Science
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Source: *The Scientific Monthly*, Sep., 1917, Vol. 5, No. 3 (Sep., 1917), pp. 253-257

Published by: American Association for the Advancement of Science

Stable URL: https://www.jstor.org/stable/22572

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NATURAL SELECTION AND THE SURVIVAL OF THE FITTEST

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IT is well known that Herbert Spencer, five years after the publication of Darwin's "Origin of Species," introduced the phrase "survival of the fittest" as an exact equivalent of "natural selection." He said:

> The survival of the fittest which I have here sought to express in mechanical terms is that which Mr. Darwin has called "natural selection," or the preservation of favored races in the struggle for life.[1]

It is also generally known, at least among scientific men, that Alfred Russel Wallace, co-discoverer with Darwin of the principle of natural selection, preferred Spencer's expression and urged upon Darwin the substitution of it for "Natural Selection," the ground of his preference being, not any difference in meaning of the two expressions, but the misconceptions that had arisen from Darwin's apparent personification of nature. He said, referring to Spencer's phrase:

> This term is the plain expression of the fact; natural selection is a metaphorical expression of it and to a certain degree indirect and incorrect, since, even personifying nature, she does not so much select the special variations as exterminate the most unfavorable ones.[2]

And in the same letter from which the foregoing passage is quoted, he said,

> Natural selection is, when understood, so necessary and self-evident a principle that it is a pity it should be in any way obscured; and it therefore seems to me that the free use of "survival of the fittest," which is a compact and accurate definition of it, would tend much to its being more widely accepted and prevent it being so much misrepresented and misunderstood.

Darwin replied:

> I fully agree with all that you say on the advantages of Herbert Spencer's excellent expression "the survival of the fittest" . . . it is however a great objection to this term that it can not be used as a substantive governing a verb. I will use the term in my next book on domestic animals . . . the term natural selection has now been so largely used abroad and at home that I doubt whether it can be given up and with all its faults

[1] "Principles of Biology," Vol. I., Sec. I.: 65.

[2] "More Letters of Charles Darwin," Vol. I., p. 268.

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I should be sorry to see the attempt made. Whether it will be rejected must now depend "on the survival of the fittest."[3]

He adopted the phrase, however, as an alternative expression of his own idea, and in the fifth and sixth editions of the "Origin of Species," as well as in some of his other books, it so appears. No objection was raised by him on the ground that it meant something different from "natural selection." Professor Huxley was not impressed, as was Wallace, by the superiority of Spencer's phrase. Writing of it in 1890 he said:

> The unlucky substitution of "survival of the fittest" for "natural selection" has done much harm in consequence of the ambiguity of "fittest" which many take to mean "best" or "highest"—whereas natural selection may work towards degradation *vide epizoa*.[4]

But Huxley, no more than Wallace or Darwin, said anything to indicate that the two phrases are not identical in meaning and interchangeable, and they have thus been used by writers generally on the subject of evolution.

And yet there is a very important distinction between "natural selection" and "the survival of the fittest." Briefly it may be said that natural selection is a process while the survival of the fittest is a result; the one is a principle of limited application, the other a universal law.

Natural selection would obviously be powerless without something to select and something to reject and, although the selection is unconscious, it implies also a mode of selection. Natural selection, then, involves, first, a plurality of objects to select from, and these are presented in the organic world through the immense fertility of living things. In the second place, there must be variations in structure or function, or differences in the environment; and, in the third place, there must be a struggle for existence, at least in a metaphorical sense. Given these circumstances, the survival of the fittest naturally results. Of course if the selection is to have a cumulative effect, that is, if it is to be progressive or regressive, the element of heredity must also come into play. Natural selection, then, as a process, includes five elements, namely, the multiplication of chances, variation, struggle for existence, heredity, survival of the fittest. The survival of the fittest is the result of the operation of all the other factors. Another outcome is the elimination of the unfit, and it would be just as correct to identify natural selection with the elimination of the unfit as with the survival of the fittest.

[3] *Op. cit.*, pp. 270–1.

[4] "Life and Letters of Thomas H. Huxley," Vol. II., p. 284.

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But this distinction between natural selection and the survival of the fittest, although valid, is not especially important. The whole is often named by a part, and to call the process of natural selection by its result is a permissible form of synecdoche. The same may not be said, however, of the distinction I am now about to point out, for it is both valid and important. It is the distinction previously referred to in the statement that natural selection is a principle while survival of the fittest is a law.

