already referred to. Their site of formation is usually the upper part of the small intestine.

According to McGee and Hastings (1942), the pH of the upper part of the small intestine is between 6.2 and 6.8 except in a few isolated instances. Information about the lower part appears to be less precise, but it seems to be accepted that the acidity decreases gradually as one passes further from the duodenum, so that the reaction in the lowest portion of the small intestine is frequently alkaline, and it is such a reaction which favours the precipitation of phosphate.

Stones of the small intestine consisting mainly of phosphate therefore have this part as their site of formation. Very few complete analyses of such stones have been recorded. More usually, the presence of phosphate is referred to in general terms. Thus Ho Dac Di (1935) removed from a woman of 40 a stone which he describes as the size of a mandarin orange, and which, on chemical analysis, revealed the presence of phosphate and oxalate of calcium; there were no calcium carbonate, cholesterol, bile pigments, or uric acid. More recently Richards (1951) removed three enteroliths from a woman of 44; he states that biochemical analysis indicated that they were composed mainly of organic debris, with some fat and lipid matter and a moderate amount of calcium and magnesium phosphates.

Calcium oxalate may be precipitated at a slightly acid as well as an alkaline reaction, and may therefore be deposited in any part of the small intestine. Barth (1928) made what appears to be the first report of a small intestine stone consisting mainly of this substance; it contained over 78% of calcium oxalate and 20% of organic matter, the latter mostly faecal material; no mention is made of bile acids. Blix (1935) described an enterolith containing about 58% of calcium oxalate and 11% of choleic acid. Grettve (1947) discussed enteroliths at some length and described a case of his own. He referred to the above-mentioned cases of Barth and Blix as the only published cases in which the stones consisted predominantly of calcium oxalate, and considered it most likely that the oxalic acid required for the formation of these stones comes from the food, which in the bowel is combined with calcium. The stone in his own case was analysed and reported on by Blix (1947). It contained approximately 79% of choleic acid and about 3% of calcium oxalate. Blix at the same time reported on a small-intestine stone sent by Dr. Waldenström. The interior of this contained 56% of calcium oxalate and about 19% of choleic acid, while the surface layer contained about 70% of calcium oxalate and only very little bile acid.

It will be seen that, judging from published reports, cases of stones in the small intestine are rare. No doubt cases are dealt with from time to time without any report being made. Of some in the literature the composition is described only in general terms. It would no doubt increase our understanding of the subject, and probably of lithiasis in general, if all such stones were reported and analysed as completely as possible.

Summary

Two cases of enteroliths consisting mainly of calcium oxalate, and one whose main constituent was calcium phosphate, have been described, and an analysis of the stones in each case has been given. In addition, a case in which stones were found in the appendix has been briefly referred to.

The conditions and sites of formation of enteroliths have been briefly discussed.

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Medical Memoranda

A Case of Human Parasitization by *Ixodes hexagonus*, Leach (Hedgehog Tick)

A welder aged 45 had noticed, a week before seeking advice, what he took to be a wart on his neck, and covered it with a strip of adhesive plaster. By the sixth day the "wart" had grown much larger, and on removing the plaster to inspect it he was concerned to discover something moving between the "wart" and the skin.

The "wart" was bluish grey in colour, spindle-shaped, and $\frac{3}{8}$ in. (1.6 cm.) long by $\frac{1}{8}$ in. (1 cm.) at its widest part. Black legs could be seen moving between the "wart" and the skin. Gentle traction revealed that the "wart" was the abdomen of a tick engorged with blood. The front end of the parasite was so firmly embedded in its host that further traction caused a part of its abdomen to come away with the forceps, spilling about 1 ml. of blue blood. The colour of the "wart" was due to the colour of the ingested blood showing through the integument of the parasite's abdomen. Firmer traction dislodged it completely, leaving a reddened vesiculated area, which completely healed in two or three days. The patient had not felt the bite, nor discomfort at any time.

At the British Museum (Natural History Section) the tick was identified as an adult female of *Ixodes hexagonus*, a blood-sucking parasite. This tick is most commonly found infesting the hedgehog. Its life-cycle consists of four stages—those of egg, larva, nymph, and adult—the active stages requiring a feed of blood from a host before passing to the next stage. As at each feeding stage it drops from the host when fully fed, the tick has to find a fresh host after each moult. Apart from hedgehogs, the tick is found on stoats, weasels, ferrets, dogs, cats, and other mammals; and, very infrequently, on man.

Records kept by the Natural History Section of the British Museum show that hedgehog ticks brought for identification after being found on human beings—mostly on the head and neck—numbered about 20 between 1940 and 1951. Other specimens were found in garden shelters, houses, and factories. Because of the protection afforded by the adhesive dressing in this case the tick had been allowed to feed for so long on a human host. The relatively large number of cases of human infestation in 1944 (13) were due to the greater recourse to Anderson shelters in that year. It is suggested by Arthur (1953) that the ticks are transferred by cats and dogs from the vicinity of hedgehogs' nests to houses and gardens. It was later discovered by my patient that three hedgehogs had recently been seen in his neighbour's garden.

When found on human hosts these ticks should not be removed by traction. The reason is that the anterior segments of the tick are modified into two laterally placed palpi and a central hypostome armed with recurved teeth like the barb on a fish-hook. The insect bites by first making an incision with the cutting organs, then inserting the hypostome. The host's blood is then taken up through a central canal in the hypostome in the same way as fluid is aspirated through a hypodermic needle. If the attempt is made to pull the tick off its host, the hypostome will be left in the skin. The best method of removal is to apply oil liberally to the tick and surrounding skin. This has the dual purpose of blocking up the two laterally placed spiracles through which *Ixodes hexagonus* respire, and of softening the skin of the host.

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