temperature 102.4°, pulse 110, evening. March 23rd (fifth day) delicious in the night. Profuse yellow expectoration. Temperature 99.6°, pulse 100, morning; temperature 100.4°, pulse 100, evening. March 24th (sixth day) had a good night. Moist *râles* on right side, with comparative dullness half way up. Temperature 99.8°, pulse 100, morning; temperature 100.4°, pulse 92, evening. She was soon up, but continued weak for a while.

CASE III.—Miss B. S., aged 25. Had pain in the chest on April 1st. On April 3rd some cough. Friction heard on left side. April 4th friction on left front. Moist *râles* on left, behind. These signs

continued. The temperature, which was 105.4° on April 6th, fell to 99.4° on April 7th, and she steadily improved. The chart shows the course of temperature and pulse.

CASE IV.—M. S., aged 9, began on March 17th with high fever, and went to bed at once. Broncho-pneumonia was developed, and ran a regular course. The chart shows the temperature and pulse.

From these cases there can be no doubt that the son introduced an infectious disease, which attacked three other members of the family. He stayed at home on March 6th, and on March 17th the second case occurred. There were no other cases in the district, and these were the only cases of the kind I ever met with. I was led to the belief that they were cases of influenza, from having read of the epidemics which used to visit this country; and the symptoms and course of the disease seem to correspond with those of the influenza which is now epidemic.

From the chart of Case III this disease evidently has a primary and secondary fever, such as all diseases depending upon a bacillus have, the primary being caused by the presence of the bacillus, and the secondary produced by the effects of the bacillus on the system.

Dr. SAUNDBY'S *Lectures on Bright's Disease* have been paid the compliment of translation into German. The translator is Dr. W. Lewin, the publisher Hirschwald.

REPORT ON
THE VALUE OF SODIUM SILICOFLUORIDE
AS AN ANTISEPTIC.¹

By T. JESSOPP BOKENHAM, M.R.C.S., L.R.C.P.

FOR some years it has been an accepted idea among medical men that in antiseptics they would at length find the means of combating infective diseases (that is, those due to specific organisms). Experiments made by Dr. Theodore Cash, F.R.S.,² showed that corrosive sublimate, when administered to guinea pigs, would afford protection from anthrax, the animals under certain conditions living quite unaffected by the inoculation. The danger here lay, however, in the extremely poisonous nature of the antiseptic itself, and it has been a desideratum to find a less dangerous substitute.

Such, I thought, might be the silicofluoride of sodium which was introduced to my notice some months back by Messrs. Burroughs, Wellcome, and Co. With regard to this substance the following particulars may be interesting, as they formed the basis of my subsequent work. It was introduced by Mr. Wm. Thomson, F.R.S.E., who, in a paper before the British Association in 1888, claimed that it was a powerful antiseptic, non-volatile, colourless, sparingly soluble in water, neutral, and above all, non-poisonous. Its saturated aqueous solution, 0.61 per cent., was unirritating, although large doses of the solid acted as an emetic. However, as much as 7 grains had been taken as a dose, though perhaps it was not desirable to take more than $\frac{1}{2}$ to 1 grain. Its antiseptic properties were demonstrated by adding the salt (1 to 700) to flour paste, or 1 to 200 to an infusion of chopped meat in water. The mixtures were placed in an incubator, and watched. After several days they were entirely free from either mould or decomposition. This was a more successful result than could be obtained with corrosive sublimate (1 to 500). The salt acted like alcohol in retarding the action of pepsin in albuminous bodies.

Mr. Robson, F.R.C.S.,³ used the drug as an antiseptic in a great variety of surgical cases, and considered it specially useful in those cases in which there might be risk from absorption, if mercuric chloride were used.

Dr. Conrad Berens* found a solution of 1 to 1,000 strong enough to prevent all decomposition of vegetable and meat infusions, even when these were exposed for some weeks. He also found that a dose of 10 gr. in $\frac{3}{4}$ iv of water could be borne without inconvenience, taken on an empty stomach and repeated three times daily for seven days.

