Cruro-Scrotal.—By a cruro-scrotal hernia is meant a hernial sac which distends not the scrotal tissues, but the fold of the skin which is found between the scrotum and the thigh. The hernia, therefore, will be covered with ordinary cutaneous tissue and not with dartos. It is always associated with an imperfect or abnormal descent of the testis, and the hernia follows the organ. The testis, usually an imperfectly developed one, having left the inguinal canal, is for some reason—probably either a want of development of the scrotal tissue or a tensesness of the fascia at the entrance of the scrotum—prevented from continuing its further descent into that region. It will therefore remain permanently in the cruro-scrotal fold, or pass into the perineum, or possibly into Scarpa's triangle. If the processus vaginalis testis which accompanies it remains patent, viscera may descend into it, and gradually distend the fold, so as to form a cruro-scrotal hernia. As the hernia progresses, the pouch becomes larger and more definite, and hangs directly downwards, and does not pass backwards into the perineum. On examining a patient the subject of this form of hernia, it will be first noticed that the scrotum is either imperfectly developed on one side, or, being developed, it is not distended. Lying external to it and separated from it by a distinct sulcus, is an adventitious sac covered with normal skin. On the patient being requested to cough, an expansile impulse will be felt in the swelling; the contents of the sac are usually reducible, and after reduction a small testis may usually be felt fixed at the bottom of the pouch of skin, which, when the viscera are not distending it, hangs lax and is thrown into folds.

A hernia which accompanies the testis into the tissues of the perineum may be designated a superficial perineal hernia, it being termed superficial to distinguish it from that rare form of perineal hernia which leaves the pelvis through a gap in its floor. The course of the descent of a superficial perineal hernia is from the abdomen, along the canal, through the superficial ring, past the scrotum near its entrance, and then backwards towards the margin of the anus. This form of hernia is necessarily rare, for perineal ectopia of the testis is uncommon, and, even when present, an accompanying hernia is seldom seen. It appears as an elastic swelling on one side of the perineum, with an expansile impulse on cough, frequently resonant on percussion, and usually reducible on pressure. After the return of the contents of the sac, the testis, sometimes well developed, can be felt lying by the side of the anus, and often tethered by a band, probably of the gubernaculum, to the region of the external sphincter or tuberosity of the ischium.

THE INFLUENCE OF PHOSPHORUS ON ORGANIC SUBSTANCES IN PILLS.

By W. HARRISON MARTINDALE, PH.D. MARBURG, London.

THE following investigation has been undertaken at the suggestion of Sir William R. Gowers, M.D., on account of the absence of definite evidence of the influence of phosphorus on alkaloids and other organic substances when mixed together in a pill. The opinion of chemists and pharmacists has been that these bodies are not affected, but hitherto it has been an opinion only. Definite facts seemed desirable, since the knowledge is important for the art of therapeutics. The suspicion that alkaloids may be decomposed, either entirely or in some degree, must have occurred to many.

For the purposes of examination phosphorus pills were prepared with the addition of strychnine (base), morphine (base), quinine sulphate, nitroglycerine, and zinc valerianate respectively, and to render the examination more exhaustive the formulæ were prepared in duplicate, employing in the first instance the official phosphorus pill, and in the second either the theobroma oil or the prepared suet basis as given in the *Extra Pharmacopoeia*. The suet basis was used where the additional ingredient in the pill rendered it preferable to produce as small a pill as possible. Large doses were arranged as these would be more advantageous to any possible decomposition, and if such should occur it would be more readily capable of detection.

The composition and results of examination of each pill was as follows:

Strychnine in Combination.

1. R Strychnine (base) gr. $\frac{1}{16}$; phosphorus (B.P., mass) gr. $\frac{1}{20}$. Ft. pil. These pills were prepared on November 25th last, and coated with sandarach varnish. On December 19th the alkaloid was extracted from 7 of them. The yield was 4.6 gr. of base in a partially crystalline condition. It was examined as to the presence of phosphorus with negative result. It further gave all the reactions characteristic of strychnine.

2. The next pills examined were of the same composition as 1, excepting that the phosphorus was exhibited in the form of the 1 per cent. theobroma oil basis of the *Extra Pharmacopoeia*. These pills were prepared on November 27th, and the alkaloid contained in 75 of them was extracted on December 30th, the yield being 4.7 gr. of a base, containing no phosphorus, and giving distinctive alkaloidal reactions for strychnine.

