food *débris* in the stools of diarrhoea or dysentery.

It must, therefore, be evident that the evacuations from the intestinal canal in many cases of cholera have very anomalous characters, rendering it difficult, if not impossible, to distinguish them readily, or under ordinary circumstances, from those in diarrhoea or dysentery, either by their general physical appearance, their histological elements, or chemical reactions. This is only corroborative of an opinion which I have already recorded, that the whole course and concomitants of cholera are, in many cases, anomalous. The characters and types of the disease vary in different epidemics, in different countries and places, and even in the same localities and classes of persons, under different circumstances; they are gradually becoming modified in various ways from year to year, and I believe that, in proportion as cholera becomes endemic among us, and as frequent and familiar to us as typhus fever, so will these anomalies or modifications—of local or general type or character—multiply and tend to baffle our powers of diagnosis and prognosis. I have already shewn to what extent cholera may be modified in the *insane*.* Bearing these facts in view, the practitioner, in future epidemics, should not expect to be able to recognise "Asiatic", "malignant", or "true" cholera, as it is distinctively called, as a disease characterised by rice-water evacuations, cramps, cyanosis, and the other symptoms or phenomena attributed to it in text books; but must be prepared to meet it in the most insidious forms, assuming the guise and taking on many of the characters of other and more familiar diseases, exhibiting the utmost variety of modifications or complications according as it is influenced by the various external circumstances, which we know to be efficient in the production of disease in general, especially among masses of the community. It is again showing itself here and there, in various corners of our country, and there is a probability that the profession may soon again have the fullest opportunities of studying cholera in all its protean shapes, both at home and abroad.

Intestinal disorders, accompanied by the exudation from the mucous membrane of the alimentary canal of mucoid matters of various degrees of consistence, are not uncommon among the *insane*. I am not in a position, from the possession of statistics or from minute investigations, decisively to affirm that the discharges of diarrhoea, dysentery, and cholera in the *insane* are more frequently mucoid in their nature, or contain a larger quantity of mucus than in similar affections in the sane; but, comparing roughly the characters of these evacuations in a general hospital, and in a hospital for the insane, experience would lead me to believe that such is the case. I have, to a great extent, anticipated the few remarks I intended here to have made on the frequently anomalous characters of the discharges in these three diseases, and on the extreme difficulty of distinguishing satisfactorily between them. It appears to me that intestinal affections accompanied by discharges of this nature are greatly more frequent—both in the insane and sane—among persons exhibiting strongly the strumous diathesis, a tendency to suffer from scrofulous diseases, or rather a tendency in all diseases to which they are liable to assume a scrofulous type, or who are actually labouring under tubercular disease, whether of brain, lungs, peritoneum, etc. In such cases, they are probably connected with

* Clinical Notes on Cholera, in number for April 14th, 1854.
† ASSOCIATION JOURNAL, March 10th, 1854.

* ASSOCIATION JOURNAL, October 27th, 1854.

tubercular disease of the intestines in some of its stages; but it must be borne in mind that strumous affections are exceedingly common among the insane; and that among the sane there are very few families indeed some of whose members do not exhibit, in some form, unmistakeable evidence of the strumous diathesis. I believe that insanity in very many, perhaps in the majority of cases, is attributable to *scrofulous* degeneration or disease of the brain; and there are grounds for supposing, moreover, that the strumous diathesis is an almost universal systemic failing in the human race, which exhibits itself in an infinity of forms not recognisable unless very narrowly studied. I use the terms *struma* and *scrofula* in their most comprehensive signification; tubercular deposit is far from being essential to the presence of strong strumous tendency.

