The six genes postulated under the author's theory of heredity are designated as *rh*, *Rh'*, *Rh"*, *Rh$_0$*,*Rh$_1$* (or *Rh$_0$'*) and *Rh$_2$* (or *Rh$_0$"*), to correspond with the factors they determine. Incidentally, the frequency of type $Rh_1Rh_2$ given in Table 1 is slightly but significantly higher than that expected under the theory. While at first the writer was inclined to ascribe this to difficulties in the technic, this possibility has been ruled out by more recent studies. The excess of type $Rh_1Rh_2$ probably represents the effect of isoimmunization in pregnancy,[6] which would affect adversely principally infants of types $Rh_1$ and $Rh_2$. An observation favoring this idea is that the excess of individuals of type $Rh_1Rh_2$ is particularly pronounced in races characterized by large families and high infant mortality, *e.g.*, Chinese and Moslems.[7]

No attempt has been made to include the factor determined by the so-called anti-Hr serum of Levine and Javert[8] (or anti-St serum of Race and Taylor[9]) in the scheme. Levine believes that this factor is determined by a special allelic gene. However, unpublished observations by the writer indicate that this factor is related to the various Rh blood types in a manner analogous to that in which the factor detected by so-called anti-O sera is related to the A–B groups and subgroups (*cf.* Race *et al.*[4]). The observation that homozygous bloods of type $Rh_1$ fail to react with anti-St sera[9] can readily be explained in a manner similar to that proposed by the author to account for the behavior of anti-O sera.[10]

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## NOTES ON STARRING IN AMERICAN MEN OF SCIENCE

IN accord with G. A. Miller's suggestion in SCIENCE for May 12 that Cattell's inauguration of a system of starring of scientists be discussed, and improvements on it suggested, excerpts are given from a study of starred psychologists[1] followed by some suggestions as to how the system of starring might be improved.

Cattell's inauguration of the system of starring the leading research workers in each of twelve fundamental sciences is considered by competent judges to have been a major contribution to the growth of research in America.

The star indicates that, in the private opinion of his peers, the starred psychologist is distinguished for psychological research. It implies either a large volume of good work or a considerable amount of especially original work. Of course it does not imply that the work done by others is not decidedly worth-while, but merely that it has not impressed the voters as quite so worthy of approbation.

The star is a recognition which not only gives the recipient satisfaction, but also increases his opportunities. It is a challenge to the recipient to continue his good work and to others who aspire to win this recognition. Vast amounts of good work have been completed as a result of this friendly rivalry. Many psychologists who are not starred feel confident that they are "as good a man as . . ." and consequently set out to prove it.

The good that starring does is increased by the widened knowledge as to who are starred and why. This widened knowledge not only encourages and puts the starred men more fully on their mettle, but it also attracts attention to their work and increases their opportunities for further research. It, moreover, augments the opportunities of promising persons not starred in the hope that, as a consequence of encouragement and improved facilities, they will win this coveted recognition. The various universities employing starred scientists are placing increased value upon this recognition as a proof of individual merit and institutional strength. They not only attempt to retain and attract men already starred, but also to have local men not yet starred win this high honor; to this end they often increase facilities and otherwise encourage their more promising men.[1]

### SOME SUGGESTIONS

Objections to the system of starring which prevailed unaltered for 1908–1943 have largely been of five sorts. (1) Although in 1903 (when starring was first done) a large share of the scientists could be classified and rather fairly judged by the vote of leaders in one or another of twelve sciences, this is no longer true. Several additional sciences have become significant and specialization has interfered with many men feeling competent to vote on workers in allied disciplines. The fact that even some members of the National Academy of Sciences can not win a star because they are working in fields not recognized by Cattell in 1903 is a serious defect. Instead of 12 sciences, at least 20 should be recognized. (2) The number of men starred recently is too small. In 1903 the leading one fourth of all the scientists worthy of sketching in "American Men of Science" were starred. In the seventh edition of "American Men of Science" about 34,000 scientists are sketched, while only about 1,300 are starred. (250 newly starred, about 220 starred in 1937, about 200 starred in 1932, about 300 starred in 1921 or 1927 and the remainder starred in 1908 or 1903.) It appears that it is relatively fully 10 times as difficult to win a star now as it was in 1903. If instead of awarding stars to the top 25 per cent. of the scientists (as in

[6] *Cf.* A. S. Wiener, SCIENCE, 96: 407, 1942.
[7] A. S. Wiener, E. B. Sonn and R. B. Belkin, unpublished observations.
[8] C. T. Javert, *Am. Jour. Obstet. and Gynec.*, 43: 921, 1942.
[9] R. R. Race and G. L. Taylor, *Nature*, 152: 300, 1943.
[10] A. S. Wiener and H. E. Karowe, *Jour. Immunol.*, in press.
[1] S. S. Visher, *Am. Jour. Psychol.*, 52: 278–292, April, 1939.

