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BOYCOTT OF GERMAN SCIENTIFIC MATERIALS

TWO remarks encountered in the very early war days of 1914 still remain clearly in the present writer's memory and unfortunately have lost none of their significance with the passing years.

At that time there was a large German colony in Manchester whose relations with the rest of the population were quite friendly. The German Consul was "hail fellow well met" with a large circle of acquaintance. The first of the two remarks above mentioned was his eager assurance to the present writer, on one of the few days before England declared war, that "It will be only a short war, Germany just wants some share in the French colonies!"

The second observation was made by a Dutch technologist, discussing the German mentality with some members of the Manchester Chemical Club. He exclaimed: "Zey haf no zychology."

Both these characteristics of the present Nazi regime, their emphasis on the need for colonies and the absence of psychology, have a clear bearing on the consideration of the *Report to the Cambridge and Boston Branch of the American Association of Scientific Workers* which has recently come to hand from Boston.

In the first place the Report draws attention to the fact that the ideology of the Nazis has resulted in the utilisation of science for purposes of enhancing armaments and promulgating racial hatred. These purposes are evident from the appointment of military experts as directors of scientific researches

and the published diatribes concerning Aryan and non-Aryan science and scientists. As a result of the Hitler regime there has been a definite decrease in the quantity and quality of published scientific research in Germany. Many of the leaders in scientific fields have left or have been forced to leave the country.

In consequence of these facts, which have been established after careful investigation by the members of the *Cambridge and Boston Branch of the American Association of Scientific Workers*, the membership of the Association has voted to investigate the possibility of a boycott of German scientific materials as a means of expressing effectively its disapproval of the Nazi attitude towards science and scientists.

In this connection the present economic situation of Germany is first considered in the Report and it is thought that owing to the alleged statement by Hitler, "We must export or die", the loss of export trade in scientific materials might constitute a threat to which serious attention would be paid.

It is possible, however, that the American Committee is still under the influence of the "gold mentality" since all the gold in the world is gravitating to the vaults of the United States. When it is safely interred there, America, as H. G. Wells remarks, may be considered to have won the Gold Standard game. The Committee may thus be liable to exaggerate the importance of the present shortage of gold in Germany. It may be remembered that certain financial pundits foretold an early end to the last war through lack of money to carry it on. Later it was realized that provided a river continues to flow, the abstraction of water from it in one year does not affect the quantity available during the succeeding years.

Consequently in response to similar warnings Hitler is reported to have exclaimed: "The money is here. There will always be money. So long as the German people work, I am not afraid." That their work has resulted in guns rather than butter does not alter the principle involved.

The question of colonies, nevertheless, does raise currency difficulties. The trouble is not that supplies of raw material are unavailable, but that they have to be paid for in the currency of the country controlling the colony or dominion concerned. Hence the need for exports emphasised by Hitler, as a means for obtaining foreign currency.

The importance of an international currency unit as an element in removing one outstanding cause of war is thus evident.

While the importance and desirability of a boycott of German scientific materials may be unreservedly supported, it would seem better therefore to stress other aspects than the merely financial pressure, which in any event may not be as effective as orthodox economists are liable to imagine.

A non-emotional reason for boycott, which would be at the same time effective propaganda, would be the well-founded belief that scientific goods produced under the present conditions in Germany must needs be of inferior quality.

A continued cultivation of a spirit of untruth must have its effects in other spheres than personal or national ethics. If as is

reported, young Nazi students are reluctant to submit to the discipline of the mathematical sciences, it is unlikely that the engineers and artificers of the next generation can be depended upon to turn out trustworthy products whether motors or microscopes. Clearly, the present Nazi Germany is living on the intellectual capital of an older generation. This is confirmed by the reference in the Report to attempts which have been made to return a certain number of Jewish intelligentsia to Germany.

An effective boycott of scientific apparatus and materials should not be as difficult as it was in the war of 1914–18. The alleged superiority of German products is a suggestion fostered by propaganda. Dyes, chemicals, porcelain and glassware of first rate quality have been available in England since the last war. British microscopes, balances, and instruments of precision generally have always held their own.

In the United States the obsession as to the superiority of German goods has lasted longer, not having been exorcised under the stimulus of necessity. There is no doubt that American manufacturers can turn out excellent materials in all spheres as a result of remarkably widespread technical research of the order exemplified in the Mellon Institute Reports. In the latest of these, just to hand, reference is made, *e.g.*, to optical glass.