The mucoid matter in the annexed cases varied in consistence according as the fluid or corpuscular element of the mucus predominated; in some cases the mucus was pure or nearly so; in others it was more or less mixed up with pus, blood, and feculent matter. In several cases, it existed as delicate flocculi floating in a fluid of varying density; in others, it formed a gelatinous mass—cohering *en masse*—very viscid and tenacious. The colour also varied greatly. In the case of the gelatiniform discharge, the mucus was of an apple-green colour, and at the same time devoid of fœtor; in the diarrhoea cases, the flocculi were usually tinged with bile or blood. In certain cases [dysentery] from intermixture of pus and blood, the mucoid matter evacuated had a cream colour, streaked or variegated with blood, or it exhibited a rusty or red mottled appearance. The latter appearance is comparatively common in dysentery, the matter discharged consisting entirely of mucus, pus, and blood in various proportions. The consistence of such a discharge is frequently that of thin porridge.

The histological elements of such discharges are chiefly delicate hyaline bands of fibrillated mucus and mucus corpuscles, in greater or less abundance, and usually fully developed; the latter are generally entangled among the fibrillæ of the former, but may with some trouble be washed out. In the majority of cases, traces of food *débris* are present in the form of hairs, isolated cells, spiral vessels and fragments of the epidermis and parenchyma of various vegetables [most frequently the disintegrated tissues of the potato, barley, cabbage, etc., and of bread], portions of muscular fibre and fatty matters, along with crystals of triple phosphates and sometimes of common salt, and granular *débris*. Where an intermixture of pus or blood occurs, pus and blood corpuscles are usually abundant, and recognisable by their ordinary characters. I say *usually*, because, in some instances, though undoubtedly present, they are so disintegrated or modified in character as not to be satisfactorily recognisable.

The mucus corpuscles in the following cases varied much in size, in the amount of granularity or opacity, in the nature of their outline, in their number, in the presence or absence of a nucleus and in its characters where present, and in the effects of water and acetic acid on the exhibition of the nucleus and the opacity of the cell-wall and cell-contents. Some were dark and very granular, others the reverse. In few was the nucleus visible without the addition of the reagents; its full development generally required the action of acetic acid; but, in some, it was rendered sufficiently distinct by water. Water generally caused a swelling of the cell-wall and a decrease in the granularity; in some cases it failed to produce any effect; it never rendered the cell-wall transparent, or, along with the interior of the cell itself, free of granularity; and only in a few instances did it cause the development of the nucleus. Acetic acid, in proportion to its strength, the length of the period of application, and the presence or absence of accessory heat, caused a swelling of the cell-wall, which frequently became quite transparent and appeared as a delicate, colourless, transparent utricle or vesicle surrounding a well defined nucleus. In some cases, it rendered the nucleus visible or distinct by merely diminishing the granularity of the corpuscles; in others, the granularity was diminished,

