long before the petroleum resources of the world have even begun to approach exhaustion.

These alternative sources are almost unbelievably abundant. In the United States alone, there is enough oil shale and coal available to provide the equivalent of 2,000,000,000 barrels of crude oil each year for at least 1,000 years. Similarly, if known techniques of producing petroleum products from coal by chemical synthesis were applied to the coal reserves of Great Britain, all British requirements for such products could be met for at least a few hundred years.

But such application of technical knowledge is not by any means an easy and simple matter. Processes now available are too expensive to permit competition with natural petroleum products except under extraordinary conditions, such as those that make the Scottish and Swedish oil-shale industries economically feasible. The necessary equipment is extremely complicated, very costly, and requires extensive plants. Its installation is not yet practical on a sufficiently large scale to permit such a substitution of mineral fuel sources in the immediate future.

Nevertheless, there is every reason to expect the gradual replacement of natural petroleum products by synthetic products in the more distant future. As the supplies of crude oil are exhausted, this alternative source will take their place. Thanks to science and technology, the mineral fuels stored within the earth will prove adequate for all human needs for as long a time as they are needed. Long before the oil-shale and coal are exhausted, still other sources of energy, such as the atomic energy released by nuclear fission, will be available to do the work that men want done.

Far more difficult than the technical problems involved in meeting the physical needs of humanity are the psychological and spiritual problems that retard the process of learning how to live properly in a world community. Perhaps knowledge of the fact that our small world is a world of potential abundance but inescapable interdependence, as illustrated by such an enquiry as this concerning one typical, nonrenewable resource, may help to accelerate that learning process.

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UNESCO Initiates Cooperation in the Abstracting of Biological and Medical Sciences

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A QUESTION OF INTEREST TO SCIENtists and physicians was the subject of a Conference on the Coordination of Abstracting Services for Medical and Biological Sciences, held by UNESCO in Paris, on October 3, 4, and 5.

The group of interested experts who gathered at UNESCO House were told by Dr. Julian Huxley, the director-general, in his address of welcome, that coordination in this important field was of importance in helping to remove barriers to the free dissemination of scientific ideas and information and, therefore, pertinent to international understanding. He also believed that coordination is important for the abstracting systems of all fields of knowledge.

Dr. Joseph Needham, director of the Natural Sciences Section, discussed some of its activities and stressed the importance of good abstract services for people working in remote parts of the world—for example, in China. Dr. I. M. Zhukova, medical counselor of the Natural Sciences Section, reviewed the events which finally culminated in the Conference. She pointed out that comments in the *British Medical Journal*, the report and recommendations of a committee of the Medical Library Association (USA) based on its recent study of the abstracting of medical literature, communications from the National Research Council (USA), and letters from Dr. John E. Flynn, editor of *Biological Abstracts*, had all served as an inspiration to call a discussion group together.

Dr. Hugh Clegg, editor of the *British Medical Journal*, was appointed chairman of the Conference, and Mrs. Eileen R. Cunningham, of the Vanderbilt University School of Medicine, president of the Medical Library Association, was named vice-chairman. Others present were Dr. Zygmunt Deutschman, director of Technical

Services of the World Health Organization; Prof. W. P. C. Zeeman, an editor of *Excerpta Medica*; Prof. Samson Wright, of the British Bureau of Abstracts; Dr. John E. Flynn, editor of *Biological Abstracts*; Dr. G. M. Findlay, editor of *Abstracts of World Medicine*; Mr. Edward J. Carter, of the UNESCO Libraries Section; other representatives of *Excerpta Medica*; and experts from the UNESCO Secretariat.

The major theme of the Conference was how to provide scientists and physicians with an adequate abstracting service at the lowest possible cost.

The National Research Council and the Medical Library Association were in agreement that amalgamation of existing nonprofit abstracting agencies on an international basis and the elimination of wasteful duplication were goals which were earnestly to be striven for. It was also obvious that this arrangement could probably not become effective immediately; therefore, at least for the present, abstracting will have to be done by existing agencies with some unavoidable duplication. The Conference discussed at length ways of effecting collaboration between the various services on an experimental basis to see what may be accomplished.

The Conference passed some important resolutions and recommendations, and its objective was stated clearly by the first resolution:

> It is desirable, on a cooperative basis, to provide a scientific medical information service by means of abstracting current publications at the lowest possible cost to the consumer.

Further discussion made it clear that, in order to be effective, this would have to be done on a nonprofit basis as far as is consistent with self-support. An interesting development was the statement by *Excerpta Medica*'s representatives that they would undertake investigation of methods of operation on a nonprofit basis.

Many of the terms used in connection with abstracting were thought to require clearer definition. Just what was meant by a "comprehensive" service came up for discussion, and it was decided that "a comprehensive abstracting service in the sense of abstracting all articles of all journals is impossible and undesirable," but comprehensiveness, in the sense that such a service would *survey* the whole of the world medical literature, would be imperative. Discussion brought out the fact that, of late, hardly a science exists in which some of the work reported does not occasionally have significance for clinical medicine. Collaboration with abstracting services in the nonmedical sciences was therefore considered of the utmost importance in order to obtain their aid in drawing the attention of the editors of clinical abstracting journals to such publications. It was also felt desirable that abstracting services intended for the practitioner as well as for the investigator should cover literature at a world level rather than, as they frequently do at present, cover literature chiefly at the national level or only work published in English.

The question of the content and scope of an abstract was discussed and it was concluded that:

> An abstract should give enough information to the reader to enable him to decide whether he should consult the original article abstracted and should include the principal data of the article. . . .

