

Scientific Official Conference in 1946, the Microbiological Institute in Trinidad has become an official centre for the British Commonwealth for Culture Collections of Micro-organisms, where types of micro-organisms will be carefully preserved. That is essential if full advantage is to be taken of research in microbiology.

"I could give many further illustrations of what we have accomplished in our early, pioneer years, but I have said enough to give some impression of the kind of benefits we hope to derive from the pursuit of microbiology in this Institute; but in saying that, I must again emphasize that pure research must come first and that any deviation from that aim in pursuit of quick results might be calamitous."

Lord Hankey then went on to ask why Trinidad had been chosen for this important work. To begin with, he said, it was essential that the work undertaken in a new centre being intended mainly for the good of the tropical Empire should be undertaken within the tropics. "We were greatly influenced also," he continued, "by previous experience of the danger of placing such an Institute in isolation. Apart from the Caribbean Research Council, Trinidad already houses the famous Imperial College of Tropical Agriculture with its valuable library, and it seemed to us that to place the Institute within easy reach of the College should be of material benefit to both, owing to the close association with other scientists that each would enjoy. In this connexion it is very interesting that Dr. L. F. Wiggins, who has been prominent in assisting Sir Norman Haworth on the important work at Birmingham University on starch and sugar to which I have already referred, has recently been appointed by the West Indies Sugar Association as head of the new Department of Sugar Technology at the College. This should give a splendid start to the development of this branch of the College which was another of the suggestions made by Sir Robert Robinson and Prof. Simonsen.

"We had in mind also the opportunities that the Institute might afford for the important study of soil microbiology, and we did not overlook the prospects of invaluable contacts with the scientists of the Trinidad Government and of the refineries, oil companies and other industrial concerns in the island, as well as its associations, societies, and institutes. In particular we look forward to a close link with the University College of the West Indies.

"But to these more or less official reasons for the selection of Trinidad I would add one more, which makes a special appeal to me, as a layman, and is expressed in language more eloquent and more imaginative than I can command in the following passage from Charles Kingsley's 'At Last', chapter 14, entitled 'The High Woods', which was inspired by his observation of the Trinidad forest, while visiting the island in the last century: "The eye is not filled with seeing, or the ear with hearing; and never would be, did you roam these forests for a hundred years. How many years would you need merely to examine and discriminate the different species? And when you have done that, how many more to learn their virtues, properties, uses? By what miracle they are compacted out of light, air and water, each after its kind? How, again, these kinds begin to be and what they were like at first? Whether these crowded, struggling, competing shapes are stable or variable? Whether or not they are varying still? Whether even now, as we sit here, the Great

God may not be creating, slowly, but surely, new forms of beauty around us.' To sum up—in the words of Lucretius—'*Felix qui potuit rerum cognoscere causas*' (Happy is he who can know the causes of things. Lucretius, 'De Rerum Naturæ')."

After luncheon the company proceeded to the grounds of the Institute and here Lord Hankey unveiled a plaque with the name of the Institute engraved upon it, and opened the main entrance door with a key made of West Indian gold and presented to him by the architects who designed the buildings, Messrs. Watkins and Partners, of Bristol and Port of Spain. At the suggestion of the Director, Lord Hankey graciously consented to have his name associated with the culture collection maintained at the Institute as a link with Commonwealth culture collections of micro-organisms, and agreed that this culture collection in future should be known as "The Hankey Culture Collection" instead of the "Colonial Culture Collection".

A description of the Institute has already been given in *Nature* of July 3, p. 14.

Following the official opening, two morning sessions on July 6 and 7 were held in the library of the Institute. At the first of these Lord Hankey took the chair, and at the second, Prof. J. L. Simonsen. Many delegates and others read papers at these meetings, which were largely attended.

It is hoped, in due course, to compile an abbreviated account of the subjects dealt with in these discussions, and to issue them as a commemorative publication.

J. L. SIMONSEN

## SOUND TRANSMISSION AND NOISE

A VERY successful symposium on sound transmission and noise was held during July 14–16 by the Acoustics Group of the Physical Society, with the kind co-operation of the Royal Institute of British Architects, in the Jarvis Hall of the latter, at Portland Place, London. The proceedings were opened by Mr. H. L. Kirke, chairman of the Group, and overseas visitors were present from the United States, France, Denmark, Holland, Sweden, Switzerland, Italy and Germany.

