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Edited by Bernard Epstein and Victoria S. Hewitson

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NAVY COMMENDATION MEDAL FOR COMMANDER R.E. ADLER, USN

Commander Robert E. Adler, who served with ONR London for 3½ years, from August 1962 through January 1966, was recently awarded the Navy Commendation Medal for his fine performance in that duty. His citation read in part: "For meritorious service as scientific liaison officer for missile and space technology ... he has brought a highly unusual combination of professional talents to bear on a wide range of projects ... By his outstanding technical competence, broad naval experience, and effective personal manner, Commander Adler has made significant contributions to naval technical progress and international cooperation ..." The award was made to Commander Adler by his present Commanding Officer, Vice Admiral Lawson Ramage, Commander First Fleet, in San Diego, California.

Commander Adler is still traveling, his new assignment having recently taken him to Japan and the Pacific Islands. His Navy friends in Europe wish him continued success.

MATERIAL SCIENCES

Two Metallurgical Conferences in England

A consultants' conference on the nature of small defect clusters was held at Harwell, 4-6 July, just after the weekend that was summer in London. (The meaning of "small" in this context was one of the more elusive aspects of the meeting.) A brief summary of the highlights was passed on to us by Prof. M. Meshii (Northwestern Univ.).

R. Perrin and R. Bullough (AERE, Harwell) presented theoretical calculations on interstitials in a bcc metal, taking into account the discrete lattice and using a pairwise interaction energy. Near a single interstitial the lattice relaxed in <110> directions; a second interstitial occupied a neighboring position. Larger groups appeared to lie on planes such as {111} and {100}, in agreement with previous observations.

Meshii and his students, J. McComb and K.Y. Chen, demonstrated that vacancy clustering in Au and Al is controlled by nucleation. If a specimen is quenched and held, say, at -40° C and then at a higher temperature, and if another specimen is quenched and taken immediately to the higher temperature, clusters occur only in the former case. In fact, there are three temperature regions -- $T_1 < T_2 < T_3$. Below T_1 only nucleation occurs; between T_1 and T_2 only growth occurs; and above T_3 resolution occurs. /Between T_2 and T_3 secondary clusters (loops, faults) remain./ The kinetics of nucleation can be studied in this way, and from knowledge of the time required for nuclei to form and of the initial vacancy concentration, this group estimates that the critical size is less than ten vacancies. This and the fact that the nuclei do not form between T_1 and T_2 -- so that the critical size is not a strong function of temperature -- were amply supported by new theoretical calculations of R.M.J. Cotterill and M. Doyama (Argonne National Lab.). Using computer models of a discrete lattice, they examined the formation energy of clusters as a function of the number of vacancies involved and found that the energy has a sharp maximum at five vacancies. This result also indicates that vacancies should be "pumped" from the surface to the clusters.

Both Meshii's group and A. Kelly and R.M. Mayer (Cambridge Univ.) showed experimentally that the nucleation was in fact heterogeneous and on impurities. Kelly and Mayer doped very pure graphite with boron; the density of clusters increased with boron content. Meshii's group exposed quenched Au foils to an oxygen-rich atmosphere to eliminate impurities by oxidation; the clustering rate decreased. Changing the oxygen pressure did not affect the kinetics, so that the rate-controlled step was the diffusion of impurities, not the oxygen diffusion.

As a result of experimental work and theoretical calculations by M. Wilkens and M. Rühle (Stuttgart) and by K. McIntyre and L.M. Brown (Cavendish Lab.), there seems to be some question as to whether the two-beam calculations of dynamical scattering by Ashby and Brown are sufficiently

detailed. The images of loops and clusters in the electron microscope do not seem to agree completely with the results of these calculations. As this point was much debated, we can hope for its solution in time for the next meeting two years hence.

Finally, Ch. Schwink (Munich Univ.) showed that care may be needed in interpreting data used to obtain activation volumes. If flow stress is obtained as a function of strain rate over many orders of magnitude of the rate, there can be a spectrum of activated events; at high rates the slope of the plot to obtain the activation volume may be reduced because some of the defects become "transparent" to glide dislocations.