but no nucleus was developed; while in others, apparently no change was produced. Sometimes the cell-wall was greatly swollen, and rendered transparent, but a quantity of fine granular matter was seen surrounding the nucleus; sometimes an opacity, without distinct granularity, existed after the action of the acid. The nucleus varied in form, size and appearance, in whatever way developed. In some cases it was single, varying in size in proportion to the cell, central or more or less peripheral in situation, distinct in outline or the reverse, round, oval, or irregular in shape, granular or opaque to various degrees, and surrounded or not by granular matter. Occasionally it appeared clear or transparent and central, surrounded and rendered the more prominent by dark granular matter. Very frequently the nucleus was multipartite, or divided into two to five segments or nucleoli, three being a common average; these were more frequently round or oval, distinct in outline, clear or opaque, but non-granular, than the single nucleus. By boiling in acetic acid, the cell-wall sometimes became very transparent, and the nucleus divided and very distinct, in cases where the reaction of the same acid in the cold was unable to produce this effect; sometimes the cell-wall was completely dissolved, and the nucleus left alone surrounded usually by, or imbedded in, fine granular matter; in the latter case some of the nuclei appeared nucleolated. The microscopic examination of the pus-corpuscles, in pus contained in similar discharges or taken from other situations, has yielded me the same results; and it is well known that the normal histological characters of fully developed mucus and pus-corpuscles are identical, or at least indistinguishable. Between non-nucleated and nucleated mucus and pus-corpuscles, or between non-nucleated mucus-corpuscles, and nucleated well formed pus-corpuscles a marked difference exists; for instance, it is easy to distinguish between the fully developed normal pus-corpuscle and the young non-nucleated mucus-corpuscle—as met with abundantly in the mucous flocculi of the “rice-water” evacuations of cholera—under the reaction of acetic acid, whereby, in the former, the single or compound nucleus is at once developed, and, in the latter, no effect is produced, or the granularity is merely lessened. But it must be remembered that it is not reasonable to compare fully formed specimens of one kind of corpuscle, with rudimentary, young or abortive specimens of another species; that, in most specimens of mucus and pus-corpuscles, some are met with smaller than the rest, and exhibiting no change or no nucleus under the agency of acetic acid; that, in few instances of purulent intermixture of intestinal discharges is the pus “laudable”, or the corpuscles normal or fully formed; but that, on the other hand, we usually find the pus-corpuscle, in such circumstances, in a state of disintegration, losing all its normal characters (and especially the facility of exhibiting its nucleus on the solution of its granular matter by acetic acid), and mixed with large quantities of granular matter. Moreover, even in the small and undeveloped mucus corpuscles, in the “rice-water” flocculi, a nucleus is sometimes visible on close examination, especially on the addition of water or acetic acid, though I have seldom or never seen it compound. It may be set down, then, as impossible, by the microscope alone, and especially in mixed fluids, such as intestinal discharges frequently are, to distinguish between pus and mucus-corpuscles. It was formerly held that the development of a distinct nucleus, and especially of a compound nucleus, was characteristic of the true pus-cell; but this is evidently erroneous; the structural resemblance between these, and also between them and the white blood-corpuscle is complete. The presence of oil-globules again was long regarded as distinctive of pus; but, though much less frequent, they undoubtedly exist also in many specimens of mucus; but, even though they did not, this would be too narrow a line of separation. In fluids consisting wholly, or nearly wholly, of mucus or pus, the general naked eye characters are much safer criteria than the histological elements. We know that mucus is usually transparent or colourless, viscid and tenacious, not mixing with, but floating or sinking in water,

according to admixture with air, devoid of fœtor, etc.; while pus is usually opaque and cream coloured, more fluid, miscible readily with water, frequently foetid, etc. Moreover, mixture or agitation with liquor ammoniac or potassæ, and with acetic acid, assisted or not by heat, produces different effects in the two substances. But, in mixed animal fluids, where both mucus and pus are intimately blended in various proportions, it is probably impossible to tell what the proportion is in any given case, either from the general appearance or by the histological or chemical characters. In cases of suspected intestinal lesion, where it is of importance to determine the presence or absence of organic disease, the full extent and value of this difficulty is evident. "These differences," says Hassall, "in the outward character of the two fluids are not always, however, equal to their discrimination, and which arises from the fact, that they are all of them subject to the greatest possible variation, so that there is not one which can be regarded as truly distinctive. Thus, in morbid conditions, the one fluid will pass by insensible degrees into the other, or they will both be mingled together in such proportions as to set at defiance all physical means employed to distinguish them."* The presence of the one appears to modify, to some extent, the characters of the other.

In one case (Case VIII), it will be noticed that, under the microscope, the mucoid mass was found to consist wholly of hyaline mucous bands, no corpuscles of any kind being detected; this serves to corroborate the fact that the presence of the corpuscular element is not essential to the constitution of true mucus. The gelatiniform transparent mucus of the uterus seems, in many cases at least, destitute of mucus-corpuscles; for instance, Donnét observed "that the mucus obtained from the neck of the uterus in young girls is invariably free from corpuscles."

In some of the following cases, *hyaline globules*, varying in size, but generally larger than the red blood discs, were found entangled among the fibrillæ of mucus; these did not disappear under the action of ether and heat, separately or combined. In other instances, similar bodies at once disappeared on the addition of ether, proving their *fatty* nature. These I have noticed alike in cholera evacuations and in those of diarrhœa and dysentery; more frequently in the latter. Altered *blood globules* I have also noticed occurring in the discharges in these three diseases, more particularly in dysentery, where bloody stools are comparatively common.

