The Organization of Scientific Research

Joseph Priestley

One of the Enlightenment's greatest scientists was the Englishman Joseph Priestley (1733-1804), the discoverer of oxygen. Convinced that America was the natural home of the scientific spirit, Priestley emigrated there and is today buried in Northumberland, Pennsylvania. The selection that follows, his proposal for systematic scientific research, is from his History and Present State of Electricity *(1767).*

The business of [natural] philosophy is so multiplied, that all the books of general philosophical transactions cannot be purchased by many persons, or read by any person. It is high time to subdivide the business, that every man may have an opportunity of seeing everything that relates to his own favorite pursuit; and all the various branches of philosophy would find their account in this amicable separation. Thus the numerous branches of a large overgrown family, in the patriarchical ages, found it necessary to separate; and the convenience of the whole, and the strength and increase of each branch were promoted by the separation. Let the youngest daughter of the science set the example to the rest, and show that she thinks herself considerable enough to make her appearance in the world without the company of her sisters.

But before this general separation, let each collect together everything that belongs to her, and march off with her whole stock. To drop the allusion; let histories be written of all that has been done in every particular branch of science, and let the whole be seen at one view. And when once the entire progress, and present state of every science shall be fully and fairly exhibited, I doubt not but we shall see a new and capital era commence in the history of all the sciences. Such an easy, full, and comprehensive view of what has been done hitherto could not fail to give new life to philosophical enquiries. It would suggest an infinity of new experiments, and would undoubtedly greatly accelerate the progress of knowledge; which is at present retarded, as it were, by its own weight, and the mutual entanglement of its several parts.

I will just throw out a farther hint, of what, I think, might be favorable to the increase of philosophical knowledge. At present there are, in different countries in Europe, large incorporate societies, with funds for promoting philosophical knowledge in general. Let philosophers now begin to subdivide themselves, and enter into smaller combinations. Let the several companies make small funds, and appoint a director of experiments. Let every member have a right to

appoint the trial of experiments in some proportion to the sum he subscribes, and let a periodical account be published of the result of them all, successful or unsuccessful. In this manner, the powers of all the members would be united and increased. Nothing would be left untried, which could be compassed at a moderate expense, and it being *one person's business* to attend to these experiments, they would be made, and reported without loss of time. Moreover, as all incorporations in these smaller societies should be avoided, they would be encouraged only in proportion as they were found to be useful; and success in smaller things would excite them to attempt greater.

I by no means disapprove of large, general, and incorporated societies. They have their peculiar uses too; but we see by experience, that they are apt to grow too large, and their forms are too slow for the dispatch of the *minutiæ* of business, in the present multifarious state of philosophy. Let recourse be had to rich incorporated societies, to defray the expense of experiments, to which the funds of smaller societies shall be unequal. Let their transactions contain a summary of the more important discoveries, collected from the smaller periodical publications. Let them, by rewards, and other methods, encourage those who distinguish themselves in the inferior societies; and thus give a general attention to the whole business of philosophy.

I wish all the incorporated philosophical societies in Europe would join their funds (and I wish they were sufficient for the purpose) to fit out ships for the complete discovery of the face of the earth, and for many capital experiments which can only be made in such extensive voyages.

Princes will never do this great business to any purpose. The spirit of adventure seems to be totally extinct in the present race of merchants. This discovery is a grand desideratum in science; and where may this pure and noble enthusiasm for such discoveries be expected but among philosophers, men uninfluenced by motives either of policy or gain? Let us think ourselves happy if princes give no obstruction to such designs. Let them fight for the countries when they are discovered, and let merchants scramble for the advantage that may be made of them. It will be an acquisition to philosophers if the seat of war be removed so far from the seat of science; and fresh room will be given to the exertion of genius in trade, when the old beaten track is deserted, when the old system of traffic is unhinged, and when new and more extensive plans of commerce take place. I congratulate the present race of philosophers on what is doing by the English court in this way; for with whatever view expeditions into the South Seas are made, they cannot but be favorable to philosophy.

