I am much indebted to Dr. W. L. Ellis for his kindness in making the drawings. They are excellent representations of the various conditions.

The bladder symptoms largely disappeared with the removal of the ligatures. A final ligature, however, was passed by the urethra on May 6th, 1898.

During the past year the condition has been fairly satisfactory; the urine has been free from pus, and the frequent and painful micturition has subsided.

A CASE OF ABDOMINAL NEPHRECTOMY FOR RENAL CALCULUS.

By WALTER L. BELL, M.D.,

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THE diagnosis of renal calculus is admittedly uncertain. Symptoms may point so decidedly to the presence of a stone in the kidney that an operation is undertaken, and yet the most careful search may fail to reveal the existence of a calculus. On the other hand, a renal calculus may for a lengthened period give rise to such slight symptoms that its presence may be totally unsuspected; or the symptoms may suggest an entirely different condition either of the kidney itself or of some other abdominal organ.

The following case is interesting, first, because of the unusually large size of the calculi, and, secondly, because the diagnosis was obscure, as the history, signs, and symptoms were not those characteristic of renal calculus:

History.—A. G., aged 27, wife of a fisherman, was admitted to the Lowestoft Hospital on February 8th, 1899, with the history that for seven years she had suffered from pain in the left iliac region. This pain was of a constant aching and bearing-down character, always much aggravated at the monthly periods (which were regular and apparently normal), and made worse also by full extension and flexion of the thigh on the abdomen. There was no lumbar pain, no exacerbations, no renal colic, no history of hæmaturia, or passage of gravel. Her labours had always been severe and prolonged. Her last full-term labour, two years ago, was instrumental. In November last, when six months pregnant, she suffered from severe accidental hæmorrhage, necessitating the induction of labour. During this last pregnancy she was never well, and suffered much from pain in the left iliac region. Since getting up after delivery this pain had been severe. She first noticed that she had a swelling within the abdomen about a year ago; it lay in the left iliac region, and was tender, hard, and somewhat movable.

Condition on Admission.—I found a densely hard, tender, slightly movable, oval swelling in the lower half of the abdomen to the left of the middle line, extending from the region of the pelvic brim to within 2 inches of the umbilicus (see diagram). The uterus was retroflexed and

A. G., showing portion of left kidney containing large calculi.

freely movable, and the sound entered readily for the normal distance. The tumour lay above and to the left of the uterus, and was apparently connected with it, as some degree of movement could be communicated from one to the other. The right ovary and tube were felt, but I could not make out the position of these structures on the left side.

Diagnosis.—The history and results of physical examination were, therefore, not at all suggestive of renal calculus, but pointed rather in the direction of a tumour connected with the uterus or left broad ligament, and this, in fact, was the view taken of the case by all who saw it.

Operation.—On February 16th, with the assistance of Mr. W. A. Shann, I opened the abdomen in the linea alba, and found uterus, ovaries, and broad ligaments healthy. It was apparent that the tumour was retro-peritoneal, so I tore through the layer of the mesocolon, and dissected down to its surface. It then became evident that one had to deal with an enlarged misplaced kidney containing large calculi. The question then arose whether one should incise the kidney and remove the calculi, or should extirpate the entire organ—that is, nephrolithotomy or nephrectomy. After making sure that there was a right kidney, which so far as could be ascertained felt normal, I chose the latter course, and decided on nephrectomy; because, first, with an organ so full of calculous masses, it was improbable that much functional kidney substance should remain; secondly, these large calculi evidently could not be extracted without the most extensive incision and laceration of the renal tissue; thirdly, if, as was likely, there was pyelitis, one ran very considerable risk of fouling the peritoneum with septic material. I therefore separated the numerous adhesions, dividing each between catgut ligatures. The renal vessels were tied and divided without difficulty, leaving the ureter to the last. This was ligatured with medium-sized silk and cut across, the cut end being cauterised with pure carbolic acid and inverted. To render it additionally secure I passed some fine catgut sutures through the fibrous coat, drawing it together over the end of the stump. Very little oozing followed the enucleation of the kidney, and the tissues fell together so well that I did not suture the divided edges of the mesocolon. The abdomen was sutured in layers without drainage.

Description of the Kidney.—The kidney after removal weighed a little over 11 ozs., the kidney itself being 7 ozs., 2 drms., and the calculi nearly 4 ozs. They were four in number: one large calculus, the size of a hen's egg, with processes fitting into the calyces, weighed 1.330 grs., and three small stones together weighed 280 grs., making a total of 1,610 grs. They were composed of uric acid.