Morphine in Combination.

3. R Morphine (base) gr. $\frac{1}{2}$; phosphorus (B.P., mass) gr. $\frac{1}{20}$. These pills were prepared on November 25th, and examined on January 1st. Both gravimetric and titrimetric analyses were conducted, but the quantitative results will not bear quotation. These unsatisfactory figures I am inclined to attribute to difficulties in the technique rather than to any decomposition.

4. Pills of the same composition as 3, but having the theobroma oil mass in place of the official pill gave similarly unsatisfactory quantitative results.

Quinine Sulphate in Combination.

5. R Quinine sulphate gr. $2\frac{1}{2}$; phosphorus (B.P., mass) gr. $\frac{1}{20}$. These pills gave more satisfactory data. They were prepared on November 25th, and their examination was commenced on December 30th. Ten pills yielded on extraction 1.1423 gram of base, giving the thalleoquin and other characteristic reactions. It contained no phosphorus. Calculated as quinine, 1.1423 gram is equivalent to 24.22 gr. of quinine sulphate.

6. The next combination examined was a repetition of that considered under 5, with the exception that the 10 per cent. prepared suet mass was substituted for that of the official pill. The pills were prepared on November 25th, and their examination commenced on January 2nd. The yield of base from ten of the same was 1.1466 gram, which reckoned as quinine is equivalent to 24.3 gr. of quinine sulphate. This base as before showed absence of phosphorus. It gave reactions common to quinine, and did not appear to have suffered in any way from its insertion in the pills in company with phosphorus for a month.

Having thus satisfied myself as to the absence of any considerable interaction or decomposition in the case of alkaloids, I turned my attention to other substances.

In the first place, it is my experience that in the case of the phosphoretted suet mass, pills composed of reduced iron in various combinations with strychnine, quinine, etc., of which the formulæ are numerous, and in which one might be led to expect decomposition, will show a luminous surface on cutting even twelve months after they have been prepared. This in itself is good proof of the protective action which the fatty basis exerts.

Nitroglycerine in Combination.

7. Of this several formulæ were tried, and it will be sufficiently obvious from a chemical point of view that the basis of the pill should be as simple and as little prone to oxidation as possible—a simple theobroma solution of the bodies appears best both chemically and pharmaceutically, and it should therefore commend itself from a therapeutic standpoint. The pills made and examined contained one-fiftieth of a grain of phosphorus and of nitroglycerine in each. The nitroglycerine in the same after keeping was not submitted to quantitative estimation. There was, however, in the case of the simple theobroma oil basis, no evidence of decomposition.

Zinc Valerianate in Combination.

8. R Zinc valerianate gr. ij, phosphorus (B.P. mass) gr. $\frac{1}{20}$. These were prepared on November 26th, and examined on December 31st. The zinc valerianate was extracted, the yield being the equivalent of 31.5 gr. of the same from the sixteen pills which were experimented upon. The method of extraction was repeated treatment with fresh quantities of warm water. The zinc valerianate thus obtained was found to contain a distinct trace of phosphorus. On washing with carbon disulphide (in which phosphorus in the free condition would be soluble) this trace was not removed from the residue. We may assume, therefore, the formation of a small quantity of zinc phosphate, probably during the process of extraction with warm water.

9. The next pills examined were of similar composition to the last mentioned excepting that the 10 per cent. phosphoretted suet basis was employed in place of the official phosphorus pill. Zinc valerianate to the extent of 9.89 gr. were obtained from five pills. It was found to contain a distinct trace of phosphorus, which after washing the residue with carbon disulphide, was still in evidence.

It is satisfactory to be able to state that even as late as January 31st most of the pills were found to be luminous in the dark on cutting them in half. This indicates in general that no great amount of oxidation of the phosphorus had set in. Of the combinations of nitroglycerine by far the best in this respect were those prepared with simple theobroma oil solution.

It will be seen, therefore, that one may conclude that there is in most instances no interaction or decomposition of substances prescribed in this form with phosphorus. In the case of the zinc valerianate, however, there is evidence of a combination, but I am inclined to think that this has taken place in the process of extraction.