After reading these accounts, I thought it would be interesting to undertake a series of experiments on the germicidal value of the substance given internally, working on the lines of Dr. Cash,⁵ who found that a solution of mercuric chloride administered to an animal would protect it from the effects of a subsequent inoculation with anthrax. Before, however, undertaking this Dr. Brunton suggested that it would be well to first test the action of the drug on fermentation. This I proceeded to do. I took four flasks, and filled them as follows: Flask 1 contained 8 oz. glucose solution in water, sp. gr. 1040 at 15° C.; Flask 2 contained 8 oz. glucose solution in Na₂ Si F₆ soln. (1 to 150), sp. gr. 1040 at 15° C.; Flask 3 contained 8 oz. glucose solution in Na₂ Si F₆ soln. (1 to 300), sp. gr. 1040 at 15° C.; Flask 4 contained 8 oz. glucose solution in Na₂ Si F₆ soln. (1 to 600), sp. gr. 1040 at 15° C. To each I added a definite quantity of fresh yeast, and then plugged the necks, placing the flasks in an incubator at temperature 25° C. The specific gravities were taken every twenty-fours during seven days. It was thus found that the solution in Flask 1 became of lower specific gravity, whilst that in the others remained unchanged.

In experimenting with weaker solutions I adopted another method. A number of tubes of equal length and calibre were taken. These were filled with solutions of Na_2SiF_6 of various strengths, each containing besides equal weights of glucose. Some actively growing yeast was then added; the tubes were inverted over pure mercury and placed in an incubator. The volume of CO_2 formed by the fermentation could thus be observed from day to day. The result is shown in the accompanying table:—

¹ The expenses of this research were defrayed by the Therapeutic Committee of the British Medical Association.

² Report on Certain Chemical Disinfectants.

³ JOURNAL, May, 1888.

⁴ *Therap. Gaz.*, 1888, p. 443.

⁵ *Loc. cit.*

TABLE.
Tubes $6\frac{1}{2}$ inches. Yeast fresh, in active growth.

Tube No.	Proportion of Na_2SiF_6 .	Day 1.	Day 2.	Day 3.	Day 4.	Day 5.	Day 6.	Day 7.	Day 8.	Day 9.	Day 10.	Day 11.	Day 12.
1	Control	3 in.	6 in.	*	—	—	—	—	—	—	—	—	—
2	Satd. 1: 150	0	0	†	—	—	—	—	—	—	—	—	—
3	½ satd. 1: 300	0	0	†	—	—	—	—	—	—	—	—	—
4	¼ satd. 1: 600	0	0	†	—	—	—	—	—	—	—	—	—
5	⅓ satd. 1: 750	0	0	†	—	—	—	—	—	—	—	—	—
6	½ satd. 1: 900	Small bubble	—	—	—	—	Large bubble	Not observed	6 in.	*	—	—	—
7	¾ satd. 1: 1050	Large bubble	—	—	—	—	—	1 in.	—	4 in.	6 in.	*	—
8	satd. 1: 1200	2 bubbles	2 bub.	4 bub.	4 bub.	—	—	—	—	4½ in.	—	Empty	—
9	¾ satd. 1: 1800	1 bubble	—	—	—	—	—	2 bubbles	—	1½ in.	3 in.	4½ in.	5 in.†
10	½ satd. 1: 7750	1 bubble	½ in.	3 in.	—	—	Empty	—	—	—	—	—	—

* Completely fermented. † No fermentation. ‡ Completely fermented; control empty on sixth day. § Separate control tube for these two experiments.

From these experiments it will be seen that a solution of Na_2SiF_6 (1 to 750) will entirely prevent alcoholic fermentation; that solutions (1 to 900 and 1 to 1,050) will delay fermentation for a time, but that these latter cannot be considered truly antiseptic, as the growth of the yeast was only delayed.

[Experiments just lately performed with nutrient gelatine containing Na_2SiF_6 (1 to 3,000 and 1 to 2,000) have shown that this proportion is quite without effect on the growth of the bacillus anthracis, and that there is no diminution in the virulence [of bacilli cultivated through several generations] on this pabulum.]

I next proceeded to try the effect of prolonged administration of the drug to guinea pigs.

EXPERIMENT I.—A saturated tepid solution of Na_2SiF_6 was made in saline solution, 75 per cent., and of this 4 cubic centimetres were injected into the peritoneal cavity of a guinea pig (weight 1 lb. 14 oz.). A short time after the injection it was found with abdomen rigid and legs thrown out; temperature 38°C . in rectum. In spite of all efforts to recover the animal, it became collapsed, with temperature 26.5°C ., and abdomen intensely tender. I then killed the animal, and found marked signs of peritonitis. No injury could be found attributable to the puncture of the syringe.

