made up largely of preserved provisions may be looked upon as a predisposing cause of ill-health, but there are no grounds for going further in the present instance.

In the fatal case I found at the *post-mortem* examination enormous dilatation of the stomach, and this I have found to be a nearly constant feature, in a greater or less degree, in the cases of acute beri-beri I have examined after death. It would appear, by the way, to contraindicate the use of yeast advocated by some in the treatment of the disease.

After the removal of those seriously ill to hospital, measures were taken thoroughly to disinfect and cleanse the quarters of officers and men, together with all bedding and clothing, etc. Fumigation with SO_2 and the liberal application of 1 in 1,000 mercury perchloride solution was carried out on three or four separate occasions, the men meantime sleeping on deck. After remaining in port for three weeks this vessel, taking those of the crew who had recovered and some fresh hands, put to sea, and did not touch land till she returned to St. Helena at the end of six months. The crew had kept in perfect health, and no fresh cases of beri-beri had appeared.

I am told by those whose memory of shipping in St. Helena goes back over many years that their impression was that the disease commonly reappeared in the same ship. It is difficult to get accurate information on this point. Since systematic disinfection has been carried out, I have not learnt of an instance in which a fresh outbreak occurred on resuming the voyage. A report on the above vessel was made to the United States Government, through the American Consul, with the recommendation that, in the *Medical Handbook* issued for the guidance of captains in the mercantile marine, a more helpful account of the disease should be inserted, embracing a warning as to the danger from heart failure, and the need for absolute rest when a man complained of shortness of breath. A similar suggestion was made to the Board of Trade in England through the Governor of St. Helena, as at that time (1903) the account given in the *Medical Guide* for the British Merchant Service was quite inadequate.

Since 1903 every ship calling at St. Helena with beri-beri cases on board has been subjected to very thorough disinfection and fumigation of the quarters of the sick. In endeavouring to trace the connexion of any case on board ship with previous cases of beri-beri, I have never failed to find one at least of three circumstances: (a) The existence of beri-beri on the ship on a previous voyage; (b) the presence on board of a member or members of the crew who had previously had beri-beri; or (c) some member of the crew who had recently sailed on a ship where beri-beri prevailed though he had not then had the disease himself.

The Norwegian Beri-beri Commission arrived at the remarkable finding that the so-called ship's beri-beri was not beri-beri. If not, what is it? The Commission came to this conclusion because the symptoms are principally weak heart, with weakness and dropsy of the lower limbs, without paralysis, and they were of opinion that degeneration of the nerves was not an essential phenomenon. But to what is the weak heart due if not to nerve degeneration in its most perilous site? The weakness, numbness, and anaesthesia, and loss of patellar reflexes constantly present are clearly due to nerve degeneration, and that complete paralysis does not follow in many cases is due to the fact that the disease tends to rapid recovery when men are removed from the ship. I have known several cases of paralysis notwithstanding. The disease as met with on board ship has been diagnosed and treated as beri-beri for many years by Manson and others at the London Tropical Hospital.

The polished rice theory of its causation is obviously not going to result in its eradication from ships. A resolution as to its non-infectious nature, carried at the International Congress, should not deter those who think otherwise from carrying out measures of disinfection till accurate knowledge is obtained.

There is a great deal that points to the conveyance of the disease by parasites. The bug is more likely than lice to harbour the possible germ. The bug clings more to places—the chinks and crevices of floors and bunks, etc., and its eggs are difficult to destroy. The organism may even develop in the latter, as in the case of the *Spirochaudinnia duttoni* in the ova of the tick. Before the etiology of beri-beri can be finally settled, the part, if any, played by parasites must be thoroughly investigated by modern methods.

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ZEISM OR PELLAGRA?

BY

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IN the issue of this JOURNAL of July 5th, 1913, Dr. L. W. Sambon, in giving the history of pellagra, quotes me as having in 1912 described cases of it in Rhodesia under the term "zeism," and, in spite of my then¹ stating that the disease in some respects resembled pellagra but was "certainly not pellagra," emphatically declares that the cases reported and illustrated by me are pellagra. I am not specially wedded to the coined word "zeism," and have no great objection to the revision of my diagnosis, but when Dr. Sambon lays such stress upon the revision I think that at the same time he should at least have mentioned the etiology I gave of the disease, especially as it is directly opposed to his insect-borne theory of pellagra.

My object in this article is to try and prove either that zeism is not the same as pellagra, or, if it is, that pellagra, at least in this part of the world, is directly due to the loss of some essential nutritive constituent during the process of grinding maize into meal, probably of the nature of an organic salt.

