# AN IRON AGE SETTLEMENT IN SOUTHERN BRITAIN*

THE aim of the excavation of the site of Little Woodbury, Wilts, was to uncover the settlement systematically and discover as much about it as possible as a social and economic organism. Little Woodbury being typical, its excavation throws light upon a number of similar sites. Excavations were carried out in the periods June 12–September 18, 1938, and June 12–July 19, 1939. Examination of the site has not yet been completed, but further work has been interrupted by the War.

The settlement lies 1¼ miles west-south-west of Salisbury Cathedral, on low hills between the Avon and Ebble at about 270 ft. above sea-level. It is situated in a kind of plain of which the highest point is the middle of the site. Four hundred metres to the west is the larger settlement, to which the name of Woodbury has been given. In 1938, 4,500 sq. metres of the site were uncovered, and in 1939 a further 2,500 sq. metres. The traces of prehistoric occupation all belong to Iron Age *A2–AB*, which is regarded as extending over the period from the beginning of the third century B.C. into the first century B.C. The traces of occupation consist of ditches, pits, hollows, and post holes. Finds are few in number, suggesting that the settlers were not numerous, but the nature of the finds shows that the settlement was thoroughly agricultural in character, although the animals' bones indicate that the settlers carried on cattle rearing. There is no sign of industrial activity beyond what was necessary to supply the individual need of each, as for example in weaving. Slag points to the visits of wandering smiths. There is no evidence of any wealth of imported goods.

From the traces of occupation in the form of ditches, pits, hollows, and post holes, of which the examination is described in detail, certain inferences can be drawn. In the area enclosed by the ditches, about a hundred pits have been uncovered up to the present. They vary very much from one to another in form, and some clearly being later than others, obviously were not all in use at one time. In depth they range from 0·49 metres to 2·98 metres. After they had been in use for a time, the pits were filled in, the filling including fragments of chalk, burnt and unburnt flint, ash, potsherds, bones, food refuse, saddle querns and sandstone grinders, iron-slag, smaller objects of everyday use, and cob fragments which had been parts of ovens. From the uses of analogous subterranean receptacles elsewhere and at other times, it is inferred that these pits were used as granaries for the storage of corn, probably roasted previously. The shallower pits may have served to receive receptacles in which water had been stored.

Eleven isolated hollows, in form an irregular quadrangle, with steep or sloping edges and a level floor, were found within the enclosure. In depth they never exceeded a metre, while in size they varied from 10 m. to 24 m. They are dug out on a uniform principle. They were not used for dwelling places, and probably served some purpose in connexion with the harvest, just as in Upper Egypt to-day the women of the villages sit in similar pits to prepare the fruits of the harvest for storage.

The post holes indicate the ground plan of two houses, of which one, the farmstead, shows evidence of reconstruction, and probably represents an advanced stage of development of a primitive prototype in which a circle of huts with lean-to roofs served individual functions belonging to the farmstead. Other post holes, it is inferred, served as drying frames or racks, square granaries, and storehouses.

Each of these elements of the settlement existed over a long period (200–300 years); but while some such pits and work places were short-lived, others, like the houses, were long-lived. No large number of houses existed at the same time. Consequently, the settlement was not a village. Probably there was no more than one dwelling-house at any one time. It follows that this was a farm, with auxiliary buildings necessary for farm work, in which habitation was continuous. No water supply was near, and dependance on water collected from the roof makes it probable that no more than one family occupied the house.

The water deficiency also points to husbandry, rather than cattle farming, as the staple occupation. The open situation of the farm points to peaceful conditions at the time of its erection. The narrow entrance to the palisade precludes the use of carts or the quick driving in of large stocks of cattle, while the decorative gate-building has no military value. Later, however, there was sudden interruption to this state of peace, and it was necessary to provide powerful defences for the farm. The work was never completed, and the palisade again became adequate.

The excavation at Little Woodbury has thrown a flood of light on a large number of other settlements of the same age previously excavated. It is one of a series of farm settlements, not previously recognized as such, which all suffered the same fate and generally enjoyed a uniform civilization. It is calculated that round about twenty acres would represent the land requirements of such a farm, and it is no matter for wonder that these farms should be found lying comparatively close together.

In Woodbury one type only of Iron Age settlement has been established; but its existence presupposes other types. The settlements of the builders of the hill-forts have not yet been determined. Yet the erection of the hill-forts implies a strongly organized and relatively numerous community. Manifestly the people of the farms were too few to have been responsible for them. Their settlements must be sought on the lower slopes in proximity to water to serve both themselves and the relatively large stocks of cattle for which presumably such spacious hill-forts were erected.

All Cannings Cross, Wilts, seems to have been a village on a slope, a situation unusual for this part of the country. Though little of the settlement has been excavated, it is evidently considerably more extensive than the farm. Its inhabitants lived primarily by husbandry.

* *Proc. Prehist. Soc.*, N.S. 6, 1 (1940). Excavation at Little Woodbury, Wilts.: The Settlement as Revealed by Excavation. By Gerhard Bersu.