I subjoin a brief abstract of the histological and chemical characters of the evacuations in the cases to which I have alluded. I also append two figures illustrative of the variations in the histological character of the mucus-corpuscle, as met with in the evacuations of diarrhœa, dysentery, and cholera. I have already figured the other ordinary histological elements of the evacuations in cholera;† and those of the stools in diarrhœa and dysentery I have just described as similar and frequently identical.

I. CHOLERA.

CASE I. Male, aged 50. Religious melancholia, which had passed into confirmed dementia. Fatal in collapse; disease sudden in its invasion and rapid in its course.

General character. The stools were of a dirty pale greenish colour; fluid, and very foetid; they contained a considerable quantity of floating mucus flocculi.

Histological character. The flocculi consisted of delicate bands of fibrillated mucus and mucus-corpuscles, having the ordinary characters of those met with in the flocculi of "rice-water" evacuations. The addition of iodine revealed the presence of a considerable amount of *starchy* matter, the disintegrated products of undigested food. The sediment contained *oily* and *fatty* matters in some of the forms which I have elsewhere described to be of frequent occurrence in cholera;‡ a few of the so-called "annular" bodies,

Fig. 1.

- 1, 2. Illustrative of the histology of the intestinal discharge in Case VII.
- d. Mucus (or pus) corpuscles prior to the addition of acetic acid.
- a, b, c. Effects of acetic acid in developing the mucus fibrillæ and corpuscular nuclei.
- e. Solution of the cell wall, consequent on boiling in acetic acid.
- 3, 4. Illustrative of the histology of the mucous sediment of the stools in Case IX.
- f, g. Variations in the size and appearance of the mucus corpuscles. In a few, the nucleus is visible prior to the addition of water or acetic acid.
- h. Effects of acetic acid—added cold. The granularity of the cell wall is not removed.
- i. Effect of boiling in acetic acid. The appearance of the corpuscle is identical with the normal reaction of acetic acid on the pus corpuscle.

Fig. 2.

- 1, 2. Illustrative of the histology of the mucoid stools in Case III.
- a. Epithelium scale.
- b, c. Effects of water on the size of the cell, and development of the nucleus.
- e. Effects of acetic acid on the same. The variations in the character of the nucleus are here distinctly exhibited.
- d. Altered blood corpuscles.
- 3, f, g. Illustrative of the histology of the mucus flocculi in the "rice-water" evacuations of cholera. The smaller size, greater number, and non-nucleation of the mucus corpuscles, are intended to be represented.
4. Illustrative of the histology of the pus corpuscle. Taken from a purulent sediment in the urine—probably derived from leucorrhœal discharge—of a woman labouring under the "consecutive fever" of cholera.
- k. Corpuscles in the albuminous precipitate, produced by nitric acid—cold.
- l. Corpuscles in a similar precipitate, caused by nitric acid, preceded by heat.

* Microscopic Anatomy of the Human Body, vol. i, p. 142.

† Ibid., p. 122.

‡ ASSOCIATION MEDICAL JOURNAL, April 14th and May 12th, 1854.

§ Edinburgh Monthly Medical Journal, August 1854.

various forms of food *débris*, and a large quantity of granular matter of a deep green colour.

Chemical characters. The addition of nitric acid, assisted by heat, developed a dirty, but distinct, pink colour.

Immediately after death, the intestines were evacuated; the discharge consisted of a thick, viscid, gelatinous mucus tinged and streaked with blood. Its general appearance closely resembled many dysenteric stools, and, with the exception of the colour, it was very similar to the discharges mentioned in Cases III, VI, and VII.

CASE II. Female, aged 36. Chronic mania with dementia. Fatal in collapse; seizure sudden, and course very rapid.

General character. The stools were very fluid; of a dark chocolate-brown colour; foetid; and contained intermixed, delicate mucus flocculi, and a number of small scybæ or feculent masses, which were normal in appearance.

In both the above cases, occurring in *insane* persons, the symptoms or phenomena of the disease, also, were anomalous or exceptional in character.*

II. DYSENTERY.

CASE III. Male, aged 30. Paroxysmal mania; masturbator, mutilator, abstinent.

