NOTES ON A GRAFT-HYBRID.

(By L. Rodway, Government Botanist.)

Plate X.

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Recently Mr. Osborne, the fruit expert in the Agricultural Department, handed me an apple of which one-half was typical Roman Beauty and the other as surely Senator. There was no blending; the division was longitudinal through the median plane and as clearly defined as it was possible to be.

The apple was grown in the orchard of Mr. Bourne, Premaydena, South-East Tasmania.

The following note is sent with it from Mr. Ward, assistant fruit instructor:—

> "The apple was picked from a Roman Beauty tree which had been grafted on a Senator stock. The tree is young, as far as I know seven or eight years old. This was the only apple of its kind on the tree."

Judging from its history and appearance there seems little escape from the conclusion that this is a genuine case of graft-hybridism. Reversion would not have given us a fruit with such a well-marked distinction of character in the two halves. Cross-fertilisation has not yet demonstrated more than at most a slight general influence. The chance of mutation producing such a sport, bearing half the character of the stock and half of the scion, is unthinkable. Till some other reasonable explanation is forthcoming we must fall back on the belief that the Senator stock is responsible for the presence of the Senator half-fruit. This belief is not new, but its present advance is justified from its unmistakeable authenticity. A considerable difficulty arises when we try to account for the phenomenon. One apple alone was influenced. In other recorded cases it is always a case of partial, not general, influence. Even in experiments with potato tubers the characters are not blended. This points to a vitalistic, not nutritional, cause. If vitalistic, it must be due to a migrating nucleus or an influence transmitted through protoplasmic filaments connecting stock and scion. If the protoplasts of stock and scion become continuous through such filaments we would expect any influence transmitted to be general, and not as

GR[illegible] S[illegible]OR — ROME BEAUTY

[illegible]

fortuitous as is this instance. Besides this, if characters may be transmitted along the filaments, we must reconsider our present position in regard to heredity. There is no evidence to prove it, but the simplest conclusion would be that of a migrating nucleus. It is quite out of the question that a nucleus can have migrated through normal tissue from stock to varying bud. Even if fragmented it does not seem to be feasible. We require a more direct route for the entire nucleus. Such a course may be provided by the conditions of grafting. A wound is made in the cambium of the stock. Many cells are opened and their nuclei set free. There is fair reason to believe that freed nuclei, under suitable conditions, may retain vitality for a considerable time. A bud or twig of a scion is thrust into the wound and bound round with isolating material. The scion starts into growth; a vigorous transpiration current is set up in the vessels, and it is not at all unreasonable that some of the free nuclei may be carried by the current to the growing point. If such living nuclei can maintain themselves under these conditions it requires no violence to biologic ideas to conclude that they may assert their presence at the growing point and produce the characteristic form of variety from which they came.

The plates are the work of Mr. L. Dechaineux.