After-History.—The after-progress of the case was uneventful. There was considerable pain for the first two days, but by February 16th this had ceased. The temperature never rose above 99.6° F. The sutures were removed on the tenth day, when the wound was found healed throughout. The patient got on to the sofa on the twenty-fifth day, and into the garden about a month later, quite free from pain, and feeling better than she had done for several years.

The only further point requiring mention is the excretion of urine after the operation. This was carefully measured for a period of eight weeks. During the first twenty-four hours 14 ounces of highly albuminous urine were excreted, but after this it remained free from albumen. During the second twenty-four hours there were 15 ounces, next three days 28 ounces each day, after which the amount passed generally varied from 35 to 45 ounces.

FRAGILITAS OSSIUM AMONGST WORKERS IN LUCIFER MATCH FACTORIES.

By W. F. DEARDEN, M.R.C.S.ENG., L.R.C.P.LOND.,
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WHEN considering the dangers arising from the use of yellow phosphorus in the manufacture of lucifer matches, prominence has always been given to the liability amongst "dippers," "mixers," and "boxers" to necrosis of the jaw. The so-called "phossy jaw" is a very serious disease, but that it is the sole important pathological condition incidental to this trade is open to strong doubt. There are grounds for believing that a certain condition is brought about in the bone tissue of the body through constant exposure of the individual for a lengthy period to the action of phosphorus and its oxides, as a result of which fractures of the long bones may very easily be produced.

I have come across two "dippers" working at the same place under exactly similar conditions for about an equal number of years, each of whom has had separately and at different times both thighbones broken in a ridiculously simple fashion.

CASE I.—J. S., a man, aged 46, had been in constant work as a mixer and dipper for thirty years, and had spent the last ten years at a works in my immediate neighbourhood. On January 1st, 1896, he fractured his right thigh, in its upper third, through stumbling down a single step. There was evidence of old fracture of the upper third of the left femur, and I learned that such had taken place nine years previously in just as simple a manner. This man, I may state, never had any symptom of necrosis of the jaw.

CASE II.—J. R., a man aged 39, had worked as a "dipper" and "mixer" for over twenty years, the last eleven being spent at the works previously alluded to. He fractured his right femur at the junction of its middle and upper third in January 1898 through catching the tip of his right foot on a piece of thin planking lying loose in the works yard and being thrown to the ground. I ascertained that the left thigh had been fractured in an exactly similar manner two years before, the offending obstruction on that occasion being the sunken board at the edge of a

bowling green. As in the former case, this man has never had symptoms of necrosis of the jaw.

That these two men, doing exactly the same work, should suffer in this singular manner I could not regard as purely accidental. I found corroboration of this view in the report to the Home Secretary on the Use of Phosphorus in the Manufacture of Lucifer Matches, which has recently been issued. Dr. Oliver there states that Dr. Magitot, of Paris, was the first to draw attention to the ease with which long bones could be fractured among workers in phosphorus, and a special note is made of the experience of Dr. Boocorens, of Grammont, in Belgium, who "met with and treated in twenty-three years 30 cases of spontaneous fracture of the long bones caused by muscular effort effecting exclusively the lower limbs of workmen who had been employed for years in dangerous departments and who had also suffered from necrosis of the jaw." Dr. Kocher, of Berne, is mentioned as having experience of a matchmaker who broke his thigh-bone five times. In this country Dr. Garman, of Bow Road, is reported to have come across nine cases of fracture of the long bones of the arm or leg occurring amongst workers at this trade.

I think it may be concluded that we have sufficient presumptive evidence to show that the osseous tissues of the body generally can be so altered by the prolonged action of phosphorus or its compounds as to render them less resistant to the application of external violence.

Six months after his second fracture, my younger patient had the further ill-luck, through the agency of a wood shaving machine, to lose the distal phalanx of his right forefinger. Being fortunate enough to secure the bone, I submitted it, along with a corresponding one of the same age, which I obtained, for purposes of comparison, from a dissecting-room subject, to Mr. John Allan, of the Manchester Technical School, for chemical examination. In the following table I show Mr. Allan's results, along with the old standard analysis of Berzelius, and the more modern one of Landois and Stirling. The component parts in the latter analysis are given in the textbooks, in terms of their probable combinations, so in order to show a proper comparison, I have, by recalculation, reduced them to the primitive state in which they come out in actual estimation. It should be stated that Mr. Allan did not find any metallic phosphorus whatever in either of the samples which he analysed, also that it was only thought necessary to estimate the earthy constituents of the bones.

