We must not suppose that the villa was the commonest, though it was the most remarkable, type of agricultural life in Roman Britain. The greater part of the population still lived, as of old, either in isolated farms of a primitive kind, or in native village communities. The inhabitants still cultivated their small, enclosed fields, the ghostly lines of which have been revealed by air-photography cutting athwart the larger fields of a later Britain.

What was the total population of Roman Britain? We do not know. Scholarly conjecture has placed it sometimes at half a million, sometimes at a million. At any rate there were many fewer inhabitants than at the end of the Saxon period, when a vast acreage of the best land had been won from the wilderness, and hundreds of villages had been planted on land that was forest or marsh when the Romans left the Island. Students of Domesday Book have calculated that there may have been a million and a half folk in England in the age of Harold and William of Normandy. Even that estimate may be incorrect, though it has something to go upon. But whatever the numbers may have been in the England of Domesday, it is certain there were many fewer in the Britain ruled by the Cæsars.

8/2

JOHANN LUDWIG STEINER AND THE HISTORY OF THE ACHROMATIC LENS

THE Naturforschende Gesellschaft in Zurich was founded on August 31, 1746 (see *Nature*, October 19, p. 559). Among the first eleven members was Johann Ludwig Steiner—perhaps the originator of the Society—a watchmaker and optician in Zurich. Goethe in his "Farbenlehre" says in a survey of the history of achromatic lenses that the practical and theoretical work of Boscovich and Steiner will not be forgotten; but Steiner's has already been forgotten. This comment by Goethe has been followed up by Prof. D. Brinkmann, of the University of Zurich, and in an article entitled "Johann Ludwig Steiner, a forgotten founder of the Naturforschende Gesellschaft in Zurich", he has published the results of his investigations (*Prisma*, No. 5, 1946).

Steiner, the watchmaker and optician, visited England as a young man and was in touch with members of the Royal Society. The impression he received never left him, and probably induced him to propose the foundation of the Swiss Society, and in one of his books, a kind of encyclopædia, which he pretends to have translated from the English, he makes this proposal. Two years later the Society was founded.

Steiner's contribution to the development of achromatic lenses is contained in his book "Abhandlungen von den Vergrößerungsgläsern" (1753), which is partly a translation of Henry Baker's book "The Microscope Made Easy" (1743). In an appendix, Steiner develops his own ideas on lenses and microscopes. Baker, who received the Copley Medal of the Royal Society for his work on crystallization in salt solutions, was a son-in-law of Daniel Defoe, with whom he edited the *Spectator* and *Weekly Journal*.

Steiner (1711–79) was a splendid artisan. He surpassed Vaucanson in the construction of artificial automats. He built microscopes with exchangeable lenses, rotating concave and plane mirrors and

apparatus for the projection of the magnified picture on a screen. He constructed also the first magic lantern with moving pictures.

A third of Steiner's books refers to the treatise of the famous mathematician Leonhard Euler at the Academy of Science in Berlin, which for the first time showed theoretically the possibility of the construction of achromatic lenses. Newton had denied this possibility. To prove that Newton was right, the optician J. Dolland in London made a practical experiment with flint and crown glass—and constructed in this way, against his wish, the first real achromatic lens. Steiner supplemented Euler's treatise with his own experiences and inventions.

ARNOLD HAHN

19/6

NORSE CULTURE IN GREENLAND

THE first of the works¹ under notice* is an elaborate survey of all the ancient Norse buildings known in Greenland, together with a summary of the relics found in them and an estimate of the stock carried on each farm. It is a most valuable and comprehensive work, and no student can hope to understand the Norse colonization of Greenland without consulting it.

The second book² is a clear and valuable account of the excavation of several Norse farms in the old Eastern settlement and should be read in connexion with Aage Roussell's earlier work.

The remaining two works^{3,4} are of very great anthropological and also historical importance. In them such knowledge as can be obtained from the comparatively few skeletons of the old Norse colonists which have so far been recovered is carefully examined and summarized. The conclusions arrived at by Fischer-Møller in the first work are very definite and give us a completely different picture from that suggested by the late Dr. Hansen, who examined the fragmentary human remains found at Herjolfsness in the extreme south of the country. Hansen supposed that the Norse colonists died out from malnutrition, degeneracy, disease and inability to breed. Fischer-Møller, while not denying that there may have been some degeneracy and malnutrition at Herjolfsness, is emphatically of the opinion that there is no trace of this in the northern (called 'western' by the medieval Norsemen) settlement up to the time when it was found to be abandoned about the middle of the fourteenth century. He suggests, with proper caution, that all the evidence goes to show that the population was not killed off by disease or by the Eskimos, that it did not merge in the Eskimo

*Meddelelser om Grønland udgivne af Kommissionen for Videnskabelige Undersøgelser i Grønland.

¹ Bd. 89, Nr. 1: Farms and Churches in the Mediaeval Norse Settlements of Greenland. By Aage Roussell. Appendix: The Osseous Material from Austmannadal and Tungmæralik, by Magnus Degerbøl. (Researches into Norse Culture in Greenland.) Pp. 356. 17 kr.

² Bd. 90, Nr. 1: Inland Farms in the Norse East Settlement—Archaeological Investigations in Julianehaab District, Summer 1939. By Christen Leif Vebæk. Appendix: Animal Bones from Inland Farms in the East Settlement, by Magnus Degerbøl. (Researches into Norse Culture in Greenland.) Pp. 120. 5.50 kr.

³ Bd. 89, Nr. 2: The Mediaeval Norse Settlements in Greenland—Anthropological Investigations, by K. Fischer-Møller. (Researches into Norse Culture in Greenland.) Pp. 84+22 plates. 5 kr.

⁴ Bd. 89, Nr. 3: The Mediaeval Norsemen at Gardar—Anthropological Investigation. By K. Brüste and K. Fischer-Møller; with Dental Notes and a Chapter on the Dentition, by P. O. Pedersen. (Researches into Norse Culture in Greenland.) Pp. 62+30 plates. 4.50 kr.

(København: C. A. Reitzels Forlag, 1941–1944.)