chromosome as it is seen in *c* is due to excessive pressure in squashing the preparation.

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Nov. 18.

[1] Manton, I., NATURE, **150**, 548 (1942).
[2] Husted, L., *Genetics*, **21**, 537 (1936).

IT is perhaps unnecessary for me to inquire into the reasons for the assumption that the evidence from dicentric bridges in Tragopogon is incompatible with the existence of a telophase split in Todea, for the suggestion that the chromosome figured by me was a dicentric is not borne out by anything in the specimen itself. The accompanying diagram, based on my previously published photograph *b*, shows the region referred to. The two distorted chromosomes are labelled *chr* 1 and *chr* 2, *chr* 1 being that under discussion. In it "two distinct and separate threads have been forced widely asunder", the separation starting at a point near the intersection with *chr* 2 (which is not otherwise of interest) and continuing to the distal extremity of the chromosome. Near this end both threads experience a sudden bend and the only point of uncertainty is whether or not they also cross over each other at this point.

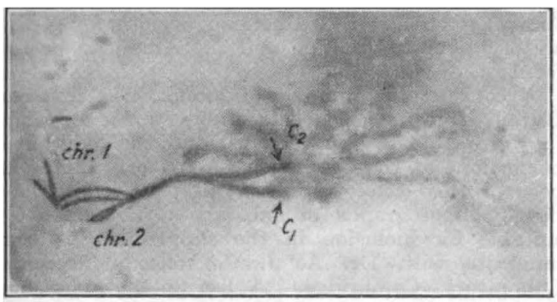

DIAGRAM DRAWN OVER A MATT-SURFACED PRINT OF THE PREVIOUSLY PUBLISHED PHOTOGRAPH *b*. FOR EXPLANATION OF LETTERING SEE TEXT.

The centromeres in both *chr* 1 and *chr* 2, as in all other chromosomes of this plant, are terminal or nearly so and their approximate positions are indicated by arrows and the letters *c* 1 and *c* 2. Owing to the predominance of terminal centromeres the question of short arms, in the form raised by Dr. Koller, does not arise. There are likewise no acentric fragments present, though some cytoplasmic inclusions may perhaps give the illusion of such in the reproduction and be the objects referred to by Dr. Thomas.

The suggestion made by Dr. Koller (if I have understood him aright) that the distal bend is a centromere is discountenanced by comparison with the sister nucleus. The significant part of this was shown in my previous photograph *a*. Had I anticipated that the number and position of centromeres would have been under discussion it would have been easy to show every chromosome in this nucleus by using two or three different focal levels. The level chosen was thought to be sufficient to indicate that the chromosomes were clearly distinguishable and were not disturbed in position. The full haploid complement of chromosomes was present in this nucleus, and therefore if *chr* 1 in the other plate was at any time a bridge it would be necessary to assume it to be a bridge which has broken and been displaced without leaving a trace of its former presence in the sister cell. This appears to me to be highly improbable and has not indeed been claimed.

My opinion that the cell in question was normal is naturally based on a wider knowledge of the material than the one specimen described. I am also acquainted with the appearances caused by dicentrics and fragments in some other organisms, but I have never encountered a case of the kind in the Osmundaceæ. Some positive evidence would therefore be required before one could assume the spontaneous production of chromosomal abnormalities of this kind in a healthy germination of fresh spores from a normal plant.

Further discussion may perhaps be left to the fuller statement which, as indicated in my former note, will be published elsewhere. Additional evidence, which is abundantly to hand, can then more easily be provided.

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Nov. 25.

Catalysts for Sodium Chlorate in Weed Destruction

BATES[1] has shown that vanadium pentoxide acts as a catalyst for sodium chlorate in weed destruction, and suggests the possibility of enhancing the value of this salt as a herbicide by the employment of a catalyst.

Compounds of manganese, cobalt and nickel act as catalysts in many oxidation processes. These metals frequently occur in plant tissues, and the first two are known to play an important part in their life processes, probably on account of their catalytic action. The effect of compounds of these metals on sodium chlorate, and on a proprietary weed-killer, 'Atlacide', which contains sodium chlorate and calcium chloride, has been investigated. The experiments included laboratory and small field tests. A few tests were also carried out with vanadium pentoxide.

The laboratory tests were made on the trailing stems of the Canadian blackberry, the wild dog-rose, and the wild bramble. The cut ends of the stems were placed in tubes each containing 50 c.c. of the solution under test. In most cases ten specimens were tested with each solution. The tests were as follows:

(1) Canadian blackberry stems in solution containing 10 per cent of sodium chlorate, and also with the addition of 0·03 per cent $MnCl_2.4H_2O$*; 0·03 per cent $MnSO_4.4H_2O$*; 0·02 per cent $KMnO_4$; 0·04 per cent $CoCl_2.6H_2O$*; 0·04 per cent $NiSO_4.6H_2O$*.

(2) Canadian blackberry stems in solution containing 5 per cent of sodium chlorate, and also with the addition of 0·015 per cent $MnCl_2.4H_2O$; 0·015 per cent $MnSO_4.4H_2O$; 0·01 per cent $KMnO_4$; 0·02 per cent $CoCl_2.6H_2O$; 0·02 per cent $NiSO_4.6H_2O$; 0·03 per cent $MnCl_2.4H_2O$; 0·03 per cent $MnSO_4.4H_2O$; 0·02 per cent $KMnO_4$; 0·04 per cent $CoCl_2.6H_2O$; 0·04 per cent $NiSO_4.6H_2O$.

(3) Wild bramble stems in solution containing 2·5 per cent of sodium chlorate, and also with the addition of 0·015, 0·03, and 0·06 per cent $MnCl_2.4H_2O$.

(4) Wild bramble stems in solution containing 2·5 per cent of sodium chlorate, and also with the addition of 0·015 and 0·03 per cent $MnCl_2.4H_2O$; and 0·01 per cent V_2O_5.

(5) Wild bramble stems in solution containing 2·5 per cent of sodium chlorate, and also with the addition of 0·06 per cent $MnCl_2.4H_2O$; 0·08 per cent $NiCl_2.6H_2O$; 0·08 per cent $CoSO_4.6H_2O$.

(6) Wild dog-rose stems in solution containing 2·5 per cent of sodium chlorate, and also with the addition of 0·015 and 0·03 per cent $MnCl_2.4H_2O$; and 0·01 per cent V_2O_5.

(7) Wild bramble stems in 1 part 'Atlacide' concentrate to 3 parts water, and also with the addition of 0·03 per cent $MnCl_2.4H_2O$; and 0·04 per cent $CoCl_2.6H_2O$. The diluted concentrate contained 4·825 per cent $NaClO_3$.

(8) Wild bramble stems in a solution containing 0·06 per cent $MnCl_2.4H_2O$; 0·04 per cent $KMnO_4$; 0·08 per cent $CoSO_4.6H_2O$; 0·08 per cent $CoCl_2.6H_2O$; 0·08 per cent $NiSO_4.6H_2O$; 0·08 per cent $NiCl_2.6H_2O$.

* Approximately equal to 0·02 per cent of the anhydrous salt.