In a more practical vein, a conference on deformation under hot-working conditions was organized by Dr. J.S. McTegart (Dept. of Metallurgy, Sheffield Univ.) 5-6 July. Industrial workers and university research men from the UK, the Continent, and the US attended. It was revealed that hot-working does not necessarily involve recrystallization; recovery is often the major process, and the resultant substructure is quite stable and stronger than recrystallized specimens with the same hardness. Cracking can be reduced if the grain-boundary mobility or recrystallization rate is high, so that cracks at boundaries are "left behind" before they develop to any appreciable extent. (J.B. Cohen)

Chemistry at Durham

The University of Durham (founded in 1832), in the north of England, is a small but relatively venerable institution. Its student body numbers less than 3,000, but many of them will boast that they are students at one of the three oldest universities in England (by which they mean Durham, Cambridge, and Oxford). Durham itself is a small town with relatively little industry. Originally the town occupied a knoll of ground which is almost completely surrounded by water (a big loop in the River Wear). The castle was built at the neck of the loop, making the town impregnable to the marauding Scots from the North. (The original medieval town of Bern, Switzerland enjoyed a strikingly similar geographic advantage.) Now the town extends outward in every direction from the original knoll. In the original area stand the magnificent cathedral and the older University buildings. The medieval castle is used as a college (residence hall) of the University, easily making up in tradition what it lacks in comfort. Newer residence halls, university offices and instructional facilities, particularly the science laboratories, have been built outside the knoll. Actually, many of the new buildings are located on land that is higher than that in the loop of the river.

The University operates on the college system. That is, students are admitted to one of the 12 colleges which make up the University. Thus, Durham is largely a residential institution. Teaching and curricula are organized centrally by authority of the Senate of the University, and all curricula are open to all students of any college. In practice some of the colleges give priority to students in a particular curriculum. Thus, there are two colleges which consist almost entirely of students who are candidates for Holy Orders in the Church of England. Three colleges consist chiefly of students wishing to become teachers in England's primary and secondary educational systems. Four of the 12 colleges are for women (two of the three teacher's colleges). As at Oxford and Cambridge, most members of the faculty are fellows of a college.

Prior to 1963 the University consisted administratively of the colleges at Durham and King's College in Newcastle (a large industrial city just to the north of Durham). The latter is now the University of Newcastle upon Tyne, and is a much larger school than Durham. The medical school, which was also at Newcastle and part of the former King's College, is now also a part of the University of Newcastle upon Tyne.

At Durham there are four faculties: Theology, Arts, Science, and Education. Actually, science has been slow to come to Durham. Thus, while chemistry was taught prior to WW II, only since then has it been possible to say that Durham has an active mature Department of Chemistry. G.E. Coates is Professor and Chairman of the Department. He is a quiet man, but possesses one of the keenest chemical minds in all of England, in the opinion of the writer. W.K.R. Musgrave is Professor of Organic Chemistry. G. Kohnstam is Reader in physical chemistry. The facilities are new, and equipment is adequate both from the point of view of undergraduate instructional needs and that of research. About 150 undergraduates, spread over the three-year curriculum, major in chemistry, and there are somewhat less than 50 graduate students.

In addition to Coates, whose interests in organometallic chemistry are well known, the inorganic staff consists of the following lecturers: F. Glockling, K. Wade, A.J. Banister, M. Kilner, and H.M.M. Shearer. Glockling continues his main interest in organogermanium chemistry, and is now also investigating germanium-transition metal bonds. Wade has been studying the donor-acceptor behavior of non-metal and typical group metal halides as well as analogous

organometallic compounds. Banister is developing a vigorous program in N-S chemistry. For example, he is investigating the donor-acceptor behavior of $S_3N_3Cl_3$ and $S_3N_3O_3Cl_3$, and it looks as though he has prepared $[SeS_2N_4^+]_2SeCl_6^{2-}$. Kilner is studying the behavior of transition metal carbonyls toward thiols, with the hope of getting terminal S-R groups in some cases rather than the bridge S-R groups encountered thus far. Shearer is a crystallographer and has recently completed the following structures: $[C_2H_5Be{\cdot}N(CH_3)_2]_3$, $[NaO(C_2H_5)_2]$, $[(C_2H_5)_4Be_2H_2]$, and $[R{-}C{\equiv}C{-}Cu]$. (S.Y. Tyree, Jr.)

