

and the Scottish Field Studies Association. Most of the grants in 1959 for field work in archaeology were towards the fees and expenses of visiting experts acting as directors of excavations and other field work. Up to 1958 astronomy was the only purely physical science which had qualified for inclusion in the Trust's scheme for the development of amateur scientific activities out of doors. During 1959 the Advisory Committee recommended the inclusion of meteorology, and the Trust has made a grant of £1,000 over 1959 and 1960 towards a scheme prepared by the Royal Meteorological Society. The

work during the first season of the Conservation Corps showed a substantial untapped reservoir of potential public service, and the Trust is meeting the cost of a scheme for providing in the Queen Elizabeth Forest Park a hill-top view-point with indicator and shelter at the highest point on Duke's road in the Trossachs and a hill-top pavilion near Aberfoyle. A grant of £12,750 was made to the Homecrafts Advisory Association for the Disabled, established by the Central Council for the Care of Cripples, to finance the development of the Association over five years.

## THE ONTARIO RESEARCH FOUNDATION

THE annual report of the Ontario Research Foundation for 1959 includes a list of papers published during the year and a list of the professional and technical staff (Pp. 40. Toronto: Ontario Research Foundation, 1960). Appended are lists of grants for postgraduate studies in science, 1959-60.

In biochemistry, work continued on long-term projects such as the effect of dietary fats on blood cholesterol-levels, the development of a self-contained domestic sewage unit, the evaluation of spruce bark as a source of tanning materials and drilling mud additives, and the reclamation of purified cellulose from waste paper. In chemistry most of the long-term research and industrial fellowships in wood chemistry were concerned with lignin, including work on the chemistry of vanillin and related compounds, development of a new method for the removal of sugars, based on the solubility in organic solvents of a tertiary amine salt of the lignosulphonates. A reasonably clear understanding of the tanning potentialities of lignin has been obtained and no further work as a major project is contemplated. The activities and staff of the Physical Chemistry Division increased considerably, and basic research was continued on stereo-specific catalysts for the polymerization of 1-butene.

In engineering and metallurgy ore dressing work materially increased, and basic research included trials on five iron ores of an improved flash roaster, evaluation of means for improving electrostatic separating machines and a study of the fundamental properties of magnetites and haematites. A major project in process metallurgy was a continuation of the jet smelting programme, and basic research in physical metallurgy was largely concerned with a fundamental study of the fatigue of metals. A possible method for measuring residual microstresses was

indicated as well as for studying the ductile-brittle transition zone in certain alloys. An extensive examination of steel and cast-iron mains and services formed part of a more general investigation of safety in natural gas distribution systems for the Ontario Government.

In parasitology, research comprised a survey of parasites of trout in certain lakes in Algonquin Park and an investigation of the mode of transmission of two tapeworms in trout; investigation of selected roundworms; investigation of life histories of blood parasites of birds and the possibilities of their transfer; and blood-sucking insects in relation to their feeding habits and the importance of insects in transmitting blood parasites.

In the Physics Department, basic research centred around the production and application of electron beams. Development of the atmospheric electron probe with X-ray spectrometer continued. An optical bench for investigating electron beams of wide cross-section was designed and its construction almost completed, and construction of a fluorescent probe for the University of Toronto Institute of Aerophysics was completed. In physiography an intimate knowledge of the soils and climate of Ontario continues to be built up, and in studies of crops a heat index was derived from growth-chamber results in Indiana and applied to thirty years records at the Central Experimental Farm at Ottawa. In textiles, continued research on wool sought new and improved methods of increasing resistance to alkali and reducing agents and of lowering felting properties. In the modification of cellulose fibres to improve crease resistance and fabric stability good progress has been made with the use of epoxy resins and of vapour phase reactions with epichlorohydrin.

## SOCIAL DEVELOPMENT THROUGH FAMILY AND HOME

THE report of the conference on "Social Development through the Family and Home," which was held at St. Hugh's College, Oxford, during September 7-25, 1959, under the auspices of the Secretary of State for the Colonies, has now been published (Pp. ii+94. (London: H.M. Stationery Office, 1960.) 4s. net).

The conference, the third in a series dealing with social development in Britain's oversea territories, was attended by representatives of 28 territories and by

participants from four international organizations, from the Colonial Office and from the Secretary of State's Advisory Committee on Social Development.