The disease which I termed zeism first came under my notice early in March, 1912, and, after observing 11 cases, I described it in the following month, though my article was not published till July. With a fuller knowledge derived from the observation of a further 29 cases (making 40 in all), I have little, if anything, to add to or subtract from my original opinions on the subject. All the cases occurred in the Victoria Gaol, of which I have been in medical charge for a little over five years. No fault can be found with the buildings, general hygiene, official diet scale, etc., while the food itself is well cooked and carefully supervised.

The staple article of diet among the natives in the district is rapoko (*Eleusina coracana*); in the gaol this was issued in the proportion of seven bags of rapoko meal to two bags of mealie meal. The main difference in the two meals is that the rapoko is hand-milled within the precincts of the gaol and contains the whole husk, while the mealie is steam-milled in the town to a fineness which must allow 75 per cent. of it to pass through a 30-inch mesh sieve, which necessarily entails, under the present milling process, the discarding as waste of a large proportion of the husk. That this waste husk, to which probably clings some minute portion of the grain itself, is of high nutritive value is proved by feeding cows on it, when the quantity and quality of the milk they give is greatly increased. This proportion of mixed meals held good up to the middle of November, 1911, when, owing to the partial failure of the rapoko crop, mealie meal alone was issued. Early in March, 1912, the first case of zeism was noted, and since then the gaol has never been quite free from it.

The gaol is built on the highest point of the township, 92 ft. above, and nearly a mile away from, the nearest river. This river is a typical South African middle veldt one—in flood from January to March during the rains, then sluggish for four or five months, finally reduced to pools for the rest of the year. It is, therefore, a more suitable breeding place for the malarial mosquito than the *Simulium* of pellagra (Sambon) except during the three months named; certainly at all times innumerable midges and other blood-sucking insects are to be found in its vicinity. Some eight or ten of the more robust prisoners are employed hauling water daily from this river, except during the rains, when the gaol catchment tanks supply the necessary water. Among those so employed zeism is seldom seen, possibly because they are usually short-sentenced men, and are lost sight of at the end of two or three months. None of the other prisoners go within half a mile of any running water. During the year not more than six or seven prisoners are ever off duty on account of malaria.

Etiology.

A good many years ago, when resident in Siam, I was a strong opponent of the theory that beri-beri was caused by

some flaw in the rice, but have since had cause to see the error of my ways. The administrative experiments of Dr. H. Campbell Highet, principal medical officer of the Siamese Local Government, by which he clearly proved that in Siam, at least, rice over-milled produced, and under-milled prevented and cured, beri-beri,² made such a profound impression on me that in 1911³ I advanced the theory that scurvy, at any rate in Rhodesia, was due to a flaw in the milling process of the mealie—when probably too much of the husk was removed. Therefore, when a year later I was suddenly confronted with an epidemic of what appeared to be an unknown disease, I at once thought it might be due to a fault in the staple article of diet, and finally named it "zeism."

I was, of course, acquainted with pellagra, and aware of Dr. Sambon's protozoan theory of its etiology, and therefore had no hesitation in stating that "the disease was most certainly *not* pellagra—even if an acute form of that disease were known."¹

Some of the early gastro-intestinal symptoms of zeism closely resembled those of scurvy and beri-beri, and therefore I was all the more ready to deal radically with the mealie meal, and, rapoko being unobtainable, issued rice instead, increasing the ration of meat and vegetables at the same time; the unaccustomed diet of rice produced some gastro-intestinal troubles, but while those suffering from zeism (at that time seven in number) did not improve it was noticeable that no fresh cases arose. Shortly afterwards rapoko was procured, hand-milled (whole-husked) within the gaol, and issued with the most beneficial results, all the cases immediately improving, and no fresh ones occurring.

Unfortunately, as time went on rapoko rose to famine prices, and I was forced again to use a mixture (on alternate days) of the two meals; finally, I was only able to issue rapoko to the actual patients, while the rest (a daily average of about eighty) had to have mealie meal until such time as any of them developed the disease and were put on the sick list. I was thus able to watch the effects of two different meals acting on a body of men, all living under exactly the same conditions, until I came to the following definite conclusions:

1. That the continued consumption of finely ground mealie meal, from which a large percentage of the husk had been removed, as a staple diet, produced zeism.

2. That those who ate rapoko did not contract the disease.

3. That prisoners who had not been outside the gaol walls for months contracted the disease if fed on mealie meal.

4. That sufferers from zeism invariably steadily improved under rapoko meal, until in periods varying from three weeks to seven months they showed no further signs or symptoms of it.

5. That its shortest incubation period was forty-two days. (Sambon⁴ gives an incubation period of only two weeks for at least one case of pellagra.)

6. That relapses were not seasonal, but occurred only in apparently cured cases that returned too soon to the mealie meal diet.

