

## The Need of Women in Science

WHEN we inquire in regard to the opportunities afforded to women for the study of science, we are not surprised to find them meagre and unsatisfactory. Nor, with a few exceptions, are we surprised at the localities in which the little culture of science is found; they have the range of latitude and longitude which we expected. the light shading on the map of the world which in the old school books used to divide the enlightened from the barbarous countries, might be used to-day to designate the scientific and unscientific.

Taking our whole country into consideration, there is very little attention paid to science. The same influence which deter men in scientific research operate only more forcibly upon women,- the want of leisure, and the unremunerative character of intellectual pursuits. And yet the fact that a few women give themselves so determinedly to scientific studies, and that so many make a beginning, would seem to show that they have a decided fitness for their requirements. Young girls almost all study the natural sciences in schools, and quite a moiety of them take up the abstract sciences. I do not believe it is because the science of the ordinary schools requires little brain work, although that is true, but because it is the work to which they instinctively incline. I should like to urge upon young women a course of solid scientific study in some one direction for two reasons,-first, the needs of science; second, their own needs.

- I. Women are needed in scientific work for the very reason that a woman's method is different from that of a man. All her nice perceptions of minute details, all her delicate observation of color, of form, of shape, of change, and her capability of patient routine, would be of immense value in the collection of scientific facts.

When I see a woman put an exquisitely fine needle at exactly the same distance from the last stitch at which that last stitch was from its predecessor, I think what a capacity she has for astronomical observations. Unknowingly, she is using a micrometer; unconsciously, she is graduating circles. And the eye which has been trained in the matching of worsteds is specially fitted for the use of prism and spectroscope. Persons who are in charge of the scientific departments of colleges are always mourning over the scarcity of trained assistants. The directors of observatories and museums not infrequently do an immense amount of routine work which they would gladly relinquish. Their time and strength are wasted on labor which students could do equally well, if students could be found who would be ready to make science a life work.

Women are needed too, as lecturers in schools; it needs only the supply, and the demand will come. Persons who are known to be in a line of scientific work are continually besieged with applications to give lectures, to write short articles for periodicals, to translate foreign works. Such lectures and such articles would do little directly for the advancement of science, but much indirectly in forming taste and arousing interest.

I am far from the intention of encouraging young women to scientific study on account of its outward utility. At best, its wages to-day are little above those of manual labor, and were they

the incomes of royal revenues, I should still raise the objection that it is an ignoble following of nature which looks for grain. Better dig in the earth for gold, than study its rocks for pay.

2. But, for themselves,-for young women who have a love of nature and a longing to study her laws,-how shall the taste be developed? And how shall they be encouraged? We must have a different kind of teaching. It must not be text-book teaching. I doubt if science can be taught in school-rooms at all. Certainly it cannot be taught by hearing recitations. There is a touch of the absurd in a teacher's asking any but a very young person a question, the answer to which he already knows. In the old-fashioned books the dialogue method is better used; the pupil asks and the teacher answers. Eudora asks how far the Earth is from the Sun, and Tutor answers. Eudora then asks how this was found out, and Tutor explains.

The method of teaching science by lectures is questionable; it is liable to the objection that the lecturer impresses himself and his views upon the listener, rather than nature and her ways. It is a feeble kind of science which can be put upon a black-board, placed in array upon a table, or arranged upon shelves. The facts of science may be taught by such means; the spirit of science, which is the love of investigation, they cannot arouse. If science can be developed at all in school-rooms, it must be by debate; free thought and free inquiry are the very first steps in the path of science. Only the "hard pan" of scientific truths should be accepted, and scarcely that. I should have more hope of a girl who questioned if three angles of a triangle equalled two right angles, than of one who learned the demonstration and accepted it in a few minutes.

It will be easier to reform the in-school work than to take young women over the next years, when they leave the class rooms and college, but it will be less difficult if in the class room they have learned to think for themselves and to plan their own lives. What lies before the true lover of nature, if she be a woman, when she leaves college? Almost always entire renunciation of her own wishes. An account which comes to me from one of the large cities of New York must be too strongly expressed, and yet it is somewhat true of any town. The writer says:

"If an unfortunate female should happen to possess a lurking fondness for any specific scientific or literary pursuit, she is careful (if of any social position) to hide it as she would some deformity."