Inorganic Chemistry at Bern

W. Feitknecht is Professor and Head of the Institute of Inorganic, Analytical, and Physical Chemistry at Bern. For many years he has been interested in the relationships between solid hydroxide phases and basic salts on the one hand, with saturated aqueous phases on the other. His particular interest is the iron system. He is now convinced that it is one of the most (if not the most) complicated. In the Institute a number of younger men have been encouraged to develop their own interests and to go to other universities to learn new ideas. Upon returning, these young men more often than not maintain research interests in the area of hydroxide chemistry, but from a new point of view.

Thus, A. Ludi spent a year with H. Hartmann of Frankfurt learning some modern theoretical inorganic chemistry. It was he who worked out the one-center model for the energy-level calculation of Ti(III) complexes, assuming a 37-electron one-center complex (see Theoret. Chim. Acta (Berl.) 3, 182-193 (1965)). Back at Bern he is starting a program on basic salts, in which the single-crystal polarized spectra of hydroxides and hydroxosalts of transition metals, whose structures are well known will be measured. Like several other inorganic chemists who have introduced themselves to the theoretical calculation aspect of spectroscopy, Ludi is convinced that the compilation of carefully measured spectra of well-defined single-crystal phases is more important at the moment than further calculation.

For example, in the spectrum of d^n ions he expects to study the effect of lowering the symmetry of the ion and of changing the field strength on the ion by successively substituting one ligand for another, e.g., Cl^- for Bi^- for OH^-, etc., in the crystal.

P. Schindler, recently appointed as Professor and placed in charge of instruction in analytical chemistry, has spent one leave in Stockholm with Sillen, and more recently, another leave in Washington, D.C., with Bates at the Bureau of Standards. Basically interested in hydroxides, he has shown conclusively that many of the polymeric hydrolysis product ions proposed by other workers are, in fact, metastable with respect to other species and a crystalline phase. He continues to investigate hydrolytic phenomena and to study the relationship between hydroxide phases and solute metal ion species. He and Feitknecht agree that one of the most critical problems now to be studied is that of the mechanism of formation of the crystalline phase.

Despite relatively modest equipment, old laboratories, and low budgets, this Institute contributes at least as much to the understanding of hydroxide chemistry as does any other in the world. (S.Y. Tyree, Jr.)

Inorganic Chemistry in Glasgow

There are now two universities in Glasgow, both granting BSc and graduate degrees in chemistry. They are the old University of Glasgow and the new University of Strathclyde (formerly Royal College of Science and Technology, Glasgow). (The former is an old, broad-spectrum university in the Scottish tradition, while the latter is essentially an institute of technology, much as MIT, CIT, etc.

Chemistry has grown rapidly in the past two or three years at Strathclyde. The Department has four professors and a senior staff of almost 40 (including the applied chemistry, or chemical engineering, group). D.W.A. Sharp is Professor of Inorganic Chemistry, and under him are five lecturers: W.A. Alexander, D.H. Brown, A. McAuley, G. Nelson, and R.H. Nuttall. This group is strongest in inorganic fluorine chemistry, specifically in fluorometallate complexes. A considerable interest also exists in non-metal fluorine chemistry, particularly phosphorous-fluorine compounds. The Department of Chemistry is well supplied with instrumentation for modern chemical research.

The staff of the Chemistry Department at the Univ. of Glasgow is as large as that at Strathclyde. However, this Department has no applied chemistry, nor is there a professor of inorganic chemistry. D.S. Payne is the reader in this subject, and there are only two lecturers. Thus, inorganic chemistry is rather neglected in comparison with organic (Raphael), physical (Robertson), and theoretical (Cruickshank) chemistry. Payne is an exceedingly able and likeable chemist who continues to be interested in the chemistry of phosphorus-halogen compounds. He has only recently returned from the University of Florida at Gainesville.

At Strathclyde there are about 20 graduate students in inorganic chemistry, whereas there are only about five at Glasgow. The two departments collaborate

in a number of ways, and there is an evident spirit of cooperation between them.
(S.Y. Tyree, Jr.)