A law, in the scientific as distinguished from the legal sense, is a statement of the coexistence or sequence of phenomena as they are manifested to our senses. Observation and generalization are alone sufficient for the formulation of a law. Since a law expresses the uniform operation of a force, our knowledge of the uniformity enables us to control the direction of the force, and this is done by the application of some principle. The essential distinction between a law and a principle has been clearly brought out by Professor Lester F. Ward. He says:

> A law is the general expression of the natural sequence of uniform phenomena. It states the fact that certain phenomena uniformly take place in a certain way. It takes no account of cause, but only of the order of events. A principle, on the contrary, deals wholly with the cause, or, perhaps more correctly, with the *manner*. It is the *modus operandi*. It has to do with the means or instrument by which the effects are produced. It is essentially an ablative conception. As principles deal with causes they must deal with forces. Gravitation, for example, is a force, but it operates in a regular way which we call the law of gravitation. Its various applications are principles or utilize principles. Thus the weight of water is a force, but the different kinds of water-wheels act on so many different principles—overshot, undershot, flutter, turbine, etc. The turbine wheel, for example, acts on the principle of reaction, according to Newton's third law of motion that action and reaction are equal and opposite. Other applications of the law of gravitation are those of weights, the balance, the pendulum, etc., all of which involve different principles. Water and steam expand by heat according to a certain law. This expansion of steam is a force which has been utilized by means of a number of mechanical principles—the piston, the cut-off, the governor, etc.[5]

Now, prior to the discovery of natural selection by Darwin and Wallace, Spencer, for one, had formulated the law of evolution. In his essay on "Progress, its Law and Cause," published in 1857, he showed that the law of organic progress consists in a change from the homogeneous to the heterogeneous, and that the law of organic progress is the law of all progress. The law of evolution, then, was recognized

[5] Ward, "Pure Sociology," Pt. II., Ch. X., pp. 169–70.

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and formulated before any one knew the principle of its operation. Spencer himself erroneously thought that, so far as organic evolution is concerned, it was functional modifications. Darwin and Wallace, however, explained the law through the discovery of its true principle. Thus Professor Ward remarks:

> Evolution is a law, or takes place according to a law, the phenomena succeeding each other in a definite order of sequence. We observe successive phenomena and from them deduce or formulate the law. But natural selection is a principle. It teaches how the effects through observation are produced.[6]

Now it must be perfectly clear that, considered as a principle natural selection explains only a limited range of phenomena, namely, the phenomena of selection that are independent of conscious choice. It applies to germinal selection, physiological, sexual, and organic selection, but it does not apply to the phenomena due to the conscious agency of man in modifying the processes of nature. Here another principle applies, namely, artificial selection. But the law of the survival of the fittest applies to artificial selection as well as to natural selection. It is universal. The fittest always survive.

That this wider significance of the expression "survival of the fittest" is not generally appreciated is shown by the frequent assumption or declaration by writers on social questions that in modern society it is not the fit but the unfit which survive. Often in contrasting the operations of nature with those of human society it is asserted that the difference between the two lies in the fact that nature favors the fit while the opposite is true in society. In war, for instance, it is said that the unfit survive while the fittest are destroyed. But in war strength, courage, and the other fighting qualities are elements of unfitness for survival. Cowardice is at a premium. "He who fights and runs away will live to fight another day." Confusion arises from the ambiguity of the word "fit" or "fittest," as pointed out by Professor Huxley, fittest being mistaken for best. But always, in society as well as in nature, fittest means only best adapted to the prevailing conditions. Conditions, including man, determine the type. If conditions favor a higher type the fittest will be best and will survive, but if they favor a lower type the best will perish and the inferior will be preserved.

We have, then, in the "survival of the fittest" a universal law, a law which prevails in the organic world and in the social world, a law which is as rigid as the law of gravitation, and

[6] *Op. cit.*

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being thus invariable it indicates the possible control of social evolution through a recognition of the law. The necessary prerequisite of human improvement is the creation of conditions which favor a higher type of man and of society. Create these conditions and by the operation of this inexorable law the type favored by the conditions will come into existence and will survive. Progress is not, as Spencer says in the essay already referred to, a thing beyond our control. He says:

> Progress is not an accident, not a thing within human control, but a beneficent necessity.

He is wrong on every point. Progress is an accident in so far as it takes place under the operation of natural selection. It is not a beneficent necessity, and just because it is subject to a great natural law it is within human control. If we learn enough about society to know what kinds of conditions are necessary to the survival of a higher type of society, and by intelligent effort bring these conditions into existence, the higher type will be ushered in and will survive. Knowledge is power with respect to social control exactly as knowledge is power with respect to the control of the mechanical forces.

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