

ages, trabeculae and intertrabecula and the regression of the lateral parts of the orbital cartilages are not affected by severe damage, resulting in drastic reduction of size, to one eye, performed about 48 hr. before the cartilages of the skull become foreshadowed as visible condensations of mesenchyme. The scleral cartilage, on the other hand, conformed to the size and shape of the regenerated eye rudiment, though parts of it were thicker than the cartilage on the undamaged side.

It is of interest that a naturally occurring anomalous chick embryo of seven days simulated the experimental specimens very closely; the left eye was rudimentary and malformed, with a thick but appropriately shaped scleral cartilage. The interorbital septum was essentially normal in appearance, and no abnormalities elsewhere in the head were detected. Comparable conditions have been observed in a microphthalmic embryo of the lizard, *Lacerta vivipara*, another tropitric form.

The results of these experiments seem to agree closely with those of Weiss and Amprino², and Amprino³, who were, however, concerned with the effects of eye reduction on the sclera and other accessory orbital structures rather than on the skull proper.

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¹ de Beer, G. R., "The Development of the Vertebrate Skull" (Oxford, 1937).

² Weiss, F., and Amprino, R., *Growth*, 4, 245 (1940).

³ Amprino, R., *Acta Anat.*, 10, 38 (1950); *J. Exp. Zool.*, 118, 71 (1951).

"Work Study"

THE article on "Work Study" in *Nature* of July 23* may, I fear, raise quite unwarranted prejudice in the minds of readers. The term 'work study' is now commonly accepted in British industry as being very much wider in scope than the mere application of financial incentives based on time study.

Work study may be defined as "the systematic and objective examination of all the factors which directly govern the productive or operational efficiency of any specified activity in order to effect improvement". It is thus founded on scientific analysis and measurement in order to determine the facts of the situation and to eliminate guesswork and the dead hand which past custom can exert in the face of changing circumstances.

The first, indeed the most effective, of the techniques involved in work study is method study applied in a strictly logical and scientific manner. From this angle, it may truly be said that work study aims first at improving the efficiency of management, and thereafter, as a result, at obtaining more effective (not necessarily harder) work from all concerned.

In order to carry out method study effectively, and to determine the true facts of any activity which is under examination, it is indeed necessary to apply measurement to all the factors, including machine utilization and human activity. Such work measurement is a means of establishing a realistic basis for costs, for production planning and labour allocation. Experience shows that it is amply justified for these

reasons alone by providing data on which efficiency can be improved and progress be measured.

Should it be desired to institute monetary incentives for the operatives in order to encourage the highest reasonable level of individual interest and effort, work measurement does indeed offer an appropriate basis. It must be stressed, however, that incentives of this or any other kind will only be effective if their application is made after full consultation and by arrangement with the trade unions and the operatives directly concerned. It is essential to ensure their understanding of what is proposed and the beneficial results to themselves, to the organization in question, and ultimately to the community as a whole, which should accrue.

If individual incentives are to be offered, it is desirable that these should be founded on careful work measurement with its insistence on finding the facts in an objective manner, rather than an out-moded system, such as the price-list, or even piece-rates, which tend to be based on rule-of-thumb and bargaining methods, with inevitable anomalies and the likelihood of disputes. It is true that work measurement and time studies, like any other technique, may be badly applied; but such cases are due to lack of training or objectivity on the part of those responsible, and not to any fundamental failure of the techniques themselves.

Lord Kelvin truly said, "When you can measure what you are speaking of, and express it in numbers, you know that on which you are discoursing. But when you cannot measure it and express it in numbers, your knowledge is of a very meagre and unsatisfactory kind".

It is surely high time that we attempted to apply the scientific method not only in the laboratory but also in the day-to-day conduct of affairs where it is so desperately needed but is all too often absent.

There is now overwhelming evidence of the benefits which can accrue from the wide application of work study principles, whether or not these include the final step of individual incentives based on measured work. It is clear, too, that where management exercises its function with proper human understanding coupled with a critical scientific approach based on fact-finding and thorough analysis, the psychological atmosphere as well as technical efficiency can be greatly improved.

The British Productivity Council is representative of the national employers' organizations and of the trade unions through the T.U.C. Among its other activities, it has set up a Work Study Unit to act as an interpreter of the best current practices in this field. This Unit is in great demand and is proving highly successful.

For the above reasons, I consider the note in *Nature* to be defeatist and not in accord with the facts. It is also wrong to suggest that work study is so limited in its aims and ineffective in its results.

Experience shows that work study does in fact provide one of the most valuable means of improving production efficiency. Not least, it stresses the community of interest between operative, management and customer alike, and encourages understanding, interest and pride on the part of all concerned in effecting continuous improvement so that all may benefit.

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* The article in *Nature* is a comment on Occasional Paper No. 6 published by the Institute of Personnel Management.—EDITORS.