The Iron Age $A2$–$AB$ hill forts which were completed when excavated reveal the same civilization as the folk who inhabited other settlements marked by pits. The pits, however, are far too few to suggest that such hill-forts were either constantly inhabited *oppida* or concerned with urban civilization and industry. They were only built and inhabited for a short time during periods of unrest. On the other hand, both boundary ditches and hill-forts lead us to presuppose a substantial agricultural population living outside the farms in open settlements on low ground and on slopes close to water. In such settlements lived the greater part of the agricultural Iron Age $A2$–$AB$ population.

# ELECTRIC TUNNEL KILNS FOR FIRING PORCELAIN

IN *Electrotechnics*, the journal of the Electrical Engineering Society of the Indian Institute of Science, Bangalore (S. India), of September, there is published an instructive paper by H. N. Ramachandra Rao, of the Government Porcelain Factory, Bangalore, discussing the use of an electric tunnel kiln for firing porcelain.

Until recently, the discontinuous coal-fired kiln, known as the round kiln, was generally used for firing hard porcelain. This type of kiln has certain inherent defects and demands great skill in handling. The coal used for such a kiln should have a high calorific value and must be free from impurities.

In using these round kilns, the ware is kept in saggars (refractory containers) which prevent the ware from direct contact with the flames, provide for economic filling and keep the ware free from strain. To obtain the maximum temperature of 1,350° C. takes about 36 hours and the kiln has to cool for an additional 48–60 hours before being unloaded.

An important factor that enters into the correct firing of porcelain is the composition of the flue gases. In the round kiln it is very difficult to control the composition of the gases within desired limits on account of the unavoidable contamination or oxidation which takes place owing to the leakage of air into the kiln through combustion devices and holes or cracks that develop in a structure made of brick and fireclay when subjected to repeated heating and cooling. Besides, it is practically impossible to get a uniform distribution of heat inside this type of kiln.

The thermal efficiency of the kiln is very low, about 5–10 per cent, chiefly due to the wastage of heat from the hot gases, which are allowed to escape to the atmosphere at a high temperature. The working cost of such a kiln is again influenced by high labour charges, total holding capacity of the building and high cost of saggars.

These difficulties were to a great extent overcome by the introduction of fuel-fired tunnel kilns which are in more general use at present. There are two types of tunnel-kilns which are suitable for firing hard porcelain. In one type the products of combustion mingle with the ware ; the most modern example is the Harrop kiln. The other is of muffled type, and is known as the Dressler kiln. The fuels in general use are natural gas or oil, and they are introduced with a small amount of air through highly refractory burner tubes. The tunnel is provided with a series of fire-places or gas burners on both sides and the goods to be fired are made to enter it on a chain of cars. The hot gases pass along the tunnel towards the end at which the goods enter, so that the ware is gradually heated as it passes towards the hottest part of the kiln. After having attained the maximum temperature required the ware travels on through the remainder of the tunnel, meeting in the journey a current of air travelling in the opposite direction. This air is heated by the cooling goods and gradually attains the maximum temperature of the kiln, thus ensuring the greatest efficiency of combustion. The goods on leaving the tunnel are almost cold.

The tunnel is built almost entirely of brick ; low-grade fire bricks are used in the zones of low temperature, and silica or carborundum bricks in the high temperature zone. Suitable expansion joints are provided in the structure. The draught which supports combustion is provided by an exhaust fan.

Although the fuel-fired tunnel kiln is an improvement on the round kiln, it has certain drawbacks which can be eliminated by using the electric tunnel kiln. When the tunnel kiln is fuel-fired, the incoming ware is dependent for its preheating upon the outgoing combustion gases, which heat the upper portions of the ware more than the lower. This not only makes an even rate of preheating over a given cross-section practically impossible, but also limits the rate of preheating to the speed at which the coldest portion becomes sufficiently hot to advance into the high-temperature zone. In the case of an electric tunnel kiln, on the other hand, the absence of moving atmosphere makes an easier recuperation possible in a continuous operation by having two lines of the ware in the same or adjacent tunnels moving in opposite directions. Owing to the greater ease of control in temperature and atmosphere the electric kiln yields first-class ware of a uniformity which cannot be obtained in a fuel-fired kiln. In spite of these advantages the progress made in the use of electricity has been very slow on account of the high cost of electric power. In America especially the general opinion is that electricity cannot compete with such low-priced fuels as oil or natural gas. The use of electricity for heating at low temperature (up to 1,000° C.), for example, in decorating or enamelling kilns was introduced into Switzerland and Germany fifteen years ago.

After extensive research work and experimentation a number of electric tunnel kilns have been installed in Switzerland (since 1933) for the glazing of wall tiles, and for firing fireclay, soft porcelain and other goods requiring temperatures up to 1,300° C. The first kiln for firing hard porcelain was put into operation at the Langenthal Factory in Switzerland in August 1937 and was constructed by Messrs. Brown, Boveri. The main novelty of this kiln, apart from the high temperature of 1,400° C., is that part of the firing is conducted under a reducing oven atmosphere. Above 1,000° C. the heating must be done under reducing conditions, as otherwise the small amounts