This is especially important for scientists working far from large libraries who must depend to a great extent on film services for access to original articles. It was also thought desirable that an abstract should indicate if the work is of interest to several groups, e.g. physiologists, chemists, clinicians, and should be as short and concise as is consistent with furnishing this information.

Duplication of specialists' abstracting journals was regarded as undesirable.

Excerpta Medica was asked to consider discontinuing those special sections already covered in *Biological Abstracts* and elsewhere. It was also recommended that *Biological Abstracts* should consider revising its subject scope with a view to excluding material appropriately covered by other organizations, and it was suggested that *World Abstracts* (British) collaborate with *Excerpta Medica* in regard to the specialists' section.

It was suggested that UNESCO undertake to explore the existing need for various language editions of the comprehensive service and to promote the preparation and publication of comprehensive multilingual dictionaries in the biological and medical sciences.

While there were points of disagreement—for example, on the merit of "authors'" abstracts versus the "critical" abstract—the Conference felt that the value afforded by two days of free discussion was so great and so much progress had been made that a resolution was passed recommending and urging that an "Interim Coordination Committee on Medical and Biological Abstracting" be set up under the auspices of UNESCO, which would function as secretary and convener of the committee meetings.

In addition to representatives from the abstracting services which would be limited to nonprofit organizations, doing extensive abstracting international in scope, it was recommended that representatives from the World Health Organization, the International Federation of Documentation, the International Federation of Library Associations, and the Medical Library Association be included. It was stressed throughout that the needs of the consumer must be considered and that later the Committee could be enlarged if desired.

Because it was realized that this whole program has a bearing on the problem of the abstracting of the literature in other disciplines, it was decided to call the Committee "Interim," and in outlining plans, the possibility of later fitting them into a more extensive program would be carefully kept in mind. A Committee of Experts on Abstracting Services for the Natural Sciences as a whole

will probably meet during the coming year, and the possibility of a World Conference on Abstracting is also being considered by the Libraries Section of UNESCO. The Conference felt that work on coordinating the abstracting of biological and medical sciences should go forward without waiting for the larger conferences, and that any data obtained through this Committee would be useful to the contemplated conferences and should be made available so that the members could utilize that experience.

All delegates made it clear that they could not at this stage commit their organizations to definite action, but all will report on the recommendations made to see how far it will be possible to proceed, on an experimental basis, toward effective cooperation. Practical difficulties exist, and it will be important to see if they can be overcome. It was pointed out that, since abstracting services are being criticized for their wasteful duplication, every effort toward coordination should be made with a view to extending knowledge and not duplicating work.

World health is basic to world well-being, and the facilitation of the dissemination of ideas and information in the biological and medical sciences is vitally important to physicians and scientists who have the task of achieving it. UNESCO, working jointly and in cooperation with other organizations, can act as an important factor in breaking down the barriers which result from the isolation of ideas and information at the national level. The results achieved represented adjustments and willingness to cooperate evidenced by all participants. It is to be hoped that the Conference in Paris has laid the foundation for constructive thinking and progress in medical abstracting. The achievements which have been made will require continued interest and support.

Obituary

Hubert Lyman Clark
1870–1947

Hubert Lyman Clark, curator of Marine Invertebrates, emeritus, at the Museum of Comparative Zoölogy and associate professor of zoology, emeritus, of Harvard University, died in the Mount Auburn Hospital, Cambridge, Massachusetts, July 31, 1947, after a short illness.

Following early natural history studies dealing with butterflies, birds, and reptiles, he devoted the greater part of his life to the study of echinoderms and became one of the world's leading authorities on that group of animals.

He was born in Amherst, Massachusetts, January 9, 1870. His innate interest in natural history was stimulated by his father, William S. Clark, who was a student of the natural sciences, president of the Massachusetts Agricultural College, and founder of the Imperial College of Agriculture at Sapporo, Japan.

After publishing two papers on the butterflies of Amherst, the first when he was 13 years old, Hubert Lyman Clark turned his attention to birds and avidly continued these ornithological studies while at Amherst College, from which he was graduated in 1892. With the intention of making these studies his life work, he entered Johns Hopkins University as a graduate student in 1894. There, W. K. Brooks, whom Clark has characterized as "the greatest teacher I have ever known," quickly convinced the young ornithologist that there were other animals in the world besides birds. The interest in marine animals which Prof. Brooks imparted to his student was intensified during a field trip to Jamaica in 1896, when Clark saw for the first time the brilliant colors and varied forms of tropical sea stars, sea urchins, brittle stars, and sea cucumbers. This experience firmly established the study of echinoderms as his major pursuit from that time on.

During this trip to Jamaica he contracted yellow fever and was the only one of six victims of the disease to recover. Although this attack in no way impaired his general health, it did leave him with impaired hearing which made difficult the contact with people he so enjoyed. This affliction in no way affected his friendly disposition, however, or ever caused him to doubt that he was more than usually blessed with good fortune throughout his life.

After receiving his doctorate from Johns Hopkins in 1897, he spent two years at Amherst College as instructor in biology. In 1899 he was appointed professor at Olivet College and, in the same year, married Frances Lee Snell, who, although not a trained biologist, assisted him on many of his later collecting trips and made color sketches from life of many of his discoveries as a guide for the color plates which enhance his more important publications. In 1905 he accepted the invitation of Alexander Agassiz to join the staff of the Museum of Comparative Zoölogy. On only two subsequent occasions was he to return to the classroom, in 1929 as acting professor at Williams College and in 1936 as acting associate professor at Stanford University. After the death of Mr. Agassiz in 1910 he was appointed curator of Echinoderms and in 1927 curator of Marine Invertebrates and associate professor of biology. He held the latter position until he