is necessarily somewhat speculative. There is, however, evidence, particularly in the recent work of Kraft,¹⁰ that one of the most active water-soluble glucosides is strikingly unstable. And the present inquiry has shown that alcoholic solutions of the less soluble active glucosides are more stable than the officinal tincture. It appears from these considerations that the deterioration of a tincture may chiefly be due to loss of its water-soluble glucosides. If this is correct, a fresh tincture is equivalent to a (moderately) stale sample *plus* a quantum of fresh infusion, and the supplementing of a weak tincture by a fresh infusion might prove more serviceable than heavy dosage with the tincture alone. It may be anticipated that the former course would yield earlier digitalis effects with less risk of cumulation.

My thanks are due to the Science Committee of the British Medical Association for a grant towards the expenses of this research.

CONCLUSIONS.

1. Few tinctures of digitalis are, initially, below standard.
2. Tinctures, not below standard, vary 200-300 per cent. in initial activity.
3. All such tinctures, after a variable period of constant activity, undergo deterioration, which may commence

within a month of manufacture, and may amount, in a year, to 70 per cent., or more, of their initial activity.

4. Concentrated alcoholic extracts of digitalis leaf compare favourably with, and behave as, the *British Pharmacopoeia* tincture.

5. Solutions of crystalline French digitaline (German digitoxin) are more stable than the above.

6. Commercial "non-alcoholic" tinctures, and allied preparations, are not trustworthy.

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A CASE OF ACUTE RHEUMATIC HEART-BLOCK.

BY

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THE chief interest in this case lies in the number of electro-cardiographic and polygraphic records taken before, during, and after the occurrence of acute partial heart-block in a rheumatic child.

S. P., a boy aged 12, had occasional sore throats up to the age of 10 years, when he was admitted to the London Hospital with pericarditis and acute rheumatism. In the following year, 1913, he was again admitted for a much milder attack of acute rheumatism. On discharge he was transferred to the Cardiac Department under Dr. James Mackenzie. He complained frequently of precordial pain as an out-patient, and two months later, February 16th, 1914, he was again admitted as the precordial pain had become more severe. He then had rheumatic nodules and mitral and aortic regurgitation; on deep inspiration the sternum was held down and there was slight sinking of the epigastrium suggesting pericardial adhesions. On the fifth day after admission he developed tonsillitis which lasted five days. Following this

For a fortnight after admission his *a-c* interval, the measure of the time taken for an impulse to pass from auricle to ventricle, was normal—that is less than $\frac{1}{2}$ second, as shown by daily polygraphic tracings. On the electrocardiogram the *P-R* interval, the electrocardiographic equivalent, approximately, of the polygraphic *a-c* interval, was also less than $\frac{1}{2}$ second. The *a-c* interval then increased beyond $\frac{1}{2}$ second and remained prolonged for ten days before dropped beats resulted. The dropped beats only occurred on two days, though the degree of block on these days reached the ratio (auricle to ventricle) of 2 to 1 (see tracing). On the day before the dropped beats commenced the pulse-rate was 106, on the two days during which dropped beats occurred it was 75 and 74, and on the following day it was again 104. These pulse-rates were counted on the polygraphic tracings taken at approximately

the same hour each day. The drop in the rate was due to the falling out of ventricular contractions. Electrocardiograms at this time showed a prolonged *P-R* interval, and a block varying in ratio of auricle to ventricle as 3 to 2 or as 2 to 1. For another week the *a-c* interval remained increased beyond $\frac{1}{2}$ second, during which time the *P-R* interval was also well over $\frac{1}{2}$ second; it then returned to normal

Chart showing the pyrexia accompanying the heart-block.

mal and, except on one day, remained normal for the remaining three weeks of his stay in hospital. The block had lasted for eighteen days. When examined ten days after discharge the *a-c* interval was still normal.

Polygraphic tracing showing an irregularity of the pulse caused by "dropped beats" in heart block. The block varies between 3 to 2 and 2 to 1.

attack he had slight irregular pyrexia for nearly four weeks. During the later part of this period he developed the heart-block (see Chart).

It is interesting to note that except for pyrexia there were no symptoms referable to the block, and without

Date.	Temperature.	Pulse.	Respiration.	a-c Interval.
Feb. 23 ...	° F. 98.6	94	20	—
.. 24 ...	99	88	22	Less than $\frac{1}{2}$ sec.
.. 25 ...	99	88	24	—
.. 26 ...	100	86	22	—
.. 27 ...	99.6	82	20	Less than $\frac{1}{2}$ sec.
.. 28 ...	99	84	24	—
Mar. 1 ...	99	80	26	Over $\frac{1}{2}$ sec.
.. 2 ...	97.6	94	22	" "
.. 3 ...	98.4	88	24	—
.. 4 ...	99	92	24	Over $\frac{1}{2}$ sec.
.. 5 ...	99	92	28	" "
.. 6 ...	99.6	100	26	" "
.. 7 ...	101	96	24	" "
.. 8 ...	101.8	106	26	—
.. 9 ...	103.2	106	32	—
.. 10* ...	100	75*	30	Over $\frac{1}{2}$ sec.
.. 11* ...	101.2	74*	32	" "
.. 12 ...	100.2	104	34	" "
.. 13 ...	101	110	28	" "
.. 14 ...	100.4	100	32	" "
.. 15 ...	99.4	106	32	" "
.. 16 ...	99.6	102	32	" "
.. 17 ...	97.4	102	34	" "
.. 18 ...	98.4	98	34	" "
.. 19 ...	98	92	32	Less than $\frac{1}{2}$ sec.
.. 20 ...	98	94	22	" "
.. 21 ...	98	108	26	$\frac{1}{2}$ sec.
.. 22 ...	98.6	100	24	Less than $\frac{1}{2}$ sec.