The young woman who leaves college belongs to one of two classes. She must either enter at once upon some business which shall enable her to be self-supporting, or she must accept parental support.

If there is any class of women for whom I have a deep compassion, it is the unmarried and unoccupied daughters of rich men; all the more do I pity them if, as often happens, they are born with a good deal of brain power. I shudder as I recall the speech of the editor of a widely read newspaper: "The first duty of a woman is to be ornamental in the parlor." That is, she is to be the marble clytie or psyche that stands on the bracket!

For such young women there is only the slow change of the ages; the conversion of public sentiment, or a struggle to which hardly any one is equal. In most cases, she

“Suffers, recoils: then, thirsty and despairing  
Of what she would, descends and sips the nearest  
draught”

There is more hope for the poor young woman. For her, there is work. But in her poverty there are elements of destruction. She is, perhaps, a lover of nature, and dreams of a life devoted to study; she is a born investigator and knows that she has special power as well as peculiar tastes; she stifles her longings and enters upon work- distasteful work- work which is fettering- because the home needs her and there are younger ones to be aided. I question if a young woman who knows she has peculiar gifts, who can say of nature, “Her priest I am, her holy fillets wear,” has any right to turn aside from this call of God. That self abnegation is not a virtue which urges the nearest, and, on the whole, the easiest, rather than the highest duty. The woman who has a definite line marked out for her in her natural gifts has a duty as imperative as that which the family tie imposes.

For these cases of rarely gifted souls, we should care. Does any one suppose that any woman in all the ages has had a fair chance to show what she could do in science? Let me bring before you two cases- one that of Tycho Brahe of the sixteenth, the other that of Caroline Herschel of the eighteenth century.

Tycho Brahe. “King Frederic, of Denmark, gave him a delightful island for his habitation, large enough for him not to feel imprisoned (the circumference being about five miles), yet little enough for him to feel as much at home as in a high-walled park. He built a great house in the midst of the isle, a palace of art and science. Uniting the ease of a rich nobleman’s existence with every aid to science, he lived far enough from Copenhagen to enjoy the most perfect tranquility, yet near enough to escape the consequences of too absolute isolation. Aided in all that he undertook by a staff of assistants that he himself had trained, supported in his labor by the encouragement of his sovereign, he led the ideal intellectual life.”

From the Journal of Caroline Herschel:

*At Fourteen years.* With my constant attendance at church and school and, besides the time I was employed in doing the drudgery of the scullery, it was but seldom I could make one in the group when the family were assembled together.

*At Twenty Years.* For my brother I knit as many cotton stockings as would last two years.

*At Thirty-seven years.* A salary of 50 pounds a year was settled on me as assistant to my brother, and in October I received 12 pounds being the first quarterly payment, and the first money I ever in all my life-time thought myself to be at liberty to spend to my own liking.

For a certain class of students there are the summer schools, like that of Penikese; and there is the “Society to Encourage Home Studies,” at present almost entirely literary in its aims. For a smaller and more decided type of women, we should become a Bureau of Advice, and also originators of ways and means. Young women should be encouraged to state their case, and our committee should be able to suggest methods- ways of increasing facilities- perhaps to find opportunities for work in science. But what a scientist most needs is leisure,-time to think. We

ought to be able to give aids, in the shape of a year's residence near large libraries, museums, laboratories, or observatories. How eagerly such opportunities would be sought, we all know.

The laws of nature are not discovered by accidents; theories do not come by chance, even to the greatest minds; they are not born of the hurry and worry of daily toil; they are diligently sought, they are patiently waited for, they are received with cautious reserve, they are accepted with reverence and awe. And until able women have given their lives to investigation, it is idle to discuss the question of their capacity for original work.

This comes from Papers Read at the Fourth Congress of Women, held at St George's Hall, Philadelphia October 4,5,6 1876

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