The opening session was devoted to problems of sound transmission. In the first paper, Dr. L. L. Beranek, of the Massachusetts Institute of Technology, described investigations he has been carrying out into the determination of the attenuation of single and multiple panels. To avoid the expense of the usual two-room method, he has developed a model test using panels 18 in. square giving results which agree well with full-scale tests and with theory. He has applied the theory to seven kinds of structures and has deduced charts which enable the attenuation, for partitions of known dimensions, mass and porosity, to be readily determined. Similar work in Great Britain at the National Physical Laboratory was described by Dr. G. H. Aston. He has not found any marked effect with size in the attenuation of glass windows, but there is an upper limit to the mass which it is worth while using set at 24 oz. glass by the compliance of the framing. With double windows there is an increase in attenuation with spacing even up to 7 in. at low frequencies, but 4 in. is sufficient at high frequencies. His work on plaster walls has

shown a curious effect with time, the attenuation showing a cyclical variation during the first few days. He finds that strip metal ties for cavity walls provide much more coupling than wire 'butterfly' ties, especially at low frequencies.

Dr. Theodore Vogel, of the Centre National de la Recherche Scientifique, Marseilles, could not attend, but his paper on the transmission of sound by elastic panels was read by Prof. Canac. It gives a mathematical treatment of the vibration of a thin plate to waves of normal incidence using Lagrange normal co-ordinates. The resulting expression contains the simple piston result of Davis together with a term depending on the panel dimensions. Extensions of the theory to cases of double partitions and panels covered with porous coatings are given, and all the formulæ have been checked experimentally.

Mr. W. A. Allen, of the Building Research Station, Garston, Herts, traced the development of the party wall. The modern standard is an attenuation of 55 db., and no practical single-leaf construction has been found to give this. Two-leaf constructions of 3 in. and 4 in. thickness can reach the required standard; but it is necessary to give special attention to leakage paths, especially windows and chimneys.

Dr. Furrer, of the G.P.O., Berne, gave very interesting and useful information on the elastic properties of various materials in sheet or quilt form suitable for making floating floors to reduce impact sound. His results illustrate the good elastic properties of glass silk.

A joint committee representing Britain, Denmark and Holland has been formulating proposals for measuring insulation to air-borne and structure-borne sound, and these were put forward on behalf of the committee by Dr. Ingerslev, of Denmark. Air-borne insulation results should be corrected to a reverberation time of 0.5 sec. to match ordinary rooms. Impact sound insulation should be determined with closely specified apparatus, and subjective measurement is important. Analysers of  $\frac{1}{3}$  or  $\frac{1}{2}$  octave bandwidth are used and the results are summed. Dr. Aston described work at the National Physical Laboratory on the insulation of wood joist floors. Using a raft and pugging, he has attained 55 db. insulation to air-borne sound and 20 db. more than an ordinary floor to impact sound.

Measurements of impact sound at London, Copenhagen and Delft were described by Dr. Kosten. Discrepancies were removed by using the same tapping instrument, a 'Rawlplug' hammer.

A record of team-work by the National Physical Laboratory and Building Research Station staffs on the insulation of discontinuous structures was given by Mr. W. A. Allen. Mr. H. R. Humphreys described further work at the Building Research Station on floating floors, giving details of different constructions and results obtained in the laboratory and actual buildings.

The final paper for this session was read for Mr. Kipfer by Mr. P. Germain and described the method developed at the University of Brussels for measuring footsteps noises. In the discussion on the first day's papers, Prof. A. Giacomini made a plea for agreement on acoustical definitions and authors replied to questions, mainly on attenuation in structures. Cases of linear and geometric attenuation in decibels with distance were quoted.

The morning of the second day was devoted to papers of architectural interest, under the chairmanship of Mr. Hope Bagenal. Mr. W. A. Allen presented

the results of a survey of domestic noise giving the proportion of people suffering in one way or another from noise. Banging doors appear to cause most trouble, but very careful framing of questions is necessary to obtain reliable information. He emphasized the strain due to self-imposed constraint on one's activities.