Heart-block.

* Dropped beats.

polygraphic records myocardial involvement could not have been diagnosed until the dropped beats occurred. The irregularity of the pulse caused by failure of ventricular response to auricular contraction in heart-block can be distinguished, as it was in this case, from premature contractions (extra-systoles) by the fact that the weak heart sounds of premature contractions are absent in the long pauses. Polygraphic confirmation of this interpretation was obtained, and this is always advisable on account of the difference in the importance of the two conditions as regards prognosis and treatment.

Though the case was one of rheumatic heart-block, it developed apart from an attack of acute articular rheumatism. The evidence of rheumatic infection was the presence of numerous rheumatic nodules, and incidentally the attack of tonsillitis.

By analogy with similar cases, acute and chronic, which have been examined histologically, it is assumed that the pathology in this case is a round-celled infiltration in the bundle of His caused by the rheumatic infection.

The case emphasizes the damage which may be done to the heart of a rheumatic child apart from a definite attack of acute rheumatism. It is only by graphic records that a positive diagnosis of acute myocarditis can at present be made. Acute myocarditis may be present without involvement of the auriculo-ventricular bundle, when the diagnosis can only be inferred rather than proved.

MR. WILLIAM BRUCE CLARKE, formerly senior surgeon at St. Bartholomew's Hospital, left estate of the gross value of £16,596, of which £9,261 is net personalty.

The council of the county borough of St. Helens have confirmed a resolution of the Health Committee that midwives should be instructed to notify to the medical officer of health forthwith on being engaged to attend a woman in her confinement, in order that advice may be given to expectant mothers and suitable arrangements made in certain cases for their assistance.

THE INFLUENCE OF THE TOTAL FUEL-VALUE OF A DIETARY UPON THE QUANTITY OF VITAMINE REQUIRED TO PREVENT BERI-BERI.

BY

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F.R.C.S.

(From the Lister Institute.)

(Preliminary Communication.)

It is now taken as settled that beri-beri is essentially privatory in origin, resulting from the deficiency in the food supply of a substance the precise nature of which has not yet been ascertained.

If this simple explanation were complete, it would follow that the more thorough the withdrawal of the active substance, the speedier would be the onset of the disease and the more severe its effects. Several investigators, however (Maurer,⁶ 1907; Cooper,³ 1913; Caspari and Moszkowski,² 1913, and Funk,⁴ 1914), have shown that the onset of polyneuritis in birds can be hastened by increasing the ration of polished rice. From this it appears that when the food ration is increased by the addition of carbohydrate material, for example, polished rice, with a very low content of antineuritic substance, although the daily allowance of the essential substance is slightly increased, the development of polyneuritis is actually accelerated.

Analogous observations have been made in the course of the epidemiological studies of human beri-beri. Thus it has been found by nearly all observers¹ that in epidemics of beri-beri the well nourished are the first to succumb, and are actually more liable to the disease than the underfed. Similarly, under natural conditions men, owing to their larger energy output, partake of polished rice more freely than women, and are more liable to beri-beri. In institutions, however, where men and women have the same fixed ration they are equally susceptible to the disease. Again, in prisons and asylums, in which the dietary has been varied from time to time, every increase in the polished rice component of the diet, the ration of other foodstuffs remaining constant, has been followed by increased beri-beri.

From these observations Braddon drew the conclusion that in rice-eating communities the extent and severity of beri-beri vary directly with the quantity absolute or relative of polished rice consumed.

Admitting, then, that in the production of beri-beri a deficiency in the diet of a certain substance is an essential factor, it is evidently of practical importance to ascertain the part played by the substance in metabolism, and, if possible, to determine the quantitative relations which the intake of active material must bear to that of the other components of the dietary, in order that the requirements of the organism can be covered.

With this object in view a study has been made of the effect upon the onset of polyneuritis in birds of increasing the carbohydrate ration of the dietary, and the main experimental results are briefly summarized in this preliminary communication, and will be shortly published *in extenso* in the *Journal of Hygiene*. The observations were made at Seremban, Federated Malay States, during the years 1909-11, and at the Lister Institute during 1913-14.

It is now a well-established observation that chickens fed on $\frac{1}{2}\%$ their body-weight of polished rice develop polyneuritis in twenty to seventy days, whereas those fed on the same daily ration of unpolished rice (padi), "cured" or parboiled rice, and "fresh" rice (partly polished) remain free from the disease. Braddon found, however, that birds when fed on $\frac{1}{2}\%$ their body-weight of parboiled rice, which has been soaked for twenty-four hours in water and then strained off, develop polyneuritis just as when fed on ordinary polished rice, and epidemics of beri-beri have been traced to the practice of soaking unpolished rice prior to cooking, and discarding the water.

The effect of adding carbohydrate to a diet which itself was adequate to maintain birds in health was first studied, and experiments made on forty birds showed that, while chickens fed on $\frac{1}{2}\%$ their body-weight of padi remained free