1903), they were awarded to the top 10 per cent., the standard would remain sufficiently high. Yet on that basis, instead of 250 new winners each five years, there would be fully three times that number. (3) One of the unfortunate aspects of starring is that many men received almost enough votes to win a star. Such men may indeed be as worthy as some who received a few more votes and get starred. Perhaps if a symbol, perhaps an Indian arrowhead, were awarded to those who stood high enough in the opinion of the starred men (and others voting) to almost win a star, these men would be encouraged to increased effort. One result would be augmented research achievement. It is therefore suggested that, in addition to the one tenth starred, one tenth be given an arrow. (4) The original allotment of the 1,000 stars of 1903 among the sciences was based on the number of research workers in each. The proportion has changed greatly since then. For example, there are vastly more research chemists now than in 1903, and not many more anthropologists. Thus now a chemist has a far smaller chance of winning a star than an anthropologist. It is proposed that for each new edition of "American Men of Science" approximately the top 10 per cent. of each science be starred. Moreover, the second one tenth should receive public recognition, as by an arrow. Although stars won would not be deleted from the sketches, it is proposed that those won more than 15 years earlier be not counted in calculating the number of scientists eligible for a star. (5) The objections that stars are "undemocratic" and are too highly evaluated by administrators and others would be met somewhat by the proposed increase in their number and by the inauguration of the lesser recognition of an arrow.

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## FISHERY DEPLETION

FOR over two years, a committee on depletion of the Fisheries Research Board of Canada has been functioning, with the undersigned as chairman. The increasing demand for fish for food as the war progresses has presented somewhat new problems in the use of this resource. The committee has attempted to clarify the situation as to greater production of fish, with the following result.

Depletion is often presumed when underproductivity of the fishery develops, that is, where the take in proportion to the effort fails to yield a satisfactory living to the fishermen. Usually such underproductivity develops sooner or later each year, which stops the fishery either automatically or by regulation based on experience. The fisherman then awaits natural replacement of the stock by the next year. If the stock of fish available is adequate, the remedy for underproductivity is improvement in fishing methods.

So long as the annual take corresponds with expectation based on past experience, the situation tends to be accepted without remark. Natural fluctuations in the abundance of the stock, which are largely of unknown origin, are quite usual and affect the take. When an increased take has continued for a number of years, it results in expectations of indefinite continuance. Then, a decrease in the take causes general complaint and an explanation is sought. Before attributing decreased annual productivity to overfishing, the possibility of natural fluctuation in stock being the cause should be excluded, which may be very difficult. Misinterpretation may lead to application of the wrong remedy.

Not infrequently intensive fishing is followed by a decrease in the average size of the fish. This may be merely the removal of an accumulated stock of very old fish and be irremediable except by reducing the fishing sufficiently to permit re-accumulation, which might be unwise. The amount not taken under the reduced fishing might be more than the gain through re-accumulation. If decrease in average size is accompanied by a decrease in production (weight of fish taken), it is often suggested that production could be increased if the fish were permitted to become larger by restricting fishing, particularly of the smaller fish. Carefully documented experiments with such restriction are desirable to establish it as wise procedure, since there are too many little known factors for any safe prediction of its effectiveness. Several such experiments are in progress.

Frequently the possibility is advanced that overfishing has resulted in under-replacement of the stock through decrease in the numbers of spawning fish. Since most species have a high reproductive capacity, this does not readily occur. Exclusion of anadromous fish from their spawning grounds by impassable dams definitely prevents replacement of the stock. Conceivably, overfishing might prevent full replacement of stock, but it is desirable to have carefully documented experiments to establish the need for restriction of the fishery to assure replacement. Leaving out of account such forms as the amphibious walrus of the Atlantic and fur seal of the Pacific, which are particularly vulnerable on their breeding grounds, we have as yet been unable to learn of a clear, documented case of under-replacement through overfishing for this continent. Information on this would be welcomed. It is proposed to undertake somewhat precise experiments to determine in particular cases how many spawners are required for replacement of the