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 stock, so that the full surplus may be taken for human use if desired.

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RESEARCH ON PHYSICAL CHEMISTRY IN THE U.S.S.R.

THE issue of *Zhurnal Fizicheskoǐ Khimii* (*Journal of Physical Chemistry*) 17: No. 5–6, 1943, released by the Academy of Sciences of the U.S.S.R. at the beginning of 1944, was received in this country a few days ago. This issue contains a review of the activities of the Karpov Institute of Physical Chemistry for the twenty-five years of its existence and carries an order of the Soviet government of October 20, 1943, decorating the institute, its director, Academician A. N. Bakh, and twenty-two co-workers for the proficiency and successes of their researches. Physical chemists will be interested in a bibliography given in that issue listing 825 publications of the Karpov Institute for the ten-year period 1933–1943, a substantial proportion of which are in English and German. The Karpov Institute comprises laboratories studying the following fields: (1) biological catalysis; (2) surface phenomena; (3) polymerization processes; (4) heterogeneous catalysis; (5) colloidal chemistry; (6) structure of matter; (7) chemical kinetics; (8) adsorption processes; (9) aerosols; (10) inorganic chemistry; (11) non-aqueous solutions; (12) solid and complex compounds; (13) x-ray; (14) physico-chemical methods of production control; (15) photochemistry; (16) technical electrochemistry; (17) a division exists known as the Kireev group.

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EDUCATION IN SCIENCE MUSEUMS; OR THE TEN PARTS OF THE FUNCTIONAL EXHIBIT

As the influence of the common man increases in world affairs, the extent of his knowledge and understanding will influence the future of all peoples. He can guard against emotional exploitation of his prejudices by developing critical habits of thought. He can build a barrier against rash judgments and actions by assembling within himself an understanding of man and the world around him. The education of the common man, on whose shoulders may hang the future of humanity, is a challenge to all museums of science.

Museums may meet this challenge with the functional exhibit. It portrays significant facts while impressing critical habits of thought on museum visitors; it compares a familiar with a strange way of satisfying a basic human need; it reveals truths discovered in the scientific search for ways to satisfy basic needs; it rouses curiosity; it stimulates the visitor to do something constructive with his learning.

There are fewer than fifty fundamental discoveries, from which man derives the millions of articles he uses to satisfy three basic needs. So the story of human progress can be told within the space of any museum, and even within the space of a single room, when this story is told through functional exhibits.

At the entrance to a science museum, which tells the story of human progress in functional exhibits, the visitor meets something familiar, perhaps a coin, a button, a light, actively doing something he readily understands, and in which he can easily take part. Compared with the familiar object is an unfamiliar one, used by strange people to meet the same need. This comparison stimulates curiosity and proclaims the main theme of the museum to be systematic comparison, which is also the crux of scientific thinking. After this friendly introduction, which rouses curiosity, stimulates critical thinking and does not block thought with enervating awe, the visitor is told what lays before him in the museum, what the museum aims to do, and why it will do just that.

At the start a frame is presented into which the visitor can fit what he knows and what he will learn. The visitor is told why men learn, to better satisfy their basic needs, and how the museum aims to aid that learning, by comparing primitive and civilized ways of satisfying basic needs and by tracing crucial steps in the evolution of the more effective ways. The visitor is told how to proceed through the museum to benefit most fully from it, to look at one exhibit at a time and understand it fully before advancing. The visitor is told to pick out of each exhibit a crucial fact and compare it with what he knows; he is told to challenge anything that differs from his own experience, accepting nothing on unproved authority. He is told to approach each exhibit with thoughts about it and it alone, which is the objective or problem attitude that psychologists have shown, in systematic experiments, produces the swiftest solutions to puzzles and problems. He is told to look in each exhibit for two ways of satisfying a basic need, and after comparing them decide which is best, and why. He is told where, in exhibits and in libraries, he may find facts that will answer his questions.

At the start and at strategic places throughout the museum, the visitor may be confronted with a chart of basic human needs, raw materials, main transforming processes—the fundamental ideas, discoveries and inventions by which man has created useful goods—and the main habits, customs and institutions through which these goods are controlled and used to satisfy common human needs. This chart, summarizing the