MATHEMATICAL SCIENCES

British Hydromechanics Research Association

The Duke of Edinburgh officiated at the Royal Opening of the new BHRA laboratory facility on 21 June 1966. This new laboratory is located within the grounds of the College of Aeronautics at Cranfield, Bedfordshire (about 60 miles northwest of London), and initially consisted of 11,000 ft^2 of converted aircraft hangar space. Since 1964, the laboratory has expanded into new buildings totaling some 26,200 ft^2 with additional work areas in 1966 bringing the present total to about 50,000 ft^2. The staff of the laboratory totals 78, of whom 30 are professional research personnel.

The annual budget is about £133,000, more than two-thirds of which is subscribed by members of the Association, the balance being provided by a government grant. This financial dependence upon member organizations channels most research into problems of immediate application, while the government subsidy supports the long-range basic research necessary for continued vitality. The 1966 membership consists of 150 industrial firms and 242 individuals (academic workers and consulting engineers), with subscription rates ranging between £100 and £1,000 per year.

The BHRA defines its main function as the dissemination and interpretation of previously published information in the field of hydraulics and other branches of fluid mechanics. Actual experimental work is undertaken only when existing information is inadequate to provide the expert advice requested by a member, or as background research for possible future application. It is probably fair to say that the BHRA is concerned primarily with the flow of fluids through channels (pipelines, dams, sluices, pumps, etc.) rather than with the flow characteristics of immersed bodies.

Apart from numerous scale models of dam projects, some interesting work is being carried out on solid-transport pipeline systems, hydraulic seals, optimum design pump characteristics, radioactive gas containment efficiency, special instrumentation for use with models and the science of "Fluidics" (Fluid Logic and Amplification). One ingenious console is a "pneumatic network analyser"; this consists of a honeycomb panel of air chambers which can be inter-connected by U-tube modules having variable inlet and outlet orifices. Each module can be adjusted to simulate a pipe section or fitting such that a complete piping network can be simulated on the panel. Once the desired network has been set up on the panel, pneumatic pressure is applied at the outlet and a bank of manometers will disclose the pressure resulting in each chamber. This procedure permits rapid analysis of the performance of a proposed fluid network and pinpoints possible areas quickly and economically.

The new British Hydromechanics Research Association laboratory appears capable of integrating academic research and industrial application in a unique way which will provide significant impetus to British progress in the field of fluid mechanics.
(J.E. Bennett)

Crisis in a Classroom

Over the weekend of 10-12 June a group of British professors from the University College (University of London), The London School of Economics (University of London) and the University of Wales (Swansea) conducted an interesting experiment at South Ruislip Air Force Base. The subjects of the experiments were some thirty men, mostly military officers and the rest US Government civilian employees (mostly teachers) all doing graduate work in International Relations.

The simulation was a game constructed around an International Relations situation involving a crisis in the Middle East. The scenario was a plausible projection of the situation found in June into the time frame of June 1968.

Various players were assigned roles as members of national governments, whole national governments, prominent individuals, members of international organizations and so forth. The two professors who had designed the game played "control." In control, plays were checked as to possibility, and probabilities of various outcomes were assigned. Control also played the part of any countries, organizations and individuals not assigned to players. The other professors acted as observers.

The players were in separate rooms or in team rooms, and identity of roles and role-players were not disclosed. Communication was by messages which were either secret or open. The latter included press releases. With Control's concurrence, meetings and conferences could be arranged and were sometimes held.

The play was initiated by the scenario and several messages from Control. The game was divided into periods of real time about an hour long, but "game" time for the same period could be an hour or several days. Each game period was followed by an interval during which questionnaire forms were completed. These gave each player an opportunity to record: his plan, the situation

confronting him, his estimate of the future, his fears and anticipations, etc.

Prior to each period of play, individuals were given time for reflection and teams were allowed to hold discussions. During the period of play, tension was generated both by the development of the situation and by a very restrictive time frame in which to make decisions, draft messages and hold meetings. Control increased tension by introducing new situations, by generating "noise," and by increasing the tempo and volume of message traffic flow. Control could also delay messages and occasionally garbles occurred, increasing the realism (and tension).

The purpose of simulation was severalfold. The hypothesis dealt with the identification and definition of "crisis." Later analysis is intended to unearth some new knowledge about the decision process. Some new insights into the emotional impact of communications may be discovered.

Now that the game is over, the supervising professors have retired into their ivory towers for the exhaustive business of studying the data. Exotic correlations will be made; message factors and content will be analyzed; attitudes, interest level, motivation and semantic differentials will be measured. Conclusions will be reported. Theories promulgated.

