

a perpetual calendar, and he need not have notched his tree.

It is said that there is nothing new under the sun, but this appears to me to be an original invention and a brilliant one.

F. HOPE-JONES.

(Chairman, British Horological Institute.)
The Synchronome Co., Ltd.,
32 and 34 Clerkenwell Road,
London, E.C.1.

The Amani Research Institute.

MAY I be allowed to add to the timely and sympathetic article on the Amani Research Institute in NATURE of June 20, p. 933, some notes on a point not emphasised by you, namely, the possibilities of Cinchona cultivation at Amani?

From the outbreak of war in 1914 Amani was used as a refuge camp for women and children, and, until its occupation by the British in 1916, its resources, thanks to the abilities of the German scientific staff, were ruthlessly exploited for the benefit of the German armies in the field. Thus, of the "economic products," catalogued under 67 heads, manufactured at the Institute, may be mentioned 830 kgm. of "plant butter" from the seeds of *Allanblackia Stuhlmannii*, 15,000 bottles of "Amani whisky" (a fearsome liquor) and medicinal alcohol, and about 400 bottles of castor oil. But most important of all were 136 kgm. of quinine sulphate, extracted at Amani, and 4000 kgm. of Cinchona bark sent to be worked up at the veterinary station at Mpapua. Prof. A. Zimmermann, the German Director of Amani, came to East Africa from Java, and brought with him both seeds of Cinchona and a knowledge of its cultivation: and the quinine plantations in the event proved one of the best investments the German Government ever made. They certainly helped materially to keep the German troops in the field. Of the three varieties of Cinchona grown in the Institute grounds—*C. Ledgeriana*, *C. succirubra*, and a hybrid (Java seed) between these two—the last assayed so well and earned so remarkable a report from the Imperial Institute that it is deserving of a wide publicity. Full details can be found in the Bulletin of the Imperial Institute, vol. 16, No. 3: I need only extract the analysis of the bark:

No. 4. *C. Ledgeriana* × *C. succirubra*.

	Per cent.
Moisture	7.50
Total alkaloid	11.30
Quinine	8.41
Cinchonidine	nil
Yield of crystallised quinine sulphate	11.21

and the manufacturer's opinion:

"The manufacturers stated that sample No. 4, the hybrid from *C. Ledgeriana* × *C. succirubra*, is one of the highest quinine-yielding barks they have examined, being fully equal to the finest Ledger bark from Java."

So far as experience has gone, Cinchona flourishes in East Africa only in the East Usambara Mountains, where the atmosphere is moist and the temperature remarkably low for the elevation (under 4000 ft.). Certainly I have not heard of its doing really well elsewhere in Tanganyika Territory, or in Kenya Colony. But in the neighbourhood of Amani there are thousands of acres of virgin forest land which appear to be suitable for Cinchona. My instructions, in view of the report on the hybrid, were to devote special attention to quinine cultivation, and when I left Amani at the end of 1923 we had some promising plantations of *Ledgeriana* and the hybrid (Amani

seed) coming on, and, thanks to Prof. Greenish and the Director of the Wellcome Bureau of Scientific Research, some assays of the bark of known, mature hybrid trees, which confirmed the original analysis and promised to open up a tempting field of research. It had always been my hope that eventually Amani would do for the East African Colonies what Sir David Brain had done for India, and supply most of the quinine needed locally, particularly for native consumption.

ALEYNE LEECHMAN.
(Lately Director, Amani
Research Institute.)

The Bedford Natural History and
Archæological Society,
Harpur Street, Bedford.

**Spectroscopic Evidence of J-Transformation
of X-rays.**

IN our letter to NATURE of April 25 on spectroscopic evidence of J-transformation of X-rays, we pointed out that there are alternative conclusions regarding the experimental results which were taken from the Table V. given by Prof. Siegbahn in "Über die Röntgenspektren der chemischen Elemente," Jahrbuch der Radioaktivität, 1916. These conclusions are: either the wave-length determinations quoted are inaccurate to the extent of more than 1 per cent., or the discontinuities which occur in $K\alpha_1$, $K\alpha_2$, $K\beta$ are real and are due to J-transformation of X-rays. Prof. Siegbahn gives as his judgment that the irregularities are due to experimental error: we accept this.

The values given in the Jahrbuch are evidently those of Malmer—according to Prof. Siegbahn "not very concordant measurements" (NATURE, July 4, p. 11). At the same time Prof. Siegbahn states that Malmer's "measurements give no evidence of such a sudden change in the slope of the curve as shown in the letter of Messrs. Khastgir and Watson." We should like to point out, however, that the irregularities referred to by us have been noticed independently by J. M. Cork (*Phys. Rev.*, Feb. 1925, p. 197). Further, Günther, so late as 1924, has quoted these same values in a booklet of X-ray spectroscopic measurements, and we employed them because they constituted at that time the only available complete set of wave-lengths throughout the region where the J-phenomenon appears.

Mr. Nipper (NATURE, July 4, p. 12) is evidently not acquainted with the facts concerning the J-phenomenon (see *Phil. Mag.*, May 1925), otherwise he would not have advanced as evidence against our main contention the fact that Siegbahn's later—or for that matter, any other spectroscopist's—values do not show a discontinuity (increase in λ as Z is increased from 51 to 52). It was explicitly stated in our letter, and it has been emphasised by Barkla on many occasions, that wave-length is not the only factor which determines whether or not J-transformation of X-rays takes place in transmission through matter. Certain critical conditions are necessary: the character of the whole of the radiation transmitted appears to exercise a very important controlling influence (see NATURE, June 20, 1925, p. 942). The J-transformation evidently did not occur in the case of Siegbahn's recent determinations of wave-length, and we therefore obtain from them no evidence of the J-phenomenon.

S. R. KHASTGIR.
W. H. WATSON.

Physical Laboratory,
University of Edinburgh,
June 19.