A large-scale investigation on a number of experimental flats at Rotterdam was described by Dr. Kosten. Several kinds of walls, ceilings and floors have been tried, together with resiliently isolated piping and sanitary installations. Dr. Kosten continued with a critical examination of similarity or scale tests, and his analysis shows the method to be very useful in determining sound insulation.

A short paper by Dr. J. L. Burn, medical officer of health, Salford, on noise in schools was read by Dr. King. The problem is outlined and results of noise measurements in typical schools are given.

Dr. Grunenwaldt's paper, also read by Mr. Germain, gives noise surveys of the ships *Prinz Albert* and *König Albert* and compares them with earlier surveys by Robinson. The engine rooms have been treated and show 102-106 phons.

Noise on board aircraft as it affects telephony was discussed by Mr. P. Chavasse, chief engineer of the Acoustic Department, Centre National d'Études Télécommunications, Paris. His paper gives general directions for improving telephonic communication on board and includes an analysis of the origin and nature of the various noises.

A complementary paper to Mr. Allen's on domestic noise was read by Mr. P. H. Parkin, also of the Building Research Station, on insulation of flats from sound. The complete programme outlined begins, logically, with a social survey, discusses methods of measurement of attenuation of air-borne and structure-borne sound and gives test results on typical constructions.

Prof. Canac's paper, which he gave in French, on the acoustics of ancient Greek and Roman theatres, came as a welcome change to many present. His studies of the theatres of Orange and Vaison have shown the importance of the various structural features and point out lessons. The relation between the various absorption coefficients was discussed by M. Grunenwaldt. His paper gives the experimental basis for a relation between the Taylor and Sabine coefficients.

In the ensuing discussion, Dr. Beranek referred to the calculation of loudness from analyses and Dr. King outlined the method, originally due to Dr. B. G. Gates, which he uses. Dr. Mintz, U.S.A. Navy Department, suggested an accelerometer instead of velocity meter for similarity tests.

The morning of the third day was devoted to noise measurement, the chairman being Mr. W. West. The opening paper by Mr. R. S. Dadson, of the National Physical Laboratory, gives a survey of the problem of noise measurement, outlining the difficulties in making measurements in the field in terms of the fundamental unit of equivalent loudness. He compares the performance of objective and subjective meters particularly on motor-car exhaust noise, and points out the necessity for general agreement on equal loudness contours and the summation of analyses.

Dr. A. J. King's paper on a portable objective noise meter refers briefly to the errors of sound-level meters on complex noises and describes a much simplified peak/r.m.s. meter. Readings on typical

noises are compared with subjective and sound-level meters showing less errors than the latter.

A mains-driven meter operating on the same principle was described by Mr. D. A. Nutt. This instrument conforms to the standards of the Acoustical Society of America but also incorporates peak/R.M.S. measurement. It is intended for routine factory use.

M. P. Baron gave his paper on objective noise measurement in French. He feels that objective meter readings and summations from analyses are unreliable and should be confined to comparing similar noises.

In his paper, Mr. Maurice, of the B.B.C., deals with a different aspect of noise, namely, interference with broadcast reception. He has correlated subjective assessment of interference with readings by various meters and finds a weighted energy meter gives the closest correlation.

The paper by Lord Halsbury describing a rapid wave analyser was read in his absence by Mr. D. G. Jaquess. The instrument is a heterodyne analyser covering 0-30 kc./s. with provision for sweeps of  $\frac{1}{4}$  to  $\frac{1}{2}$  sec. and maximum resolution. It also permits more detailed examination of a 2 kc./s. band.

In his paper on the reduction of noise in aircraft, Mr. N. Fleming, of the National Physical Laboratory, deals with the contributions from the engine, propellers, aerodynamic flow and auxiliaries. He has studied octave frequency bands in each case and he shows the effects of power, tip speed and air velocity.

M. P. Chavasse read his paper describing an apparatus to produce complex sounds and artificial voices for acoustic tests in French. It is based on valve noise with suitable modulation to simulate the voice. Results obtained with it agree well with those for the natural voice.