7. That the disease was in no way infectious or contagious.

I further noticed that the cooks never contracted the disease, and that any case suffering only mildly recovered rapidly when working in the kitchen, doubtless on account of the extra titbits that were to be procured there.

Symptoms.

Dr. C. R. Box⁵ has described the symptoms of pellagra under three heads—alimentary, cutaneous, and nervous—and, as his description is the fullest I know, I propose to draw largely on it in comparing them with those of zeism.

It will be noticed that zeism closely resembles pellagra in its alimentary, differs considerably from it in its cutaneous, and bears no relationship at all to its nervous symptoms.

It is also interesting to note that the symptoms of beri-beri and scurvy fall naturally under the same headings.

Gastro-intestinal Symptoms.

Pellagra (Box).	Zeism.
1. Tongue sore, coated, then peels red; sometimes fissured.	1. The same.
2. General stomatitis; gums swollen, spongy, tend to bleed; mucous membrane superficially ulcerated.	2. The same.
3. General pharyngitis.	3. The same.
4. Indigestion, diarrhoea, nausea, anorexia; sometimes vomiting.	4. The same.
5. Stools peculiarly offensive; mucus, sometimes blood.	5. No blood or mucus.
6. Proctitis, haemorrhoids.	6. Not observed.
7. Great loss of weight—10 to 40 lb. in a week.	7. The same.
8. Disturbances of alimentary system may be responsible for fatal termination.	8. Never.

In spite of the close similarity of these symptoms it must be borne in mind that they hold almost equally good for scurvy, and to a large extent for beri-beri also; in other words, they are the first and most noticeable symptoms in the large group of "deficiency" diseases, where some essential necessary for the normal physiological processes is absent or deficient.

Cutaneous Symptoms.

Pellagra (Box).	Zeism.
1. Dermatitis is seasonal and recurrent.	1. Not seasonal; relapses, not recurrent.
2. Symmetrical and sharply defined.	2. The same.
3. Predilection for extensor surfaces, and sometimes on elbows, perineum, and adductor regions from pressure.	3. Extensors of forearms only.
4. First appears on back of hands and wrist, forming a "pellagrous glove."	4. First appears on back of forearms; never extends to back of hands, and seldom to wrists; no "pellagrous glove."
5. Later "pellagrous mask" of cheeks and nose; back of neck and front of chest involved.	5. "Zeism collar" of neck begins when arms are first affected; then extends across forehead and under the eyes, sometimes with patches on cheeks; nose not affected.
6. Sometimes dorsal surfaces of feet; scrotum or vulva may be implicated.	6. Dorsum of feet only affected in severest cases from extension downwards of dermatitis; scrotum never affected; vulva not observed.
7. Sometimes axillary and inter-scapular regions affected.	7. Never.
8. Skin red, then inflammation subsides and brawny desquamation follows.	8. First appears in dark, somewhat rough patches, slightly raised; redness unobservable in the jet black native skins; dry skin peels off in large flakes during convalescence only. Slightly irritable only.
9. Severe cases may have bullae with serous or bloody fluid on inflamed areas.	9. Never bullae; the severer the case the blacker, thicker, drier, and rougher the dermatitis.
10. Skin becomes rough and thick from annual recurrences.	10. As attack passes off skin resumes its natural colour and softness; no annual recurrences.
11. Sometimes subcutaneous haemorrhages and fissures.	11. Never.
12. Ultimately cutaneous atrophy, skin becoming parchment-like.	12. Never.
	13. In severe cases the dermatitis spreads completely round the forearms, but does not extend above the elbow or below the wrist; also it may, after beginning on the calves, surround the legs, never above knee; rarely affects dorsum of foot.

In my original paper I used the expression "burnt areas" to describe the dermatitis of zeism, for that term seemed to suit better the jet-black, rough, and superficially hard surface of the affected areas.

Certainly the dermatitis in both pellagra and zeism has some strong points in common, but when their respective positions are considered in full, and those of zeism compared with the beautiful coloured drawing of pellagra which appeared in the JOURNAL of July 5th, 1913, their differences are even more striking than their similarities.

Nervous Symptoms.

Pellagra (Box).	Zeism.
1. Neurasthenic symptoms begin early, and may be earliest of all.	Nervous system not affected in any of the 40 cases observed.
2. Knee-jerks exaggerated; spinal pain on pressure.	
3. Symptoms referable to sclerosis of the posterior and lateral columns of the cord.	
4. Nystagmus and sphincter paralysis may occur.	
5. Speech hesitating.	
6. Ataxia, spasticity, myelitis; meningeal haemorrhage may occur.	
7. Jerky movements of muscles of face and limbs; possibly cerebellar fits.	
8. Neurasthenic symptoms tend to merge into permanent mental disorder, excitement, hallucinations, dementia.	
9. In from 4 to 10 per cent. suicide occurs.	

