the Ostracoderms, and those on social philosophy. The latter were the outcome of the idea that harmonious cooperation is a necessary factor in evolutionary progress, which he developed in his book, "The Grand Strategy of Evolution; the Social Philosophy of a Biologist," published in 1920. That year he organized the freshman course in evolution at Dartmouth, in which he at first used this as a text-book but later wrote and published for the use of his students a series of pamphlets in which his social philosophy was further developed and various principles of biology were discussed.

As a paleontologist he scoured the world for new material. Seven summers between 1902 and 1914 were spent in field work and collection of fossil fishes in northern New Brunswick, a search which extended into Newfoundland and Labrador and was the source of the fine collection of *Bothriolepis* at Dartmouth College, of which he made an exhaustive study.

In search of scorpions and other arachnids, he visited, with Mrs. Patten in 1912, New Guinea, Australia, Java, and sought the far-eastern representative of *Limulus* in Japan. In 1912 he traveled in Costa Rica and Cuba. During the last seven years of his life he made in all four trips to the Baltic countries after ostracoderms, and in 1925 went on to Spitzbergen.

With extraordinary talent as an artist, he had an artist's impulsive temperament and keen imagination. Infinitely patient in the search for structural details of an organism, he never failed to find in these facts a meaning. To him *Bothriolepis,* for example, was no mere fossil, but the embodiment of a cherished ideal, a link between two great phyla. Fortunately, he found this primitive fish so perfectly preserved that it needed no restoration but awaited only patient, skilful investigation and an interpretation.

His tenacity of purpose was unflinching; he attacked his work with the vigor and strategy of a general at war, almost fiercely. Never dependent upon others for ideas, he occupied himself very little with the discoveries of his predecessors, but pushed on independently, boldly. His thought was stimulating, whether one agreed with him or not.

The importance of harmonious cooperation as a *sine qua non* to evolutionary and social progress, brought out in his book, "The Grand Strategy of Evolution," appealed to him as a fresh discovery, for he was emphatically a rugged individualist.

But this philosophy, as he dwelt upon it, probably had more than a little to do with the development of that genial, friendly spirit which was always latent in him, even at that earlier period when he went fiercely to his work.

A fine physique and fondness for outdoor and indoor games kept him perennially young. Still a graceful figure skater at 70, it was his great delight in winter to teach his neighbors' daughters to waltz upon the ice. At carnival competitions his services as judge were always in demand.

He was never more happy than when explaining his work to those who showed interest and appreciation; it was a pleasure to follow the progress of his anatomical and paleontological research, presented with drawings and plastic models of remarkable clearness and beauty.

An independent, original thinker and stimulating teacher, he seemed at 70 still at his prime. His scholarship expanded and ripened with advancing years; grim determination gave way to broader human sympathies. A many-sided, vigorous, imaginative thinker, he had the vision and talent of an artist and sculptor, combined with extraordinarily keen and infinitely painstaking powers of observation.

JOHN H. GEROULD

SCIENTIFIC EVENTS

THE HARVARD ANTHROPOLOGICAL SURVEY OF THE IRISH FREE STATE

HARVARD anthropologists have begun a five-year study of the Irish Free State. They hope to include in it surveys of the social and economic life of the Irish people of the present and the past, their material civilization and their racial characteristics. These researches will be correlated in an attempt to produce some sort of scientific interpretation of the Irish nation.

In the summer of 1931 two experts were sent to Ireland to make a preliminary survey in order to determine the most suitable areas for the concentration of research and to ascertain whether such a study would be welcomed by the Irish people. The project was cordially received by all classes and parties and this year has been accorded the official approval of the President of the Irish Free State.

County Clare has been selected as the focus of sociological research because it seems to blend most typically the new and old strata of Irish Gaelic culture, being neither over-modernized nor ultra-conservative. During the past year, Conrad Arensberg, a graduate student in anthropology at Harvard, has been preparing himself for sociological work in Ireland by studying at the National University. This summer W. Lloyd Warner, assistant professor of sociology in Harvard University, began with the help of Mr. Arens-

berg the study of the economic and social life of County Clare. Many aspects of Irish social life were examined, including the marketing system, land tenure, political institutions, the family, etc. At least two years of full-time work with an enlarged staff will be required before the necessary data are collected.