The report directs special attention to the role of the family as a basic unit of society, and to the need for Governments to adopt a social development policy to support it in conditions of rapid social and economic change. It recommends the establishment, in overseas territories, of 'ministries of social development,' supported by departments or services with

trained workers, and the setting up of social development councils to advise Governments. Among its recommendations on the training of social service workers, the report points out the need, in rapidly changing societies, for trained workers. Their training should for preference take place in the territories in which they will work, although it recognizes the advantage of some additional training overseas for occupants of the highest posts.

More specifically, the report recommends the introduction into schools of education for family life, so that both boys and girls may learn to play a happy and considerate part as young people and later as adults in the circle of their families and friends. Informal education among adults "is one of the most important ways of establishing a right relation between formal schooling and social development".

Turning to food, nutrition and health, the report advocates the study of dietary habits, consumer education, and community development campaigns to improve health and hygiene. Recognizing the importance of housing, it calls for advance consideration of the needs and customs of those who will live in houses which are being planned. Against the background of economic development, facilities for employment of women, the establishment of day nurseries, industrial welfare, social security and recreational facilities are considered to assume increasing importance. The report describes as important the availability of advice to families and as urgent the need for study of the legal status of the family, with particular reference to the new patterns of family life emerging as a result of industrialization and the growth of towns.

## LABORATORY-TEACHING OF LANGUAGES

WITH the aid of mechanical and electronic devices, students may now use entire class periods for practice in reading, speaking and comprehension during language laboratory sessions (Industrial Bulletin of Arthur D. Little, Inc., No. 373; March 1960).

The language laboratory system emphasizes the 'hearing and speaking' approach which is endorsed by the Modern Languages Association of the United States and the American Council of Learned Societies. The students are exposed to their new material on an essentially private basis. In general, comprehension, performance and speed of learning are greatly improved under the new system.

The Federal Government has recognized the need of language laboratories by providing support for the new facilities, as well as sponsoring scientific research on the mechanics of language teaching. Many colleges, high schools and even private industrial firms have installed language laboratories, where students attend at least once a week. Eventually such laboratories may become so widespread that college

entrance requirements in language will include oral as well as written tests.

In class, students sit in semi-sound-proof isolation booths provided with earphones; a master tape-recording is played, and the teacher may project slides or other visual aids simultaneously. Master tapes may be pre-recorded and catalogued and filed like library books; special text-books and exercises accompany each tape. Well-placed pauses in the tape allow the student to repeat phrases; the whole class is monitored by the teacher, who may tune in to make corrections of inflexion and pronunciation. Special instruction may be given to individuals needing it most, thus solving in part the familiar class-room problem of dividing teaching time equally among students.

Language laboratories are not intended to replace teachers, but to supplement them. Although, under the new system, students can progress faster than under the old, and will have more opportunity to develop their conversational abilities, the teacher will still be needed to explain linguistic structure, to correct errors, and to prepare good master tapes.

## IONOSPHERIC MODIFICATION OF THE RADIO EMISSION FROM JUPITER

By PROF. ALEX G. SMITH, T. D. CARR, H. BOLLHAGEN, N. CHATTERTON and F. SIX

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THE sporadic long-wave-length radio-frequency energy emitted by the planet Jupiter is received in the form of brief pulses, the majority of which range from about 0.2 to 1.5 sec. in duration. Occasionally the radiation is very intermittent, with pulses occurring singly, or at most in twos or threes. However, it is more common for the energy to be received in complex bursts of pulses, with each burst lasting from a few seconds to a minute or more.

An experiment reported in 1958 by Gardner and Shain<sup>1</sup> has thrown considerable doubt on the real origin of these details, suggesting that many of the features may originate in the terrestrial ionosphere.

In this experiment, antennae spaced 25 km. apart were used for simultaneous reception of outbursts from Jupiter, and the received signals were compared by means of high-speed pen recordings. Although only one completely satisfactory pair of records was obtained, it seemed to demonstrate clearly that there were important differences in the signals received at the two sites.

We have recently repeated this experiment, using a much longer base-line. One antenna was located at the University of Florida Radio Observatory, lat. 29° 39' N., long. 82° 21' W., while the other antenna was at the Maipo Radioastronomical Observa-