Natural Philosophy is a science which more especially requires the aid of wealth. Many others require nothing but what a man's own reflection may furnish him with. They who cultivate them find within themselves everything they want. But experimental philosophy is not so independent. Nature will not be put out of her way, and suffer her materials to be thrown into all that variety of situations which philosophy requires, in order to discover her wonderful powers, without trouble and expense. Hence the patronage of the great is essential to

the flourishing state of this science. Others may project great improvements, but they only have the power of carrying them into execution.

Besides, they are the higher classes of men which are most interested in the extension of all kinds of natural knowledge; as they are most able to avail themselves of any discoveries, which lead to the felicity and embellishment of human life. Almost all the elegancies of life are the produce of those polite arts, which could have had no existence without natural science, and which receive daily improvements from the same source. From the great and the opulent, therefore, these sciences have a natural claim for protection; and it is evidently their interest not to suffer promising enquiries to be suspended for want of the means of prosecuting them.

But other motives, besides this selfish one, may reasonably be supposed to attach persons in the higher ranks of life to the sciences; motives more exalted, and flowing from the most extensive benevolence. From Natural Philosophy have flowed all those great inventions, by means of which mankind in general are able to subsist with more ease, and in greater numbers upon the face of the earth. Hence arise the capital advantages of men above brutes, and of civilization above barbarity. And by these sciences also it is, that the views of the human mind itself are enlarged, and our common nature improved and ennobled. It is for the honor of the species, therefore, that these sciences should be cultivated with the utmost attention.

And of whom may these enlarged views, comprehensive of such great objects, be expected, but of those whom divine providence has raised above the rest of mankind. Being free from most of the cares peculiar to individuals, they may embrace the interests of the whole species, feel for the wants of mankind, and be concerned to support the dignity of human nature.

Gladly would I indulge the hope, that we shall soon see these motives operating in a more extensive manner than they have hitherto done; that by the illustrious example of a few, a taste for natural science will be excited in many, in whom it will operate the most effectually to the advantage of science and of the world; and that all kinds of philosophical enquiries will, henceforward, be conducted with more spirit, and with more success than ever.

Were I to pursue this subject, it would carry me far beyond the reasonable bounds of a preface. I shall therefore conclude with mentioning that sentiment, which ought to be uppermost in the mind of every philosopher, whatever be the immediate object of his pursuit; that speculation is only of use as it leads to *practice,* that the immediate use of natural science is the power it gives us over nature, by means of the knowledge we acquire of its laws; whereby human life is, in its present state, made more comfortable and happy; but that the greatest, and noblest use of philosophical speculation is the discipline of the heart, and the opportunity it affords of inculcating benevolent and pious sentiments upon the mind.

A philosopher ought to be something greater, and better than another man.

The contemplation of the works of God should give a sublimity to his virtue, should expand his benevolence, extinguish everything mean, base, and selfish in his nature, give a dignity to all his sentiments, and teach him to aspire to the moral perfections of the great author of all things. What great and exalted beings would philosophers be, would they but let the objects about which they are conversant have their proper and moral effect upon their minds! A life spent in the contemplation of the productions of divine power, wisdom, and goodness, would be a life of devotion. The more we see of the wonderful structure of the world, and of the laws of nature, the more clearly do we comprehend their admirable uses, to make all the percipient creation happy: a sentiment, which cannot but fill the heart with unbounded love, gratitude and joy.

Even everything painful and disagreeable in the world appears to a philosopher, upon a more attentive examination, to be excellently provided, as a remedy of some greater inconvenience, or a necessary means of a much greater happiness; so that, from this elevated point of view, he sees all temporary evils and inconveniences to vanish, in the glorious prospect of the greater good to which they are subservient. Hence he is able to venerate and rejoice in God, not only in the bright sunshine, but also in the darkest shades of nature, whereas vulgar minds are apt to be disconcerted with the appearance of evil.