We wish them well.
(J.W. Hemann)

MISCELLANEOUS

A Gastronomic Miracle!

A new addition has been made to the long list of reversible chemical reactions. According to the British press, a method for making a protein food product out of methane gas has been developed at the Shell Research Laboratories in Milstead, Kent.

Methane is the stuff that is bubbling up from the gas wells in the North Sea, and a micro-organism is said to be able to convert it into an edible protein, colorless, odorless, and (unfortunately!) tasteless. The report doesn't say, but perhaps the nitrogen -- the necessary element in all proteins -- comes from the gas well off the Dutch coast, reported to be producing nearly pure nitrogen gas.

It has been suggested that the discovery of North Sea gas may bring about a revolution in British fuel policy (see ESN-20-6); perhaps it may also revolutionize British food habits.

Making protein from hydrocarbons is not new. British Petroleum and some of the other oil concerns have been using heavy oils for this purpose for some time. BP, however, believes that its gas well -- the first in the North Sea -- may produce at least 50 million cubic feet of gas a day. This amounts to some 560 tons of methane, capable of yielding 200 tons of protein food, according to estimates. That's a sizeable beefsteak for half a million people! And since it will presumably require no cooking, the whole gas supply may as well go into the food instead of the stove.

When BP peddles synthetic hamburgers on the streets of London, however, "Cor! That'll be the dye!"

"'Ere, luv, 'ave a methyl Wimpy."

Of course, there will always be the persnickety one who will refuse to eat something that comes out of an oil well. So what?

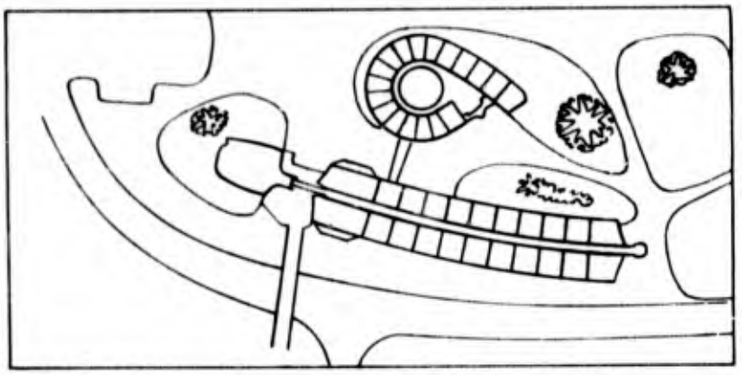
"'Ere, mate, 'have a boiled egg."
(N.W. Rakestraw)

Togetherness at Birmingham

When it was founded about the beginning of this century, the Faculty of Commerce of the University of Birmingham served students seeking careers in industry, commerce, and finance. Early in its history, however, courses for the training of social workers were added, and finally, in 1947, the Faculty was formally expanded and re-named the "Faculty of Commerce and Social Science." It now offers both the Bachelor of Commerce and the Bachelor of Social Science degrees. The present Faculty includes a sizeable number of departments and research centers covering the fields of theoretical and applied economics, economic history, accountancy, commercial and industrial law, political science, social policy and administration, social psychology, statistics and econometrics, and philosophy. The centers include one for Russian and East European studies, another for West African studies, and a third for topics of special relevance to the industrial Midlands of Great Britain.

The courses of study undertaken by the students frequently cut across departmental lines. The job market is such that individuals with training in both fields are in considerable demand. A graduate of the center for Russian and East European studies, for example, frequently finds openings in the business world, although his study has been primarily in the field of social science. Jobs are also available in British business and the Civil Service for statisticians with training backgrounds in social science.

In 1964, the Faculty moved into a pair of new buildings consciously designed to foster the interdisciplinary nature of its teaching and research. These buildings (Figure 1) serve different functions. One is a two-story structure containing lecture theaters, seminar rooms, locker rooms, and a common room, and is devoted primarily to teaching. The second is a so-called "quiet" unit of five stories



which provides office space for the teaching and administrative staff. The buildings are almost equal in size (slightly over 23,000 ft^2), but their external appearance and internal design are quite different. The two-story structure is built up from a series of 1-3/4° bays, resulting in a building which follows the gentle curve of an adjoining road.

