

### How to Become a Great Discoverer

THERE is no twenty-five cent book on the newsstand with that title and the correspondence schools do not include it among the courses by which the young man is invited to ascend the ladder of success. Consequently any stray bits of information on the subject are worth picking up. We are always trying to guess how genius works by watching how geniuses act, as tho learning a little of the external mechanism would help

us in our efforts to imitate the process—and sometimes it does.

We got one of the rare glimpses into the psychology of discovery thru the frankness of Dr. Alfred Russel Wallace when the Linnean Society presented to him the first of its Darwin-Wallace medals. This new decoration implies a greater equality of achievement than actually existed, but it is well that it bears both names if for no other reason than that it commemorates something almost as remarkable as the discovery of evolution, namely, two scientists in honor preferring one another when they had seized upon the same truth. Dr. Wallace gave another evidence of this when in expressing his appreciation of the honor he said that since the death of Darwin he had been receiving from popular writers more than his share of credit and praise. The idea of natural selection had come to them both independently, but not simultaneously. It had occurred to Darwin in October, 1838, nearly twenty years earlier than to himself, and during the whole of that time he had been laboriously collecting evidence and carrying out ingenious experiments and original observations. How different from this long study and preparation, this philosophic caution, this determination not to make known his fruitful conception till he could back it up by overwhelming proofs, was his own conduct! The idea came to him, as it came to Darwin, in a sudden flash of insight. It was thought out in a few hours, and was written down with such a sketch of its various applications and developments as occurred to the mind at the moment. Then it was copied on to letter paper and sent on to Darwin, all in one week. Dr. Wallace modestly concluded from this that he would have no cause for complaint if the respective shares of Darwin and himself had thenceforth been estimated as roughly proportional to the time that each had bestowed on their theory when it was first given to the world, that was to say, as twenty years was to one week.

Then he went on to explain how Darwin and he came to hit upon the same solution to the problem that had baffled so many of the greatest intellects. He

pointed out as the most important of the common factors in the mental processes leading to their discovery three things, which we may summarize as:

1. Beetles.
2. Solitude.
3. Malthus.

Thus reduced to its lowest terms it looks easy enough, and we are inclined to regard it as an algebraic formula of the art of discovery in general. The first essential is the material, the accumulated facts, in this case the beetles. Both Darwin and Wallace became ardent beetle hunters in early life. Now, there are more different kinds of beetles than of anything else on earth, and a man who tries to collect them all gets to wondering how there came to be so many. And the same question came up in regard to everything else the naturalist found on his way around the world in the middle, where it is the biggest. So these two men were for years confronted by The Problem, surrounded with it, immersed in it.

The second factor of success is one that Dr. Wallace thinks a great deal of and most people not at all. On his long sea voyages and tramps in the tropics, each of these men was much alone, alone with his thoughts. There was nobody to dictate to him or bother him or worry about him. If he got started thinking about something at sunrise he could keep at it all day if he wanted to, or go to sleep and dream about it if he preferred. There was no long cue of students waiting outside his office door to have their cards filled out, no committee meeting at 3.30, no laboratory getting into bad habits thru his absence. It is a poor college nowadays that could not give its instructors more books and apparatus and specimens than these men had fifty years ago, but what college is rich enough to give what they had in abundance—that is, leisure to think? We wonder why some one of our patrons of learning does not establish an endowment fund to furnish solitude to our scientists; we wonder also what our scientists would do with it.

Finally, at the critical moment when the minds of Darwin and Wallace were freshly stored with personal observation

and reflection, they had their attention directed toward Malthus's "Principles of Population," and at once this accumulated material began to take an orderly arrangement and a new meaning about the law of the survival of the fittest. Sometimes a chemist gets a solution that will not crystallize. He may keep the thin glass dish on his desk for months and stir the sticky liquid with a sharp rod never so much, but it still remains obdurate. But if he drops in a crystal obtained elsewhere, a single particle too small to weigh or see, the whole mass instantly assumes its regular and predestined form. So the mind of the scientist requires, at just the right time, the fertilizing suggestion, the crystallizing thought, gathered from books or caught from conversation, the stimulus of contact with other minds engaged on similar problems.

It is curious what a fertile seed-thought that of Malthus has been to many minds in divers fields. Equally curious how the ideas that everybody detested and most people denounced have at the end of a century pervaded the philosophy and practice of the world. Malthusianism had three meanings; it was a law, a warning and a policy. In all three lines it has been triumphant. The law that the population tends to increase faster than the means of subsistence evolved into the larger idea of the universal struggle for existence, and in this shape has transformed for us both the past and the future. The warning, that the unchecked pressure of population would lower the standard of life, was derided by his opponents, who relied upon emigration and the improvement of agriculture to relieve them from the iron law. Both the means of transportation and of production have developed beyond their most liberal estimates, and yet the economic customs of all nations have had to be modified to meet the new conditions. That the policy advocated by Malthus, the voluntary restriction of the birth rate, is becoming dominant, the statistics of every civilized country show.

But it is a trivial matter, worth only a moment's attention, whether a dead philosopher has the right to say "I told you so" to the world.

"Our little systems have their day,  
They have their day and cease to be."

Already Wallace lingering on the stage can see the younger biologists turning away from the faith in which they have been brought up, and treating with a certain degree of contempt the simple formula which he and Darwin announced to the Linnean Society at that memorable meeting of 1858. Our men of science have stopt arguing about the possibility of new species and are hard at work making them. We now hear it said occasionally that Darwinism does not work. It does not matter. Darwinism has worked. It has done splendid service in organizing and guiding biological science for fifty years. To what extent or in what form it will be of service in the future it remains for the new Darwins and Wallaces to determine. As Professor Thomson says: "A scientific theory is not a creed, but a policy."

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