The complete absence of any nervous symptoms, even in the most severe cases, convinced me that zeism was not the same disease as pellagra. It is true that I have had no one particular case under observation and treatment for a longer period than twelve months, but, considering the early onset and severity of the nervous symptoms in pellagra, it seems hardly possible that no case out of forty of zeism should have developed a single symptom if the two diseases were identical. Again, it is possible that if my cases had not been detected and treated from their very onset, such symptoms might have appeared.

The prognosis in pellagra is bad, in zeism good. Only one of my earliest cases of zeism gave any cause for anxiety, and that was a patient whose weight fell from 140 lb. to 91½ lb. in five weeks; after twelve months he made an excellent recovery, and when discharged from gaol weighed 150 lb.; six months later I ascertained that his health was perfectly normal both physically and mentally.

Treatment.

The treatment in pellagra appears to be unsatisfactory, and chiefly symptomatic; it is, however, very interesting to see that Dr. Box says that we cannot on general principles be wrong in forbidding the use of damaged maize, that the importance of proteins and fats (cod-liver oil) is insisted on, and that active antiscorbutic measures are often beneficial, while Castellani and Chalmers⁶ tell us that "maize should be avoided."

In zeism there is a specific remedy, and that is that the staple article of diet must consist of some grain retaining a large proportion of its pericarp. The only grains I have had to deal with are mealies (*Zea mays*) and rapoko; the former, deprived of the greater portion of its husk, produced the disease; the latter, retaining its entire husk, both cured the disease and acted as a prophylactic. Meat and vegetables added to the diet were of great assistance; cod-liver oil was invaluable; from arsenic and phosphorus I had no good result. Kaffir beer (made from rapoko, and containing from 3 to 5 per cent. of alcohol) in time became my sheet anchor, though it was not always procurable. Given this treatment I felt confident that I could deal with the disease satisfactorily.

That the epidemic I had, and have, to deal with is a formidable one may be gathered from the fact that from March 5th, 1912, to September 1st, 1913, the number of days' work lost by the prisoners who suffered from the disease amounted to 1,210, not counting the mild cases, which were on light duty only. That no actual death occurred from it I attribute solely to the early recognition of its etiology, from which treatment and prophylaxis naturally followed.

Conclusion.

I do not wish it to be thought—for I am naturally not in a position to do so—that I am combating Dr. Sambon's *Simulium* hypothesis of pellagra, but as he insists that zeism is in reality pellagra, I have only attempted to justify both my diagnosis and etiology.

Beri-beri, scurvy, pellagra, and zeism form a group of diseases almost by themselves. Beri-beri, at least in the Malayan Archipelago, has been proved to be due to a deficiency of phosphorus pentoxide in white polished rice;² zeism, as I have attempted to show, is caused by the ingestion of mealie meal from which too much husk had been removed; scurvy, in Rhodesia, I have elsewhere suggested may be caused by some flaw in the milling process of the mealie (analogous to that of zeism), while a strong "zeist school" insists that pellagra "is a variety of food poison attributed to the use of maize as a staple article of diet" (Box). Finally, Mr. F. E. Place, Veterinary Lecturer to the Department of Agriculture of South Australia,⁷ draws a striking picture of the resemblance between beri-beri and scurvy in man and their analogues in horses and heifers, due, in his opinion, to the absence or deficiency of "vitamines," or protective substances, in the staple diet of all four cases.

If, therefore, I were inclined to support the zeist school in its etiology of pellagra, it would be solely on the lines that the elimination of the husk during the milling process of certain grains deprived the resulting meal of its "protective substances"—a view which I am not aware has been advanced before, and which is probably the key-note to the etiology of the above group of deficiency diseases.

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ANASTOMOSIS OF THE VAS DEFERENS.

BY

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TWICE recently I have had occasion to anastomose the vas deferens after division in operations on the spermatic cord. In making a junction I found the method illustrated by the accompanying diagrams simple and effective. The divided ends of the vas are passed over the eye

and point of a fine straight needle until they meet. A few points of suture are then inserted, and the needle is pushed out through the wall of the vas at a distance from the anastomotic junction. The line of sutures is wrapped round with neighbouring fascia to give additional strength. After salpingectomy the anastomosis of the Fallopian tubes could readily be accomplished by the same device.

THE German Surgical Society will hold its forty-third congress at Berlin in April (15th to 18th) under the presidency of Professor W. Müller of Rostock. Among the subjects to be discussed are the causes and treatment of post-operative ventral hernia, the remote results of transplantation of the thyroid gland in man, and tumours of the bladder.