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“To the solid ground  
Of Nature trusts the mind which builds for aye.”—WORDSWORTH.

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River Pollution and Fisheries.

ANGLING in the slow-running rivers of England affords recreation for an ever-increasing number of artisans and other responsible citizens of our large industrial centres. Inexpensive opportunities of health-giving open-air amusements in the limited time they have available are becoming fewer as the population increases and greater distances have to be traversed before arriving beyond the outskirts of the cities. Since it is upon the health and contentment of the city and industrial workers that the prosperity of the country has come to rest, it has become a duty of the nation to conserve the facilities for this tranquil and pleasant pastime quite as much as to conserve the more valuable salmon and trout fisheries, all of which suffer from the effects of pollution by industrial and other effluents more and more as time goes on.

With these objects in view, the Standing Committee on River Pollution was appointed in 1921, and, with the help of local sub-committees, and a growing weight of public opinion, it has already accomplished a great deal towards checking an increase in pollution, and in some cases in ameliorating the existing conditions. The problem with which the Committee is faced is not a simple one; it is not obvious how, in many cases, an industrial effluent can be rendered harmless, or sufficiently non-toxic and clear, so as not to damage life in the river or the amenities of the country-side. Every such effluent must go somewhere or the industry be dislocated; its satisfactory treatment in the space available at reasonable cost frequently provides matter for research.

An interesting problem of the moment is the satisfactory treatment and disposal of the large volume of water used for washing and transportation in the new beet-sugar factories. This wash water, besides dirt, contains organic matter in solution and suspension

which, although comparatively harmless to fish life on leaving the factory, may become harmful owing to the development of toxic substances during the decomposition of the organic matter.

It is often easy enough to determine whether a river is polluted, but quite another matter to gauge the extent to which life in the river will be damaged. Fish utilise as food a large number of organisms, animals as well as plants. The larger animals, such as the fresh-water shrimp and insect larvæ, which serve as food for many species of fish, in turn feed on smaller animals and plants. In many cases the dependence of one on the other is direct and obvious: in others less so. The presence or absence of vegetation, even of the smallest forms such as diatoms, may play a considerable rôle in determining the conditions of life in a river, quite apart from their actual food value, since they afford harbourage to animals and assist in the self-purification of the water. Hence it is clearly not the direct physiological effect of a polluting effluent upon fish alone which has finally to be determined, but its effect, if any, upon some necessary link in the food-chain and upon the flora.

The need for the solution of problems such as these before satisfactory legislation can be introduced to cope with river pollution is obvious, and has been felt in countries other than England. In 1920 the Dutch Government established a central institute at the Hague for experimental work in connexion with waste waters generally, from which advice is now sought by local authorities administering the law against pollution of the canals and waterways, and by industrial associations seeking the most economical means of treating their effluents. In the United States many rivers are grossly polluted; for example, the river carrying the Chicago sewage is stated to be devoid of dissolved oxygen for a distance of twenty miles. There the question of rational legislation is beginning to attract attention, and many specific problems are presenting themselves. Since the laws of the country have allowed the rivers to be treated as a public sink, and in consequence vested interests in them as such have developed, it will doubtless be a difficult and very expensive task to cope with their purification.

In Great Britain numerous surveys of rivers have been carried out and local pollutions investigated during the last five years by Dr. E. C. Jee, the technical adviser to the Standing Committee on River Pollution, and by several scientific workers resident in various districts. Upon the results of this work, action has been taken in a number of cases and has led to the abatement of nuisances, and the fact that sources of pollution are being investigated at intervals and

reported upon undoubtedly acts as a deterrent against increased pollution in other cases.

Besides this necessary survey work and investigation of local problems, a small scientific staff at the Fisheries Experimental Station, Alresford, have begun several lines of research fundamental to a proper scientific attack of many existing problems. With the final object of undertaking a complete biological survey of a river with particular reference to the effect of various pollutions upon the normal fauna and flora, methods have been evolved which aim at providing a quantitative, or, at any rate, comparable, measure of the abundance of life in different rivers or in the same river at different times of the year. Preliminary work showed that by far the greater proportion of the animal life (in the upper waters of the Itchen) lived either on the bottom or among the weeds which clothe it; ordinary dredges did not yield a representative sample. To obtain a representative sample of the smaller animals a frame with gauze bottom containing stones, etc., similar to the river bottom, was left for a week in the river, and the organisms which had migrated into it were then picked out and counted. It is anticipated that the various methods evolved will be of service in the examinations of polluted rivers, and also that results obtained will finally provide a valuable basis for comparison.

Fish found dead are frequently posted to Alresford for examination, and as our present knowledge of fish disease is fragmentary and the fish often arrive after decomposition has commenced, giving rise to symptoms which may easily be mistaken for those produced in a fresh fish by poisoning, an attempt is being made to obtain further accurate knowledge of post-mortem conditions, particularly histological changes in the gills and alimentary canal due to poisoning.

