genic value is high, it is non-toxic, and has given very good results in many severe cases of local and metastatic complications.

Polar Body Production in Organisms other than the Gonococcus.

Although perhaps outside the question under review the following general remarks may be of interest by way of confirmation.

Polar bodies, which we have been able to obtain in 33 per cent. of all gonococcus strains—provided the necessary elements for their formation are present in the culture medium and the physical conditions required for their development are maintained—have also been found to develop in a certain percentage of strains of every organism investigated up to the present. For example, this development has been observed in strains of *B. tuberculosis* (bovine), staphylococci, streptococci, pneumococci, Friedländer's bacillus, *B. coli*, *B. catarrhalis*, *B. crassus*, *B. influenzae* (Pfeiffer), *B. septus*, Hoffmann's bacillus, *B. xerosis*, etc.

In the case of the above, with the solitary exception of *B. coli*, a very large percentage of the strains show this development. In the case of the true *B. diphtheriae*, this organism, as is well known, develops polar bodies on Loeffler's medium, and when subcultured upon nucleo-protein media shows a remarkably increased production of polar bodies.

Of interest is the culture of true Klebs-Loeffler bacilli upon Dorset's egg medium; the primary culture invariably shows a certain number of elements containing polar bodies, apparently due to the carrying over to the medium of nucleo-proteins derived from the leucocytes and cells of the membrane. In the second, third, and fourth subcultures, however, no polar bodies are developed. However, if such a non-polar body culture of Klebs-Loeffler bacilli from the third or fourth Dorset medium subculture be transferred to a nucleo-protein media an immediate and enormous development of polar bodies can be observed as early as the seventh to eighth hour of culture.

As in the case of the gonococcus, if vaccines have been cultured upon media providing for detoxication during the period of subculture, and if means are taken during the process of manufacture of the vaccine to prevent further development of toxin, it is noteworthy that there is a complete absence of negative phase following the administration of such vaccine, as compared with the marked negative phase resulting from vaccines prepared from non-polar-body-producing strains. For example, polar body strains of *M. catarrhalis* sterilized by means of 0.5 per cent. phenol cause an immediate positive phase and amelioration of symptoms in *M. catarrhalis* infections. On the other hand, if such vaccines are heated at 60° C., though a favourable antigenic action is ultimately obtained, there is a definite negative phase, apparently due to the liberation of some toxin by the action of heat. The same effects are seen following the employment of gonococcus vaccines both locally and parenterally.

In tuberculosis *B. tuberculosis* will probably be of value when cultured and detoxicated with the development of polar bodies. A bovine strain of tubercle bacilli with abundant polar body production, brought about marked clinical improvement in a case of pulmonary haemorrhage, and with no evidence of negative phase.

Observation of the serum ferments in the mononuclear digestion of a polymorph leucocyte shows the following invariable time reactions. The cytoplasm of the cell is first digested, leaving the nuclear lobes free in the cytoplasm of the mononuclear, the nuclear reticulum disappears and the lobes are stained a uniform blue. Subsequently the nuclear lobes gradually become smaller and smaller until completely dissolved by the cytases of the reticulo-endothelial cell vacuole.

Precisely similar is the course of events in the case of the polymorphonuclear leucocyte laden with polar-body-containing gonococci, here the cytoplasm of the polymorph cell and that of the gonococcus first disappears, leaving the nuclear lobes and polar body granules free in the mononuclear cytoplasm. Subsequently these disappear at a much later period.

It is possible that in the above phenomena we have an explanation of the positive and negative phases resulting from vaccine administration—the negative phase being due to the liberating of endotoxin from the early digestion of the cytoplasm of the organism, whereas the positive phase may occur later as a result of the liberation of the antigenic complexes present in the polar body fraction of the organism.

If this explanation is a true one, the negative phase as a result of vaccine administration does not appear to be necessary to the development of the ameliorative positive phase—this being confirmed by the fact that it is possible with properly detoxicated polar-body-producing strains of all organisms to bring about immediate positive phases with clinical improvement.