General Characters. The stools were scanty; they were passed without any complaint of pain or uneasiness, and formed a jelly-like mass of mucus, having a somewhat bloody tinge.

Histological Characters. The stools consisted of a perfect mass of mucus-corpuscles. The mucus fibrillæ were very delicate and transparent, and only seen on addition of acetic acid. The mucus proper was small in amount, compared with the corpuscular element. The corpuscles varied much in size and granularity; all were comparatively of large size, and appeared fully developed; some were very delicate, and scarcely visible till after the addition of water or acetic acid. Water caused in many a swelling and increased clearness and transparency of the cell-wall, and a development of the nucleus, which was sometimes single and very granular or opaque, at other times divided more or less completely into two or three segments, and more transparent in the centre, and distinct in outline. In some corpuscles, the nucleus alone occupied the interior of the cell; in others, it was surrounded by a greater or less amount of fine granular matter.

Acetic acid produced similar effects, but more rapidly, and to a greater extent. Some corpuscles, however, retained their granularity, which was only diminished in amount, and showed no nucleus. In some cases, the cell-wall was much increased in size, and rendered very transparent and distinct in outline; in others, the corpuscles maintained their somewhat irregular margin and granularity.

Intermixed with the mucus-corpuscles were a few red blood-discs, somewhat altered in shape in various ways; a very few pavement epithelium scales, infiltrated with finely granular matter; some fragments of vegetable tissues, muscular fibre, and other food *débris*; and a quantity of granular matter.

Chemical characters. Much albumen was detected on the application of heat to a solution. Nitric acid, with or without heat, failed to develop any marked change of colour.

Here it is interesting to note that, from the physical characters of the discharge, there was no evidence of the presence of any purulent intermixture; that the corpuscular element of the mucus greatly predominated over the fluid portion; that the majority of the corpuscles, in their characters and reactions, were identical with those of pus; and that the few blood-discs, which were intermixed, were structurally altered, though but slightly.

CASE IV. Male, aged 21. Acute mania. Strumous diathesis strongly marked; probable existence of tubercular disease of brain, lungs, and intestines; advanced emaciation and extreme debility.

General characters. The stools consisted of cream-coloured flocculent masses, resembling thickened pus, or having a

denser consistence, and resembling pieces of soft putty floating in a watery fluid of a brownish-red or blood-red colour, according as it was chiefly tinged by bile or blood: very foetid.

Histological characters. Neither fibrillated mucus nor corpuscles of any kind were visible, but only granular *débris*. But, in subsequent stools, which were more feculent and normal in their characters, corpuscles, having the appearance of mucus and pus corpuscles, were detected, and along with them a few phosphates, annular bodies, food *débris*, and granular matter. There were also a number of *hyaline globules*, from a size equivalent to that of the red blood-discs to three times that size.

It is noteworthy in this case, that the histological characters of the cream-coloured masses, in the earlier stools, were those usually found in disintegrated or scrofulous pus; their general naked-eye characters would have equally led to the belief that they were purulent in their nature; and that hyaline globules, which I have also met in cholera evacuations, were entangled among the fibrillæ of mucus. Of the precise nature of these globules I am ignorant; I only know that, in some cases, they appear to be of a fatty nature—that is, they disappear under the action of ether; in others, they do not.

CASE V. Female, aged about 40; chronic mania.

General Character. The stools were fluid, of a dark brownish-red colour; the sediment was flocculent; the fluid, filtered, had a blood-red tinge from bloody intermixture.

Histological Character. The stools contained mucus fibrillæ and corpuscles of ordinary characters, but of a deep greenish-yellow tinge. Phosphates were present in large regular prisms. Hyaline globules, two or three times as large as the red blood discs, were found; and a quantity of light brownish-green granular matter.

Chemical Character. The reaction, with nitric acid and heat, was dark blood-red.

CASE VI. Male, aged 47. General paralysis; epilepsy, subsequently fatal.

General Character. The stools appeared to consist of varying proportions of mucus and blood.