The need for investigations of a general nature is amply borne out; the Standing Committee on River Pollution in its recent report<sup>1</sup> states that it is "constantly faced with the lack of scientific knowledge necessary to devise a method of dealing with a particular effluent," and advocates the appointment of sufficient technical staff to elucidate, not only in the laboratory, but also by experiments at the source of pollution, the scientific questions which at present have no answer.

The future of many rivers in Great Britain is clearly in the hands of the chemist and biologist, for it is upon accurate knowledge such as they alone can obtain that any satisfactory legislation must rest. The longer the necessary efforts to tackle the pollution

<sup>1</sup> "River Pollution and Fisheries. A non-technical report on the work during 1925 of the Standing Committee on River Pollution." Ministry of Agriculture and Fisheries, London, 1926. Price 6d.

problem in a comprehensive manner is put off, the more difficult and the more expensive will be the task and the greater the risk of failure.

To allow the serious pollution which exists at present in some British rivers to continue more or less unchecked and to grow, which it undoubtedly will tend to do as the population and industries increase, is an evil greater than can be expressed in terms of decreased monetary value of the fisheries. Increased demands on the water supply in towns and cities as they enlarge have also to be considered. From before the time of Isaac Walton the rivers of England have been part of the nation's playground, a playground put to greater use as the population becomes denser, a heritage to preserve—unpolluted.

### The Origin of Civilisation in America.

*La Esfinge Indiana: antiguos y nuevos aspectos del problema de los orígenes americanos.* By Prof. J. Imbelloni. Pp. 399+19 plates. (Buenos Aires: Librería "El Ateneo," 1926.) n.p.

ALTHOUGH there is no reference to W. H. Prescott in this book, its title, "The Indian Sphinx," and the author's frequent references to himself as the Oedipus who is solving the riddle, suggest that Prescott's famous book "The Conquest of Mexico," which was published in 1843, had made a stronger impression upon him than he is prepared to admit. Both in the introduction and the lengthy appendix, Prescott gave an impressive summary of the evidence which forced him to admit, although it is clear he was very reluctant to do so, "that the coincidences are sufficiently strong to authorise a belief that the civilisation of Anahuac was in some degree influenced by that of Eastern Asia." At the same time, perhaps from having read Robertson's History, he was puzzled to account for the scores of arbitrary likenesses between the customs and beliefs of ancient Mexico and Asia. Thus he wrote:

"Was it [the pre-Columbian civilisation of Mexico] indigenous? or was it borrowed in some degree from the nations in the Eastern World? If indigenous, how are we to explain the singular coincidence with the East in institutions and opinions? If Oriental, how shall we account for the great dissimilarity in language, and for the ignorance of some of the most simple and useful arts, which, once known, it would seem scarcely possible should have been forgotten? This is the riddle of the Sphinx, which no Oedipus has yet had the ingenuity to solve."

If there were any real scientific discipline in ethnology, one might have hoped that Prescott's two difficulties having now been removed by the advancement of knowledge during the intervening eighty years (which have also added a vast accumulation of evidence in

corroboration of the clear implications of the statement in "The Conquest of Mexico"), the way would be clear for the frank admission of the diffusion of culture from eastern Asia. But in ethnology emotion still counts for more than reason: or perhaps it would be more explicit to say that the Newtonian principles of inductive reasoning, by basing theories on observed facts, have not yet penetrated into the subject, which is still under the sway of the deductive methods of Descartes. For in ethnology—and Prof. Imbelloni's treatise is a conspicuous illustration of the point—the dominating principle is still to force the evidence into conformity with certain catch-phrases that are called 'natural laws,' the *idées innées* of Descartes, the *Elementargedanke* of Bastian, the universal symbols of Freud, et cetera, from which a long line of philosophers, starting with Turgot in 1751, have been striving to rescue the study of mankind and make a real science of it.

For the introduction of confusion into the fascinating problem of the origin of the pre-Columbian civilisation of America, as indeed into all ethnological doctrine, the chief blame must be attributed to Dr. William Robertson, Principal of the University of Edinburgh, whose famous "History of America" was published in 1777. He seems to have been the first to give wide currency to the Cartesian ideas that are so popular in ethnology to-day.

"When the people of Europe unexpectedly discovered a New World, removed at a vast distance from every part of the ancient continent which was then known, and filled with inhabitants whose appearance and manners differed remarkably from the rest of the human species, the question concerning their original became naturally an object of curiosity and attention. The theories and speculations of ingenious men with respect to this subject would fill many volumes: but are often so wild and chimerical that I should offer an insult to the understanding of my readers if I attempted . . . to enumerate or refute them." After mentioning some of these speculations he adds: "though they rest upon no better foundation than the casual resemblance of some customs, or the supposed affinity between a few words in their different languages, much erudition and more zeal have been employed to little purpose, in defence of the opposite systems."

Hence, without bothering to examine the evidence, the Scottish historian fell back on the device of formulating a law. "Were we to trace back the ideas of other nations to that rude state in which history first presents them to our view, we should discover a surprising resemblance in their tenets and practices; and should be convinced that, in similar circumstances, the faculties of the human mind hold nearly the same course in their progress, and arrive at almost the same conclusions."