This has been our experience after eighteen months' employment of this toxin-free gonococcus vaccine, provided every precaution is taken against the elaboration of endotoxin during manufacture. In a certain number of cases when, for experimental reasons, various modifications in the technique of culture and preparation have resulted in the causation of a negative phase, this has invariably been found to be the result of the presence of endotoxin caused by faulty methods of manufacture.

DISCUSSION.

Colonel HARRISON said he had always thought that these variations in potency were due to differences in the strains of gonococci employed to make the vaccine, and he had also hoped that perhaps by means of special cultural methods the antigenic properties of the vaccine might be enhanced. He had had some of the new vaccine satisfactorily prepared and tested at St. Thomas's Hospital. So far as could be ascertained from investigation of only a few cases by Dr. Oliver, utilizing the complement fixation test they had established that the polar body vaccine was of definite value in raising the production of antigen. Clinically they had had one brilliant result—an absolute cure in three days after one injection, notwithstanding the most vigorous efforts to excite a relapse. Other cases had cleared up more quickly than usual but had then relapsed. He asked, Why should the vaccine-producing body be called exotoxin when it was not toxic?

The PRESIDENT believed that the authors had opened up a subject which might eventually yield important results in the treatment of gonococcal infections, and also produce an explanation of the discrepancies known to all who had used vaccines for gonorrhoea and other infections. There was a large field for reliable vaccine therapy in the treatment of female gonorrhoea.

Major LAMBKIN, in reply, said that the term "endotoxin" was scientifically correct, as the substance was the product of the disintegration of the gonococcus. The term exotoxin was more debatable, since it was doubtful whether the substance was a true toxin, but it was difficult to find a more appropriate and descriptive name.

WORLD EPIDEMICS AND THEIR RELATIONSHIP AS CAUSE AND EFFECT TO SOCIAL CONDITIONS.*

BY

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ONE who speaks with authority has told us that—

"There are nine-and-forty ways of constructing Tribal lays,
And every single one of them is right."

Much the same might be said with regard to history, only the number of methods would require to be indefinitely extended, since almost every historian has his own views of the manner in which it should be written, and there is scarcely a philosopher, from Aristotle onwards, who has not tried to show the professed historian how his work should be done. The reader of history, therefore, comes under a spell of infinite variety. In one volume he will

* A paper communicated to the Section of the History of Medicine at the Annual Meeting of the British Medical Association, Edinburgh, July, 1927.

find the doings and sayings of the kings minutely recorded, while his next author will write as if the various statutes were the only things worth remembrance. After that he may meet the historian whose pen will scarce waste a drop of ink on these things, but acts on Johnson's words:

"How small of all that human hearts endure,
That part which law or kings can cause or cure."

History, of course, has only too often been perverted to the purpose of the pure partisan or propagandist; but with all this variety of point of view it is at least curious that the influence of disease on the history of a nation or people has been almost entirely overlooked. No one can deny that ill health very greatly affects the individual and may make or mar his life work, but the biographer also for the most part minimizes or misses its significance. Nor can it be said that the medical man turned biographer has been much more successful. The reason for that perhaps lies in the fact that he was not so much writing a biography as proving a thesis. In one such book, if I remember rightly, the author showed to his own satisfaction that all his subjects suffered from eyestrain or had errors of astigmatism. In another the remarkable men and women whose lives were sketched were proved to have been insane. I need only say a word in passing as to the efforts of the psycho-analysts in this direction; they have at least succeeded in adding a new terror to death.