Histological Character. Fibrillated mucus; mucus-corpuscles; annular bodies; blood-corpuscles; food *débris*; crystals of phosphates; siliceous crystalline particles; and granular matter.

Chemical Character. The stools were very albuminous, on application of heat, probably chiefly due to the presence of blood. The reaction, with nitric acid and heat, gave a light red colour.

According to my very meagre experience of dysentery in the insane, it is frequently unaccompanied by tenesmus, abdominal uneasiness, or febrile symptoms: it often appears to be productive of no suffering, is of short duration, and readily amenable to ordinary treatment, such as opiates, alternated or not with gentle laxatives. In other cases, again, it becomes chronic, defies all curative means, and especially when epidemic, is frequently attended with a very high mortality in asylums. In many cases, the disease acquires its name mainly on account of the mucus or pus and blood contained in the stools.

CASE VII. [History of case unknown.]

General Character. The discharge consisted of a gelatinous mass, apparently a mixture of pus and mucus, streaked and mottled with blood; the basis was cream coloured, and very opaque.

Histological Character. Fibrillated mucus and mucus corpuscles were scarcely visible till after the addition of acetic acid. Some corpuscles shewed single nuclei prior to the addition of the acid, which, in no case, rendered the cell-wall quite transparent, though it usually materially lessened the granularity. In some corpuscles, acetic acid rendered the nucleus less obscured by granular matter, and sometimes quite transparent: in this case, it became very prominent from being imbedded in, or surrounded by, dark granular matter. In others, the nucleus appeared amid the general granular mass as a darker granular body, with a

Distinct outline. The nucleus varied in size, and was divided sometimes to various extents, bifid or trifid, double or triple nuclei being frequently observable. The varieties of corpuscular character, under the action of the same reagents, were found so to graduate and pass into each other, that it was impossible to distinguish different species or kinds of corpuscle.

When boiled in acetic acid, the cell-wall was wholly dissolved, and the nuclei left naked; but they were floating in, or imbedded among, minute granular matter. In this condition, a few of the nuclei were colourless and clear; a few exhibited various degrees of granularity or opacity; some were more or less divided; and a few of the single clear nuclei exhibited the appearance of a nucleolus in the form of a dark central spot. When boiled in aqua potassæ, both cell-wall and nucleus were dissolved, no trace being left under the microscope.

Chemical Character. The fluid was densely albuminous, when mixed with water and heated.

Acetic acid agitated with it, in the cold, formed a somewhat viscid mucilaginous liquid. On the application of heat, this became very fluid; but the mixture continued opaque, and of the same colour as prior to the addition of the acid.

Aqua potassæ agitated with it, in the cold, likewise formed a viscid mucilaginous liquid; but a partial solution only was effected, many curdy opaque flocculi being left floating in the fluid. On the application of heat, however, a complete solution was effected, the fluid showing no trace of flocculi, and having an uniform dark brownish-green colour.

Nitric acid, cold, added to a mixture in water, produced a dense white opacity (albumen); and, at the same time, caused the development of a fugitive pink tint (biliary reaction), which slowly became greenish-yellow. On the subsequent application of heat, the latter colour was rapidly deepened, and there was a copious formation and precipitation of albuminous flocculi.

CASE VIII. [History of case unknown.]

General Character. Discharge a jelly-like mass, of an olive-green colour; devoid of fœtor.

Histological Character. Nothing but hyaline bands of mucus were seen, which were only visible on the addition of acetic acid. There was no trace of corpuscles of any kind.

Chemical character. A mixture in water, on the application of heat, became very coagulable. In aqua potassæ, assisted by heat, it was wholly dissolved. Nitric acid developed a greenish-yellow colour.

In this case it is important to notice the absence of fœtor and the absence of the corpuscular element of the mucus.

III. DIARRHŒA.

CASE IX. Chronic diarrhœa.

General character. The stool was of a pea-soup colour and consistence: sediment flocculent; resembled oatmeal and water; devoid of fœtor.