	Match-makers' Bone (J. Allan).	Healthy Bone.		
		J. Allan.	Landois and Stirling.	Berzelius.
Lime	53.67	54.03	53.66	53.11
Magnesia	0.73	0.82	0.88	0.80
Phosphoric acid ...	40.01	39.51	39.70	36.00
Carbonic acid ...	5.24	5.07	4.67	7.45
Chlorine, fluorine, etc.	0.35	0.57	—	—
Fluorine	—	—	0.52	0.78
Soda and sodium chloride ...	—	—	—	1.80
Sodium chloride ...	—	—	1.00	—
	100.00	100.00	99.94	99.94

From this table it is seen that the relative proportion of phosphoric acid to lime, according to Mr. Allan's analyses, is distinctly greater in the "dipper's" bone than in the healthy one, the difference amounting to nearly 1 per cent. This is not quite so well marked when we compare with Landois and Stirling; but when it is noted that this column shows more magnesia, which is generally assigned to the phosphoric acid in combination, and less carbonic acid, which is supposed to combine with the lime, we find the difference more real than apparent. The same deductions are arrived at in comparing the first with the last column. The conclusion I prefer to adopt at is that this excess of phosphoric acid combines with the pre-existing neutral phosphate of lime to form a slightly acid salt.

Though I am of opinion that the formation of a compound of

phosphorus, most probably acid phosphate of calcium, in bone is a most reasonable explanation of this peculiar condition of fragilitas ossium, before my deductions can be accepted more analyses may be required. The chemical examination of a necrotic sequestrum from a "phossy jaw" would, I think, if carefully executed, yield important results. As I know from experience, the requisite material is difficult to obtain, but I trust when the opportunity does present itself to anyone it will not be lost.

The importance of investigation in this direction can readily be appreciated when it is pointed out that this chemical alteration of the bone tissue, even if it be not a necessary adjunct, must have an important bearing upon the causation of necrosis of the jaw. It can easily be understood that bone interfered with in the manner described would be less able to resist local irritation, less prone to repair after inflammation, and thus more ready to take on necrotic changes.

There is a strong modern tendency to ignore the share which constitutional changes might have in bringing about this condition in favour of the purely local action of phosphorus or phosphoric acid through the medium of a carious tooth or exposure of bone after an extraction. The recognised course of events is irritation followed by periostitis, suppuration, and ultimate necrosis. I would point out that in certain trades workpeople are exposed a great deal to the action of hydrochloric acid fumes, and their teeth suffer much in consequence. I have seen men who are under the influence of this kind of local irritation affected with the same train of symptoms, excepting the ultimate result, which would follow if the acid were phosphoric instead of hydrochloric.

Again, if we except the tuberculous theory, which I think we may with safety, we get not the slightest support of the solely local causation from bacteriological examination of the pus of affected subjects. The bacteria, streptococci and staphylococci found are the ordinary micro-organisms associated with suppuration. Granting this general alteration in the osseous tissue of workers amongst phosphorus, it would be the only condition not common to both classes mentioned, and would thus supply the missing link in explaining the cause of what could properly be termed a severe scourge to an important industry.

THE MECHANICAL FACTOR IN SURGERY.*

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At the present time, when bacteriology and the nervous system are being so freely invoked to explain the manifestations of disease, there is a great tendency to overlook the action of simple mechanical causes. Without for a moment wishing to minimise the importance of bacteria or the nervous system, I propose briefly to discuss the action of what I have termed, for want of a better name, the mechanical factor.

Ununited Fracture of Long Bones.—Every now and again the surgeon has a case of apparently simple fracture in a long bone, which, after a prolonged period of rest and splinting, fails to unite. Various explanations for the non-union are given—such as restlessness or ill-health of the patient, idiosyncrasy, deficient formation of callus, etc.—nearly always erroneous, as, on cutting down on the fracture, the usual thing is to find a pad of muscle, with sometimes a splinter of bone, interposed between the two ends, due to one end of the bone having perforated an adjacent muscle at the time of the original injury. On refreshing the ends of the bone and placing them in apposition union usually takes place, in spite of any idiosyncrasy or ill-health, which, in the case of the lower extremity, has certainly not been improved by a long confinement to bed.

Mechanical Obstruction of Respiration during the Administration of Chloroform.—Obstruction of the air passages by foreign bodies or the base of the tongue is well recognised; the valve-like action of deep and flabby lips in edentulous patients is sometimes overlooked. I have seen a patient getting black

* Read before the South-Western Branch of the British Medical Association.