It is true, indeed, that almost every history records such dramatic events as when

"The Angel of Death spread his wings to the blast
And breathed in the face of the foe as he passed";

so that a siege was suddenly raised or a hostile army rapidly destroyed. But it is no less true that the remote and less obvious consequences of terrible and world-wide epidemics have failed to gain recognition. Thus Hume only devotes one short paragraph of sixteen lines to the Black Death, and seems to have been prompted to mention it merely because it interrupted the festivities held to celebrate Edward's victories on the Continent, and because it prolonged the truce entered into between him and the King of France. It is still more strange to find Green, whose ideas as to the proper subject matter of history were so different from those of Hume, failing to notice the awful aftermath of that pestilence. Fortunately the term of this neglect has now passed, and we stand in the dawn of a new day, of the brightness of which there is an excellent augury in the book of W. H. S. Jones, *Malatia and Greek History*. The reason for this welcome change is to be found in the interest recently awakened in the medical mind as to the story of medicine in bygone ages. To-day for the first time the British Medical Association has assigned a special Section at the Annual Meeting to the history of medicine, and this is in itself a testimony to the widespread interest in the subject and an acknowledgement of its importance.

The theme allotted to me is manifestly too wide to be developed adequately in the time at my disposal, even if I had the competent knowledge to do so. As it is denied to me to enter the promised land, I esteem it a privilege to have even a glimpse of it from my lowly Pisgah, and I shall be happy if I may rightly discern the lines along which others may be able to enter into possession.

Let me, then, direct attention to three dates: 430 B.C., A.D. 542, and A.D. 1348—periods when Death held such high carnival throughout the world that the survivors thought it a miracle to find themselves alive. Now if the mind be cast back to the century which followed each of these dates, it will be found to be marked by events of world-wide importance. In 430 B.C. Greece was at the height of its power, but one hundred years later it had fallen before barbarous Macedon, and Alexander had pushed his conquests from Egypt to India. In A.D. 542 Justinian at Constantinople and Chosroes in Persia were each at the head of a long-established and stable empire, and yet within a century the Arabs had set out on a career of conquest that wiped the empire of Persia off the map, and deprived the Byzantine ruler of half his dominions. Then in 1358, ten years after the Black Death, a fresh race of barbarians, the Turks, first set foot in

Europe, at Gallipoli, that shrine of dolorous memory to all of British blood, and passed from victory to victory till in 1453 the Byzantine empire was numbered with the things of the past.

It may be said that these are merely curious coincidences and nothing more, that the immediately preceding circumstances brought these events about, and that the direct effects of the pestilence had worn themselves out long before. It may be so, but the matter seems well worth more careful investigation. However widespread the pestilence there must have been some inequalities in its distribution, and in general its destructive powers must have been greater in the closely packed towns than in the more widely spread population of the country. We certainly know that the popular method of trying to avoid contagion was for the citizens to fly to rural districts. Other things being equal, then, the direful effects of plague must have been much heavier in civilized communities than among barbarians, for the city is the symbol of civilization. For these and many other reasons I believe that there is real ground for thinking that it was pestilence that gave the Macedonian, the Arab, and the Turk the first push on the road to power and empire.

This idea is greatly strengthened if we consider in a little more detail what happened after the Black Death. We know that the cities suffered so much from the loss of citizens that various means were adopted to attract fresh inhabitants. These efforts were successful through the rapid influx of people from the country. As a result, and because of the lessened power of the nobles owing to the drain of their rural retainers, the cities rose in power and influence. Thus we find that by the treaty of Stralsund in 1371 the Hansa League of towns entered upon its period of greatest prosperity.

The weakened power of the nobles led to the downfall of the feudal system, which was the mainstay of the lords and barons; its end was hastened by the protection given by the kings to the towns. By the gradual absorption of fiefs the power of the king waxed stronger and stronger, till by the end of the fifteenth century all the land became vested in him alone, and the kings of England, France, and Spain became absolute monarchs. This trend towards concentration of sovereignty had already been manifested in 1307 in the treaty of Kalmar, which brought Norway, Sweden, and Denmark under one crown.

The indiscriminate visitation by death of the castle and the hovel gave a fearful object lesson of the essential equality of man. When the corpse of the lord was dragged in the same tumbrel as that of the labourer and both were cast into the same trench, it was inevitable that the question should be asked why it should be the privilege of the one to have power and wealth, while the lot of the other should be poverty and labour. In England it found popular expression in the refrain,

"When Adam dived and Eve span,
Who was then the gentleman?"

