

**SCIENCE SIMPLIFIED, AND PHILOSOPHY,
NATURAL AND EXPERIMENTAL, MADE EASY.
FIRST SERIES, CONTAINING
I.-ANIMAL PHYSIOLOGY, II.-VEGETABLE
PHYSIOLOGY, III.-MECHANICS, IV.-OPTICS,
V.-ASTRONOMY, VI.-GEOLOGY; PP. 1-122**

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DAVID WILLIAMS

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NATURAL AND EXPERIMENTAL,
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BY THE REV. DAVID WILLIAMS, M.A.,

Author of the "Preceptor's Assistant,"

"Composition, Literary and Rhetorical, Simplified," &c. &c.



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A D D R E S S

TO

PARENTS, GUARDIANS, & TEACHERS.

It is hoped the work now offered to the attention of parents, guardians, and teachers will be found to contain a fund of useful and practical knowledge—a store-house of facts and information in the various branches of science and philosophy—adapted not only to instruct but to interest and lead the youthful mind to think and inquire, to compare and investigate; in a word, to qualify the learner for the contemplation and discovery of truth, and to imbue his mind with the points of real and useful knowledge—the leading principles and great axiomatic truths of science and philosophy. The plan adopted is calculated to collect and concentrate into a focus that knowledge and information which, in the usual method of treating scientific subjects, is spread and scattered over a wide and an expansive surface; or, to adopt an emphatic and a familiar expression, it condenses into a nut-shell that which is diffused through a mass of countless and cumbersome volumes, affording the maximum of information in the minimum of space, and, while plain to the mind, will be found brief for the memory.

Among its other advantages over the old method of verbiage and profuse dissertation—of book-plodding and book-poring—it will not only smooth and enliven, shorten and facilitate the approach to the temple of science and the fountain of philosophy, but it is pecu-

liarily and emphatically adapted to bring down the arcana or mysteries of science and philosophy to the simplest and the tenderest capacity. In a word, by its medium the solution and comprehension of scientific and philosophical knowledge may be converted into a rational amusement and an instructive recreation, into an amicable contest and rivalry of literary and scientific skill and improvement between parent and child when families are assembled round the domestic hearth, instead of occasioning learning and science to be viewed as a dull and a repulsive—a dry and an uninteresting study. The plan, it is true, is not novel or of recent invention; the “*Compendium Physico Aristotico Cartesiana*” of Sincerus—a work of considerable merit for the age, and from which subsequent compilers have borrowed much without acknowledgment,—was published at Amsterdam about the end of the sixteenth century of the Christian era. Above thirty years ago the author of “*Science Simplified*” introduced the plan into one of his educational works; but since the appearance of his little work a host of similar books have been published, in which his matter has been so artistically diluted, and arranged in a form and finery so fantastic, that it is with some difficulty the descent of the bantlings can be traced to their progenitor.

A few more introductory words seem necessary.

It has long been the complaint of all thinking and observant persons that our present mode of school education is erroneous and defective, on account of the absence of *scientific instruction* in schools or seminaries, and the attention of learners being confined to, and the time allotted for their school education being consumed in, the *acquisition of mere words*,* or, in the language of the poet, of

“A little Latin and a smatch of Greek,”

with, as one of the most sagacious and enlightened

* No axiomatic truth has been more recognized and more acknowledged by the intelligent and thinking class of the com-

writers on educational subjects says, "a few odds and ends of bald French phrases, and the rules and tables of some elementary compilation on arithmetic. Nor is female education less defective, less irrational, less inefficient. A smattering of French and Italian—dancing, singing, piano playing—a something about the globes and geography—and a parroting, and that, too, of the most trifling nature, of the ologies and the onomias, the isms and the asms, the istics and the astics, are considered the very perfection and consummation of female intellectual attainments." And these schemes—schemes that almost justify the poet's invective, that accomplishments and a heap of incongruous shreds and scraps and patches