Histological character. Mucus corpuscles were abundant. Some were very indistinct and delicate; others were larger than usual, and loaded with dark granular matter. The nucleus was usually indistinct or invisible, until after the addition of acetic acid; but, in no case, did this acid completely dissolve the granules, so as to make the cell wall transparent and the nuclei very distinct. On boiling in acetic acid, the granular matter was wholly removed, and the nucleus, thus rendered prominent, was more frequently single than divided or compound, and was usually dark and hazy. A few blood corpuscles were also present.

Chemical character. The stool was densely albuminous. Nitric acid and heat developed a greenish-yellow colour. The flocculent sediment was converted into a thick mucilaginous fluid by aqua potassæ, and on the superaddition of heat a complete solution was formed, which was clear and of a light-brownish red colour. Acetic acid, assisted or not by heat, appeared to effect no change.

The presence of mucus, and more especially of blood,

tend to assimilate the case to dysentery; to which, however, it presented no other resemblances.

CASE X. Chronic diarrhœa.

General character. The stools were of the consistence of thin porridge or gruel; of a pea-soup colour; contained a considerable amount of floating mucus flocculi; fetid.

Histological character. The sediment contained mucus fibrillæ and mucus corpuscles, large and well formed; prismatic phosphates, muscular fibre and other food-débris, and granular matter.

Chemical character. The filtered fluid was very albuminous; nitric acid and heat developed a transient but deep blood-red colour, which passed gradually through orange into greenish-yellow. Nitric acid, in the cold, produced a deep green, which slowly became orange.

CASE XI. Chronic diarrhœa of phthisis, which proved fatal shortly after the stool under-mentioned was evacuated.

General character. The stool had a light brownish-yellow colour, and a branny or oatmeal-looking sediment. It closely resembled many reaction and fever stools of cholera, which I have seen.

Histological character. The sediment contained potato-cells and other forms of food-débris; fatty matter, phosphates, compound granular bodies, and granular matter.

Chemical character. The fluid was very albuminous. Nitric acid, in the cold, produced a pinkish tint; preceded by heat, it developed a transient deep brownish-red colour, which rapidly passed into yellowish-green.

Murray's Royal Asylum, Perth, February 1855.

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CASE OF STRANGULATED UMBILICAL HERNIA: OPERATION: RECOVERY.

By HENRY LOWNDES, Esq., Surgeon to the Liverpool Dispensary.

FRANCES LONGUEST, aged 64, had had a hernial protrusion about the umbilicus since her first confinement, which occurred when she was 28 years old. Before that time, she stated, no tumour existed. This hernia she could in general return without difficulty; but, for four months before I saw her, she had been unable to return it. Her bowels were usually costive.

On September 15th, 1854, she sent to the South Dispensary, and was visited by one of the house surgeons, who found her suffering from much pain about the umbilicus. Her bowels had been slightly moved that morning. The night following, at midnight, she was seized with vomiting; and this persisted till the next morning, when the house surgeon reported the case to me. I saw her at noon, when she was still vomiting brown flocculent matter, without any fœcal odour. She was low and anxious; her pulse was small. She complained of great pain about the umbilicus. I found the tumour of about the size of a small orange, tense and hard, and rather tender to the touch; and the abdomen about it also rather tender. I tried to reduce it, but without success; the house surgeon had also previously used the taxis. As she seemed very low, I determined to operate at once; and at half-past twelve I commenced, assisted by my colleague, Mr. Fenton, and the house surgeon, Dr. Carslan, who administered chloroform. I made a single incision from above downwards, through the skin, the whole length of the tumour, about two inches and a half in length. Under one part, a little fat was found; but the greater part of the sac was almost subcutaneous, nothing requiring division but a thin subcutaneous fascia, when the sac was exposed. The sac was laid freely open, when a small quantity of clear fluid escaped. Only one knuckle of bowel was down; this looked dark-coloured, but was in good condition; it was very tightly grasped at the ring (which I believe was situated at the umbilical opening of the peritonæum); so that the handle of a scalpel could not be introduced by the side of the bowel. Two slight in-