Besides, owing to the lack of labour, the peasant found himself to be a person of importance in the State. Land had to be tilled if the nation was to escape starvation, so that landowners competed with one another in offers of wages for labour. Parliament stepped in with ineffectual laws to try and fix wages or to prevent the labourer leaving the land. And so came the insurrection of the peasants of England, which had already been preceded by a similar movement in France—the "Jacquerie." It was thus the pestilence which first enlisted the labourers against the army of capitalism.

It is to this period also that we must assign the real beginning of the middle classes. Naturally the citizens were the begetters of the prosperity of the towns, and the riches and power of the towns were reflected in the affluence and influence of the burgesses. In the order of things the accumulation of wealth is gradual, but the great mortality brought undreamt-of riches into unaccustomed hands, which as rapidly dissipated the money in reckless prodigality. Such people thought of nothing but rich clothing, sumptuous feasts, and generally riotous living. Many social customs were changed. The cloak was cut down into a garment which only reached the knee and was still further abbreviated, and as it now closely fitted to the body it was no

longer drawn over the head, but was left open in front and fastened with buttons. The indecency of this new fashion, the jacket, was the theme of many homilies.

In no direction, perhaps, did the Black Death make greater havoc than in regard to religion. To some the mortality brought a greater sense of their own sinfulness and the need of a greater dependence on Divine providence. But even the devotions that were the consequence of this feeling were of a different character from those previously followed. Such people still kept within the line of orthodoxy, but there were many others to whom the extraordinary fatality among the priesthood brought other thoughts. To them it was a sign of God's judgement upon the wickedness of the clergy, else why should they have been cut off? Thus Wyclif taught that only those priests who were in a state of grace could properly administer the sacraments. So many parishes were left destitute of incumbents that the faithful became accustomed to the absence of these spiritual directors and began to fend for themselves. From this time we can trace the growth of a somewhat Presbyterian cast of thought. It is significant that the flagellants were almost all lay people, and that priests or religious when present did not direct the proceedings. The efforts to make good the depleted ranks of the clergy and to fill up the vacant places in the monasteries were far from attaining success. The ranks were to some extent made up and places filled, but in too many instances the hasty selection of unsuitable recruits and the inadequate training to which they were submitted gave to the lay people pastors quite unfitted to discharge their duties adequately. It is abundantly clear, indeed, that with the harvest of death there was a widespread sowing of the dragons' teeth, which were to grow up in due time into an army of revolt against the authority of the Church of Rome. Luther merely applied the torch; the Black Death had already assembled the faggots.

The moral and religious effects that follow the contemplation of death on a great scale may be noted even in our own time. Four years of war on a scale unparalleled in history, followed by an epidemic which, perhaps, cut off even more than the war, may give us some faint idea of what happened during the Black Death. As then, so now, the moralists insist on the increased selfishness of mankind, the blunting of religious feeling, the inordinate pursuit of pleasure, the new mania for dancing, the immodesty of conduct and of garments. It is no part of my duty to inquire to what extent these complaints are justified. I merely note that the symptoms are similar, and the resemblances might be greatly multiplied. It was in a time of pestilence that Max Augustin, a singer and bagpipe player of Vienna, composed his well known song. Is it a further coincidence that his tune has received a new consecration in the froth-blowers' anthem?

Memoranda :

MEDICAL, SURGICAL, OBSTETRICAL.

TREATMENT OF VARICOSE VEINS BY INJECTION.

THE inquiry of Major-General T. M. Corker in your issue of August 6th (p. 244) leads me to send a brief report of my own experience during the last six months in the treatment of varicose veins by injection. The number of cases treated is small, and too short a time has expired to allow me to judge the permanence of the results obtained, so I do not wish to pronounce a final opinion at present.