This year the archeological phase of the work was also successfully begun under the leadership of Dr. Hugh O'Neill Hencken, assistant curator of European archeology in the Peabody Museum of Harvard University, and Hallam L. Movius, Jr., of Harvard University. The excavations were conducted under the auspices of the National Museum of the Irish Free State, which will be the recipient of all archeological finds.

The first site investigated was a crannog or lake-dwelling of the tenth century A. D., at Ballinderry, near Moate, County Westmeath. Here the archeologists completed the most thorough investigation of such remains hitherto carried out in Ireland. The crannog was an immense wooden building erected on a platform of logs in the center of the lake and surrounded by a high palisade of stakes. Among the finds were truck loads of bones of wild and domesticated animals, remains of wooden tubs and barrels, iron knives, axes, bone combs and bronze pins. The most important discoveries were a bronze, heart-shaped oil lamp, ornamented in Keltic style, and a curiously carved Viking gaming-board. Both of these are unique.

Another successful excavation was carried out on the six hundred foot hill of Knockast, where a huge cairn, or stone grave, was explored. This yielded forty-three burials belonging to the Bronze Age, mostly cremations. A considerable assortment of implements was found. Many other sites must be explored in future seasons, since the archeology of Ireland is almost unknown.

The anthropometric or racial survey of the Free State will be under the direction of E. A. Hooton, professor of anthropology at Harvard University, who is also in general charge of the entire Irish project. The field work in physical anthropology will be deferred until the other aspects of the study are well under way.

THE NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING

THE Tenth National Exposition of Power and Mechanical Engineering is to be held at the Grand Central Palace, New York, from December 5 to 10, inclusive, and runs concurrently with the annual meetings of The American Society of Mechanical Engineers and The American Society of Refrigerating Engineers. It will be open daily from 12 noon until 10:30 P. M.

Features of the exposition include the products of three hundred manufacturers of power and mechanical equipment. Among the distinctly new things to be seen will be control devices of unique design, including a three-element water-level control; a new type of temperature control designed to eliminate hunting; a differential draft-control system; a device for controlling the fuel level in ball mills; and a new type of mechanical steam-flow meter. Many new designs of instruments will be seen, including high-pressure steam gages, fluid meters, condensation meters, recording thermometers and gages for distant pressure recording. Two distinctly new types of expansion joints will be shown for the first time. There will also be on view a superheater especially developed for return-tubular boilers.

The results of research will be reflected in many valves and fittings of alloy steels developed to meet the conditions imposed by the trend toward higher steam pressures and temperatures. Also the progress in welding within the last few years will be depicted by the display of welding fittings and fusion-welded boiler drums.

There will be an exhibit of chlorination methods which will give the visitor an opportunity to see by means of the microscope how the marine growths actually accumulate and how they can be effectively eliminated.

Two new types of oil burners will be exhibited, one of the wide-range mechanical-atomizing type and the other of the steam-atomizing type for burning refinery waste.

Among the many other new things may be mentioned a device for removing free air from condenser circulating water; a new type of vibration damper; and a hydraulic coupling for use between motors and fans. One manufacturer will show a thermodynamic motor deriving its power from the surrounding atmosphere.

The subject of atmospheric pollution will be treated from several angles, such as its economic aspect, methods of measurement, effect on the human system, research and progress in abatement. The New York City Department of Health, the Mellon Institute, the New York Meteorological Observatory of the U. S. Weather Bureau, Stevens Institute of Technology, the Pure Air Committee of the American Society of Mechanical Engineers and a number of smoke enforcement bodies are cooperating in this exhibit.

For Saturday morning there is being arranged a specially conducted inspection of the exposition by upperclassmen in several of the universities within convenient traveling distance. This tour will be preceded by addresses from prominent engineers from