In the discussion after this session, Dr. Beranek described recent work in the United States tending to confirm the level high-intensity equal loudness contours. He questioned the differences between pressure and field sensitivities of the ear, hinting at an obscure effect. He also asked for terminological agreement on 'random' and 'white' noise. Mr. Fleming objected to the indiscriminate use of phons for decibels, and Dr. Furrer asked about the calculation of loudness from analyses.

For the final session Mr. Kirke was again in the chair, and papers covered a wide range of applied acoustics. First, Dr. L. Cremer, who had only just arrived from Munich, read his paper on sound insulation at oblique incidence. Consideration of the travelling waves along a panel with a sound at oblique incidence suggested to him that grooves in the panel would improve attenuation. His paper gives the theory and experimental confirmation.

Dr. Kosten had had to return to Holland, so the joint paper on sound absorption in layers of material was read by J. van den Eijk. The paper gives the theoretical performance of such layers and includes experimental confirmation.

In his paper on noise in air ducts, Dr. Grunenwaldt gives the results of noise measurements on several ventilation systems with various air velocities and duct lengths. These data enable him to design duct systems for given room noise conditions.

The paper by Dr. A. Schoch, of Göttingen, on absorption by gradual transition gives the theory for successive layers of material of increasing density, leading up to the modern wedge construction. He takes as an example a linear wedge structure and gives curves for its performance.

Mr. C. A. Mason described the development of quiet chokes for use with fluorescent lamps. His paper examines the essential causes of the noise—magnetostriction and bad joints—and shows the stages followed in their reduction. He also considers the noise of a number of chokes.

In his paper on the elastic properties of rubber, Dr. E. Meyer, of the University of Göttingen, describes an elegant method using a sample in a resonant column of liquid. This gives bulk modulus and dissipation, while Young's modulus is given by longitudinal resonance or travelling waves. The frequency range covered is 10 c./s. to 20 kc./s. Effects of temperature and load are also discussed.

Mr. C. H. Bradbury's paper discusses the noise of machines, especially Diesel engines. He gives noise spectra and considers the pitched and unpitched components. He emphasizes the shock excitation of damped systems and uses a loud speaker to show up resonances. He also considers the effect of background noise.

Owing to the unavoidable absence of Prof. P. Bruel, Dr. V. L. Jordan, Mr. E. N. Storr and Mr. R. S. Hogben, their papers were not read but will be published in the *Proceedings*.

There were many contributors to the closing discussion. Among them, Mr. Fleming quoted work at the National Physical Laboratory disagreeing with Dr. Cremer on grooves and he also suggested that 'frequency of troubling' should be included in Mr. Allen's questionnaire. Mr. Mason asked about the critical frequency between dynamic-static properties of rubber, and Dr. Meyer gave it as 1 or 2 c./s. Dr. King said he was investigating the matter and thought it would be nearer 0.1 c./s. M. Brillouin gave a humorous contribution suggesting that the phon is insufficiently defined for practical purposes, but Mr. Fleming, chairman of the British Standards Institution Committee on Noise Measurement, gave a convincing reply.

A. J. KING

## MIDDLE EAST OIL

THE name of that distinguished American geologist and statistician, Dr. Everette de Golyer, has been proverbial in international oil technology for many years past. He has an almost uncanny flair for predicting correctly the trend of events in the petroleum world, and his forecasts on developments in those countries comprising the Middle East are no exception. So long ago as 1925 the writer remembers de Golyer saying that "he expected from Persia a continued increase in production, as handling and marketing facilities are increased, so long as the fields may last". Nearly twenty years later, when leader of the United States Petroleum Commission to the Middle East, he stated that "the centre of gravity of world oil production is shifting from the Gulf-Caribbean area to the Middle East and is likely to continue to shift until it is firmly established in that area". That this has actually happened is probably not generally appreciated: the economic, technical and political implications of the fact have yet to be assimilated by the public, quite apart from the industry itself. To this end an up-to-date, straightforward survey of the position is essential to its understanding, and the *Petroleum Times* has rendered signal service by publication of its "Review of Middle East Oil" (London, June 1948, 7s. 6d.).