Of six cases which have been completed recently, two had very large and extensive varicosity in the veins of both legs, two were early cases, and two were of long standing but not extensive, only one limb being affected. Sodium salicylate solutions in 20 and 30 per cent. strengths have been used, because these can be prepared and sterilized at home, and the patients have attended at my house for treatment. The two severe cases have had many injections, have felt very little pain, and have shown no evidence of spreading thrombosis. On the other hand, relief was

felt after the first treatment. Both patients have discarded bandages and elastic stockings worn for many years, and they appear quite satisfied with the results.

Of the slighter cases one was cured by two treatments of seven punctures altogether; one patient who was extremely nervous did not take kindly to the injections and they were discontinued, so I should consider this case a failure; a third had much pain, and after her second treatment showed signs of phlebitis extending down towards the ankle, not upwards; the veins are smaller, and I am hoping for a cure. The fourth had developed varicose veins in the right leg during pregnancy; the veins were getting bigger quickly, and she complained of increasing pain. Two treatments, of three injections each, were given with one week's interval; the pain was relieved, and the veins in the leg became smaller and quite hard. About the same time I attended another lady who had developed varix of the internal saphena during pregnancy. No treatment was given, and I was interested to find, a few days after delivery, that the vein had become thrombosed from the saphenous opening downwards for about four inches—evidently a natural cure, by a process similar to that which follows injection.

Up to the present I have followed the instructions given by Professor Sicard¹ and Dr. Meisen.² I have seen no sign of danger from thrombosis, and no sloughing of skin from escape of the injected fluid into the tissues. A fine sharp needle and a little neatness in manipulation are needed, and, of course, surgical cleanliness. An expensive outfit is not required.

This method of treatment is to be recommended for true varicose veins, but should not be used for patients with dilated superficial veins following "white leg."

Saffron Walden.

F. ARTHUR HEPPWORTH, M.B., Ch.B.

ACUTE APPENDICITIS IN AN INFANT.

INSTANCES of the vermiform appendix being found in a hernial sac have been recorded in the JOURNAL from time to time,³ but the unusual history and features of the following case make it worthy of record:

In September, 1924, a male infant, aged 3 weeks, was admitted to the Royal Manchester Children's Hospital with five days' history of progressive swelling and inflammation of the penis and scrotum, more marked on the right side; the scrotum formed a reddened, tense, inflamed mass about 3 inches in diameter. The temperature was 102.2°, and the pulse 170 (approximately).

A provisional diagnosis of acute orchitis was made, and incision and drainage of the abscess in the scrotum brought immediate relief. The temperature subsided slowly during the ensuing three weeks and drainage ceased in another two weeks, when the infant was discharged home in good health, having gained 1½ lb. in weight during convalescence.

Two years later the same child was brought back to hospital for further treatment. A discharging sinus had formed in the scrotum shortly after his return home and had persisted, and a rupture had been present on the right side since the operation and was becoming increasingly evident and troublesome. A typical right scrotal hernia could be partially but not wholly reduced, and a small indurated sinus was present on the anterior aspect of the right side of the scrotum from which a clear glairy bead of discharge could be expressed.

An operation for radical cure of the hernia was performed by Mr. A. H. Southam on September 1st, 1926. A large sliding scrotal hernia was found containing the distal four inches of ileum, together with the caecum, and appendix, and the first part of the ascending colon. The appendix appeared thickened, and was adherent by its tip to the sinus, with which the continuity of its lumen could be demonstrated. The testis was normal and showed no evidence of old inflammation. Appendicectomy and radical cure were performed, and an uninterrupted recovery with complete closure of the sinus resulted.

It appeared evident that the previous trouble had originated as an attack of acute appendicitis in the hernial sac in the scrotum, a condition which must be unusual at so early an age, and which had resulted in the formation of a "pathological appendicostomy."

I am indebted to Mr. A. H. Southam, under whose care the boy came, for permission to place this case on record.

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¹ *La Presse Médicale*, June 2nd, 1926.

² *Acta Chirurgica Scandinavica*, June 30th, 1926.

³ BRITISH MEDICAL JOURNAL, February 27th, 1926, p. 373; March 20th, 1926, p. 528; June 4th, 1927, p. 1006.