EXPERIMENT II.—Guinea pig (weight 10 oz.) 0.033 grammes, in warm saturated solution, were injected into the stomach with an œsophageal tube. Animal evinced uneasiness soon after injection; its abdomen became much distended, and it died after fifty-five minutes. *Post-mortem* appearances as follows: Stomach much dilated, with vessels injected; no signs of injury by the tube; full of pulpy food, with much thick mucus and gas. Intestines contained similar mucus. Heart arrested in diastole. Other organs normal.

EXPERIMENT III.—Guinea pig (female). On April 24th, injected 0.02 grammes in solution (1 to 300) into stomach. In three hours repeated the dose. April 25th. Animal quite well and lively. Injected during the day 0.1 gramme of the salt. April 26th. Again injected 0.1 gramme. April 27th. Animal quiet but feeds well. Injected 0.05 gramme in a single dose. Three hours afterwards it appeared uneasy, with some swelling of abdomen. Respiration became slow and laboured, and the animal seemed collapsed; temperature, 33°C . Shortly after this it died. *Post-mortem* appearances exactly as in Experiment II.

After this experience I had grave doubts as to the utility of trying further the internal administration of the drug. Still, I wished to control the statement as to its harmless nature when taken internally by man. My friend, Mr. Blackman, and I had noticed after drinking some of the saturated solution a feeling of distension of the stomach, with tendency to eructations, but had not thought of attributing these effects to the drug.

On April 28th, after a mixed meal, I took 0.05 gramme of the solid. I did not notice any effect for an hour, but, about that time after, a feeling of great nausea with eructations came on. This lasted several hours, and I felt utterly unable to do anything; the pulse was at the same time greatly slowed, tension being reduced. Next day all symptoms had passed off. Three of my friends, medical students, agreed to repeat my experiment on themselves. Each took a dose of 0.05 gramme, and the same feeling of nausea with eructations followed; the effects did not, however, last so long as in my case.

I think the above facts were sufficient to justify my abandoning the research. It is strange that my results did not tally with

those of other observers, as I used a salt of great purity, and apparently identical in all respects with the one previously used.

In conclusion, I have to offer my best thanks to Dr. Lauder Brunton for his valuable advice, as well as for the use of his laboratory; and to Messrs. Burroughs, Wellcome, and Co. for the pains they took in procuring me an absolutely pure salt.

I feel that no apology is due for the appearance of the foregoing notes, as sodium silicofluoride seems to have been somewhat widely advertised, and I have frequently been asked whether it is a safe internal remedy. My experience will, at any rate, make others hesitate before they advise its use internally.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, ETC.,

INFLUENCE OF THE INFLUENZA WAVE ON PUERPERAL AND MENSTRUATING WOMEN.

It is a matter of common observation that the influenza wave—whatever be the nature of the morbid influence borne upon it—acts in strikingly different ways upon different individuals, according to differences of age, constitution, or pre-existing disease or proclivities. Some cases I have seen in puerperal and menstruating women suggest to me the importance of observing closely the clinical history of similar cases, carefully noting the hygienic surroundings and the meteorological record. This is an opportunity that should not be lost of studying some of the relations of meteorology to health.

ROBERT BARNES.

THE ETIOLOGICAL RELATIONS OF INFLUENZA.

BEFORE a specific form for this epidemic infection can be determined, some thought is due to the class of infection to which it belongs. All infective particles fall into two classes; for the one the living animal body is the only medium where the germ can be reproduced in its full vigour, those of the other class can increase in external media.

Keeping to the infective fevers, we may note the help gained from artificial cultures of certain germs associated with them, even when their specific infective power is weakened or lost in the process. Thus the rapid growth of the anthrax bacillus and the conditions under which it will or will not produce spores is instructive; also Koch's demonstration of the slower development of his bacillus tuberculosis, the steady high temperature close to that of the blood needed, and the fact that it does not sporulate in the air show why it is not a widely diffused aerial infection, and hardly to be reproduced or multiplied outside the living body. On the other hand, the germs of ague and remittent fevers, capable of growth and increase in the living body, so far lose their infective power as only to be revealed by uncertain inoculation, flourish and maintain their fullest powers in favourable external conditions indefinitely.

Ague, then, is the type of the second class of infection, small-pox and measles are typical of the first. Diseases of this class are not only directly infectious, they are propagated only by direct infection; moreover, one attack is protective against a recurrence.