Here in India there is a great field awaiting development. Beginnings have already been made with chemical balances at Agra, and laboratory fine chemicals in the General and Organic Chemistry Departments at the Indian Institute of Science, and in other academic laboratories. Refractory porcelain is being successfully manufactured on a large scale at the Government Porcelain Works at Bangalore. The construction of electrical instruments of precision, particularly in the field of wireless, is being developed in the Department of Electrical Technology at the Indian Institute of Science. The necessary training for workmen who will be competent to construct instruments of precision is already available on a modest scale under Dr. Parameshwaran at Trivandrum, and under Principal Bence Jones of the Maclagan Engineering College, Lahore, from whom a bulletin on the subject was advertised some time ago by the Industrial Research Bureau.

Great expectations may justly be entertained of the results likely to accrue from the activity of the newly appointed *Board of Scientific and Industrial Research* under the brilliant leadership of Dr. Bhatnagar.

The scientific community of India may therefore confidently and unreservedly support their American colleagues in their resolution to boycott all German scientific material for which duplicates or suitable substitutes can be obtained elsewhere, to give the boycott the widest publicity, and to endeavour by every means to stimulate the production of such material in their own country.

Let it not be said that through lack of energy and enterprise the industrialists and scientists of India have left the doors of their country open to the burglarious entry of predatory powers.

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A STATISTICAL STUDY OF THE WEIGHTS OF OLD INDIAN PUNCH-MARKED COINS

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THE punch-marks on old silver coins found in India have presented an unsolved riddle which has been attacked by a classification of the *obverse* marks. The efforts of Messrs. Durgā Prasād,[1] Walsh,[2] Allan,[3] in this direction will be valuable to future scholars, but as yet lead to no conclusion. The first two have paid some attention to the reverse marks also, while the third sometimes ignores them; the reason for this partiality to the obverse is that a group of five marks occurs systematically there, while the reverse may be blank or contain from one to sixteen marks.

The most important qualities of the coins in the ancient days were undoubtedly the weight and the composition. The latter has received very little attention, a coin or two being sampled from each new lot. The former is given as a rule, for every coin, but the statistical study of a coin group by weight does not seem to have been attempted.[5] The resulting confusion as to what standard of weight actually existed can be seen by consulting any of the above works; even Rapson[4] found documentary evidence too self-contradictory for use.

For the basis of a preliminary study, I took Walsh's memoir[2] on two Taxila hoards as fundamental. The work is full of oversights and mistakes, as I have shown in a note to be published in the *New Indian Antiquary*. Nevertheless, it is the only sizeable mass of data available to me, and I take all figures from Appendix XI, with the hope that no error of any importance enters into the weighing. Excluding the 33 Long Bar coins which approximate to Persian sigloi, and the 79 minute coins, all the rest, to a total of 1059 coins which seem meant to represent the same amount of metal, average 52·45 grains in weight. The 162 later coins (App. XII) of a single coinage average 52·72 grains. But the standardization of weights was not the same, as is shown by applying the z test to the variances of the two lots.

But even the main hoard of 1059 *kārṣāpaṇa* is not homogeneous. So, I classified them by the number of reverse marks and found the following data, in which the 64 double obverse coins have been omitted.

In Table I n is the number of coins with the number x of reverse marks given at the column head, and m the average weight in grains. One coin in the square 10-reverse mark class has been omitted, because it has a decidedly different history from that of the rest.[6] There exist coins with as many as 16 reverse marks, but counting the number of marks becomes difficult, and the total not tabulated being 15 square coins and 7 round, the table given below will represent substantially the most reliable portion of the data available to us.

It is seen at once that there is a regular drop in average weight with increase in the number of reverse marks. In fact, for the square coins, the linear regression can be fitted accurately enough by eye and is found on calculation to give the formula: $y = 53{\cdot}22 - 0{\cdot}212\,x$, where y is the average weight in grains and x the number of reverse marks. For round coins, the fit is not so good, though still satisfactory, the regression being $y = 53{\cdot}1 - 0{\cdot}214\,x$. That

TABLE I

	x =	0	1	2	3	4	5	6	7	8	9	10
Square	n =	224	128	132	85	64	46	21	25	10	9	8
	m =	53·26	52·93	52·74	52·47	52·53	52·17	52·03	51·67	51·40	51·47	51·01
Round	n =	58	34	29	28	25	10	13	8	9	3	3
	m =	53·35	52·84	52·75	51·90	52·29	51·67	51·82	52·23	51·23	50·10	51·20