

menon, Archimedes a unique individual and therefore inimitable. Anything may be possible to a genius, but plain people proceed by the surer paths mapped out for them by precedent. Archimedes's engines now afforded a precedent to be copied, but not so the methods of thought which made those engines not only possible but inevitable.

The truth of the matter was, of course, that Archimedes made no new discoveries with which we are acquainted during the period of the war. The heat and urgency of conflict do not afford a favourable atmosphere for research. What he did was simply to draw upon the stores of knowledge accumulated during a lifetime of laborious investigation and to apply this knowledge in the simplest and most direct fashion to the immediate crisis which confronted him. His catapult was no more than the lever to the description of which he had devoted a treatise written many years before the siege occurred. The laboratory model was simply enlarged and applied to the task of casting stones. The only problems solved during the actual crisis were those of a purely constructional type, the problems, namely, of cutting beams of sufficient length and resiliency for this purpose, of manufacturing tackle of sufficient strength, of devising a trigger mechanism which would be safe and convenient to handle—problems of the type of thousands which are hourly being solved in this our crisis of to-day. But these are not in themselves scientific discoveries, no new principles are evoked, as a rule, in their solution, they are simply adaptations of the known to the situation as it lies before us.

So it was, also, with the burning glasses which ignited the sails of the Roman fleet. These were nothing more than enlarged editions of the lenses and mirrors which he had devised and devoted many years to studying long before the idea of applying them to such a purpose had arisen in his mind. The crisis of war

called forth the application of his knowledge and experience, gathered fragment by fragment during a lifetime of investigation, to the urgent need of the moment. Again, the problems solved, during the crisis itself, must have been purely of the constructional type—problems of the craftsman and not those of the natural philosopher.

The plain lesson of these events, as of the events of our own day, was that the patient investigation of nature pursued under the discipline of the scientific method, without ulterior thought or object of immediate profit or utility, yields us in ever-augmenting measure a storehouse of information overflowing with things useful to man, adaptable to every crisis, helpful in every need. In peace no less than in war, but in war more dramatically than in peace, the scientific investigation of nature yields material rewards of which the value to man is in our day little less than the material value of civilization itself. That it yields spiritual rewards of unmeasurable value will hardly be contested, but it is generally, although mistakenly, believed that these are the privilege of the few and their compensation for a dull and stuffy existence spent in laboratories odoriferous with chemicals. But the material rewards are shared in manifest proportion by all, only the links which connect them to the investigator and his laboratory are generally overlooked.

Had the Romans learnt this lesson and cultivated the sciences as energetically as they cultivated the arts of administration, the history of the world might have been written in very different terms. The clues which were uncovered by the labours of Archimedes and his Greek contemporaries and Alexandrian successors would have led in time to the laws of Kepler and the *principia* of Newton. Those in turn must have led, in about the space of time that separated the discoveries of Newton from those of Newcomen and of Watt, to the develop-