frailer part below; but this aperture had all the appearance of having been squeezed by the adjacent intussusceptum into a mere slit, which had been nearly and eventually quite impassable. A longitudinal incision through the intussusceptum showed it to be a simple pouch of bowel turned inside out, bounded peripherally by mucous membrane and centrally by peritoneum; thus differing essentially from the ordinary form of intussusceptum, composed of two cylinders of bowel in juxtaposition, bounded both peripherally and centrally by mucous membrane, with a double layer of peritoneum between them.

NOTES ON APENTA AND SOME OTHER BITTER WATERS.

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THE individual differences which are found to exist in the chemical composition of mineral waters belonging to the same group are of considerable interest from a pharmacological as well as therapeutical point of view. Mineral waters generally contain one or at most two principal ingredients, in addition to which, however, there are habitually two or three other substances present which modify the effects of the prime constituents in a peculiar manner. These "modifiers," as I would call them, often occur in very small quantities, and have for this reason by many been considered as inoperative. Such an opinion, however, is erroneous, for careful clinical observation of the action of such waters shows the "modifiers" to be of considerable importance, so that a mineral water would find its individuality impaired or destroyed, were they to be removed. I will remark in passing that this is the principal reason why artificial mineral waters in which the "modifiers" are often left out, in order to save trouble in the manufacture, have not the same therapeutical effects as natural waters.¹

Apenta belongs to the class of bitter waters, and contains, as its principal ingredients, the sulphates of magnesium and sodium, while its chief modifiers are the chlorides of sodium and lithium. The medicinal value of bitter waters in general depends to a great extent upon the relative proportion of the two sulphates contained in them.

Pharmacological experiments and clinical experience have shown that those waters act most pleasantly in which the magnesium preponderates over the sodium sulphate, while the chloride of sodium should not amount to more than about $\frac{1}{10}$ or $\frac{1}{15}$ of the two sulphates together. Where the sodium is in excess of the magnesium sulphate, the purgative action of the bitter water is *ceteris paribus* too violent; digestion is apt to be disturbed, and if the use of the water is continued for some time, debility and a degree of anæmia will be the result. On the other hand, where the chloride of sodium is in excess, the water does not act so beneficially on the liver.

If we apply the above rules to some of the best known bitter waters we find that:

1. Püllna water contains 123 parts of sodium against 93 parts of magnesium sulphate, with 16 parts of chloride. While, therefore, the proportion of the latter is good, the excess of the sodium sulphate causes those drawbacks which I have just mentioned, and which, although the water in question is a highly efficient purgative, have been so conspicuously felt in practice in years past, that this water is now rarely prescribed.

2. Rubinat water shows a still more marked preponderance of the sodium sulphate, as it contains 1,485 parts of it against only 50 parts of magnesium, the chloride of sodium being 31. What I have just said about Püllna would therefore apply in even a more marked degree to Rubinat.

3. Saldschütz water has to be placed in the same category, for it contains hardly any magnesium at all, and owes its effect almost exclusively to the sodium sulphate.

4. Friedrichshall water appears to be decidedly superior to the three waters just mentioned, as it contains 46 parts of sodium against 39 parts of magnesium sulphate. The excess

of the sodium sulphate, which in Rubinat and Saldschütz is overwhelming, is therefore in Friedrichshall only 7, which explains the milder and more agreeable effects of the latter. On the other hand, the excess of chlorides in this water is formidable, as it amounts to 99 parts, that is, 14 parts more than the two sulphates combined. This renders the Friedrichshall water somewhat similar to sea water. Indeed, the water of the Baltic does not contain as much—namely, only 67 against 99; while the Atlantic, the Mediterranean, and the Dead Sea, contain respectively 203, 225, and 543 parts of NaCl.

5. Hunyadi János water shows a slight excess of the sodium over the magnesium sulphate, namely, 1,578 against 1,564, with 119 parts of NaCl. The latter proportion is far better than that contained in Friedrichshall, and this is probably the reason why the Hunyadi water has recently been employed preferably to the latter.

6. Franz-Josef water has very nearly the same chemical constitution as Hunyadi János, namely, 24.65 parts of magnesium, against 24.06 of sodium sulphate and 1.673 of NaCl. This composition easily explains the generally favourable results which have been obtained from this water.

7. Æsculap water is one of the best of this group. It contains an excess of the magnesium over the sodium sulphate, namely, 172 parts against 139, and a favourable proportion of NaCl, namely, 29.

8. Apenta water shows an excellent proportion of sulphates and chlorides, the magnesium amounting to 24.49, the sodium sulphate to 15.43, and the NaCl to 1.87. It is therefore a most useful aperient. In addition to this it contains an appreciable amount of lithium chloride, by which it is distinguished from all the other waters of this group. Although the quantity of this constituent is small, it is for that reason by no means devoid of effect as a "modifier."

I may here aptly draw attention to the very small quantity of iron contained in such powerful chalybeates as Spa and Schwalbach (Pouhon 0.375, and Weinbrunnen 0.443 grains in 16 ounces of water). Again, the Kreuznach Elisenquelle, which is so highly effectual in the treatment of scrofula and allied conditions, contains only 0.035 grains of magnesium iodide in 16 ounces, and the Purton water only 0.066 of sodium iodide in the imperial gallon. The presence of lithium in Apenta water explains, therefore, why a course of the latter is so useful in warding off attacks of gout, and in moderating their intensity when present.

It is useful to know that in cases where we are obliged to give morphine in somewhat considerable quantities, either *per os* or hypodermically, as for instance in the gastric crises of tabes, and in severe and obstinate forms of neuralgia, Apenta has an excellent effect in neutralising the prejudicial action of morphine on the hepatic functions. In some of these cases I had previously given small doses of mercury, podophyllin, and other drugs and mineral waters for that purpose, but none of them equalled the beneficial effects of Apenta in this respect.

The same water is useful, as an adjuvant to other treatment, in threatened cerebral hæmorrhage in the aged, where there is high tension in the vascular system, with confusion, drowsiness, etc. On the other hand, it sometimes fails to relieve obstinate constipation which arises from deficient nervous influence, as in certain forms of spinal disease, where more stimulating aperients, such as cascara sagrada, etc., find their appropriate sphere of action.

A NOTE ON THE EXAMINATION OF THE BLOOD IN MALARIAL FEVER.

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[ABSTRACT.]

SURGEON-CAPTAIN McNAUGHT'S notes refer to the results obtained in 54 cases of malarial fever observed in the Northern Deccan from August, 1895, to June, 1896. He found the parasite in 50 cases, 130 examinations being made. The list of cases include both old and new infections. The blood was examined between 9 A.M. and 11 A.M. When he found large intracorporeal pigmented forms of parasite, the affected corpuscle being full and swollen, he diagnosed tertian

¹ I have dwelt fully upon this point in my work on *The Spas of Europe*, London, 1862.