munity than that the mode of education in current use is not only defective and inefficient, but in many of its effects and consequences highly mischievous and inimical to the best interests of society; and the causes are obvious. 1st, *The incompetency, aye, the absolute inadequacy of the generality of those who assume the office of instructors*; and, 2nd, *their inability and unwillingness to select fit and proper educational works—works calculated to awaken and elicit the powers of the youthful mind and enable it to investigate, to compare, and to reason.* The case is very different with the most enlightened nations of Europe, particularly France, Prussia, and Germany; and the consequence is, that the generality of the natives of those countries are more intelligent, and speak their languages much more correctly, than is the case with the generality of the natives of England, Scotland, and Ireland. In those countries teachers are in general intelligent and well educated, and the educational works, instead of being filled with meagre and trite information and couched in vicious and slovenly language, are well written and stored with useful knowledge. On the contrary, in our notable schemes of education, the propriety and obligation of imparting to the youthful mind habits of inquiry and investigation, of thought and reflection, seem never to have entered into the conception of their broachers; and the error—an error fundamentally and emphatically calculated to incapacitate the mind for the contemplation and discovery of truth—is faithfully and tenaciously observed by the supporters and upholders of those schemes. No rational and thinking person can therefore be surprised at the result, that in the greater part of our population the powers of the mind are allowed to become waste and unproductive.

of learned litter and lumber "have taken Virtue's place" and "Science's usefulness,"—are called, and *strangely believed* to be, EDUCATION,—are mistakingly and mischievously considered *to be the proper training and the legitimate institute* of immortal minds—of minds that are to work out their purification for the enjoyment of a higher and a more perfect state of existence by the due and rational exercise of the heavenly endowment of intellect. In both cases, as well for males as females, the concoctors of the schemes seem to have strangely lost sight of the wise and weighty maxim propounded by the highest authority, "It is better to speak five words with understanding than ten thousand in an unknown tongue." Never on any occasion or for any purpose was a master mind, who will free the understanding of mankind from the trammels of error and superstitious prejudices—more required, than *for the rectification and rationalizing our educational notions and practices*. To further the accomplishment of this great and hallowed purpose should be the earnest and unwearied endeavour of every person, both male and female, to whom God and Nature have given a sound understanding and a humane heart. "When *the elements and principles of scientific knowledge*," adds the same philanthropic monitor to whom I have just alluded, "constitute part of educational topics, *we shall not have our children, after drawing away their allotted penance of school education, returned on our hands with starved and impaired intellects, possessing little or nothing of that knowledge which is useful and necessary in the affairs of life, and of that information which is essential for stamping on them the impress and character of intelligent beings and useful members of society; in a word, for enabling them when they appear on the grand theatre of life to discharge well and wisely their respective vocations of usefulness and duty.*" To further this great and desirable purpose, the author of "Science Simplified," &c. hopes that he has

presented to teachers of youth of both sexes a manual containing a fund of invaluable knowledge, unequalled for variety and extent, and condensed into the smallest possible compass that can be devised, and that, too, at a moderate cost; that he has verified the truth and application of the sententious and emphatic apothegm—*multum in parvo*—a store-house in a nut-shell; and that his little volume will be found to contain the most interesting and instructive portions of numerous and expensive tomes; but in making this declaration, he deems it a duty due to himself to say, though the problems, propositions, or questions have been suggested by the valuable statements and observations to be found in those works, the solutions or answers are generally attributable to himself: in many cases the problems have been suggested from his own observations of the appearances, phenomena, and occurrences of nature, and the results and operations of art.

An additional word addressed to the most interesting and influential portion of the social fabric—**MOTHERS**, both those who are in the exercise of the great and high prerogative, as well as those who are desirous of the same distinction and destiny.

As Mothers are the most influential of teachers, and as it is the office of **WOMAN** by Nature to impart the elements of thought, to prompt the earliest speech, and to awaken the latent powers of the infantine mind, it is of the highest importance that, when the tablet of the heart is fairest and the mind most easily shaped and influenced, the teacher should be duly qualified for the task—a task of the greatest and most vital nature in this our sublunary state of existence. To enable mothers to perform that duty with facility and effect, some knowledge of the causes of the appearances and operations of Nature—of the products, mysteries, and results of art—the leading and important events of history—some elementary notions of the principles of mechanical science and of