Somewhat more interesting is the design of the second building, variously called the "study" or the "research" block. In addition to promoting interdepartmental interaction by housing teaching activities and offices in separate buildings, the design of the five-story building itself is intended to encourage interaction. Excerpts from articles in the Architectural Review of March 1966 and the Architects' Journal Information Library, 9 March 1966, indicate some of the goals for which the architects strove:

"The essence of university life is the cross-fertilization of ideas but this is unlikely to happen if the communal space is 200-ft long and 5-ft 6-in broad. The great merit of this Birmingham building is that, by wrapping its corridors around a central well, it turns them into a place and not merely a route."

"... it draws together the small individual departments of a somewhat diffuse Faculty."

"... the plan shape and structure have evolved from the architect's wish to emphasize the homogeneity of a Faculty which had become dispersed about existing University buildings ..."

"... the need to design a building in which members of the many departments could become aware of without being disturbed by each other ..."

"... the need to foster a sense of the unity of the Faculty as a whole."

In their attempt to achieve these goals, the architects designed and built a snail-shaped building providing for the 69 Faculty members wedge-shaped offices constructed around an open central well. The occupants of the offices are grouped on the various floors on the basis of assumed common interests, and a special telephone system permits easy communication among them. Despite masonry interior walls, considerable sound insulation has been achieved (a recent fire drill was missed by more than half the staff). The offices are reputed to be pleasant places in which to work. The ones seen by this writer tended to be somewhat austerely furnished, and one wonders what happened to the hundreds of books which generally overflow from the shelves of university professors' offices.

The ventilation has been criticized, as has the size of the rooms (190 ft^2 for professors, 150 ft^2 for lecturers). Although the noise level in the individual offices is satisfactory, that in the faculty lounge on the top floor is distractingly high. The ground floor of the rotunda has been criticized in Architectural Review as not being "a real meeting place." A small fountain in the center, which has been referred to as an "outsize spittoon," also sprays passers-by. The floor contains a combination of ramps and short (3-step) stairways which make crossing it somewhat of a hazard.

Insofar as it was possible to assess the attitudes of the staff, they seem reasonably pleased with the overall accommodations. Unfortunately, however, as is so frequently the case, the Faculty has already outgrown the new building. Economies forced them to restrict it to five stories when they could easily have made use of seven. Since the foundation of the present building cannot carry the additional load of two more floors, part of the Faculty will move to a nearby Faculty of Arts building now under construction. In terms of the most critical aspect of the design, that is, whether it does in fact promote interdisciplinary rapport and interaction, a definite answer could not be obtained. It was conceded that the design does make informal consultation as easy as possible, but whether more actually takes place as a result of the new accommodations is problematical. (J.A. Nagay)

The German Institute for International Research in Education

This Institute, located in Frankfurt, was established as an independent foundation in 1950, although its work did not actually get under way until 1951. It was the first institution in Germany set up primarily for the purpose of conducting empirical research in education. Its research program covers a broad spectrum of educational problems, and its teaching function is devoted almost exclusively to educational research methodology. It is "international" in the sense that it cooperates with institutions outside Germany in comparative educational projects; guest professors and lecturers from foreign countries occasionally serve at the Institute, and temporary research fellows (students) frequently represent foreign countries.

The administration of the Institute is supervised by the Minister of Education of the West German State of Hesse which provides the principal support. The staff members, who must meet the same qualifications as are required for teaching in universities, are Hessian civil servants. However, complete freedom of research and teaching is guaranteed by the statutes of the Institute. It is located in what was a bomb-damaged school building donated by the city of Frankfurt. Funds for rebuilding and adapting the structure to the special needs of the Institute were provided from US sources.

At the time of its founding, three fields of educational research were covered. The first was in educational psychology, which was under the direction of Professor Erich Hylla, the founder and first Director of the Institute. A second chair encompassed comparative education and practical school work, including curriculum planning, methods of teaching, textbooks, audio-visual aids, and other school equipment. The third was a department of educational administration, including problems of school legislation, finance and administration. Later, a chair was added in the sociology of education, and the most recent department is that of educational statistics, also headed by a full professor. The total professional staff numbers between 15 to 20. Dr. Walter Schultze is the current acting director and also holds the chair of comparative education. Dr. Johann Ruppert heads the Educational Psychology Department, in which Hylla has served as emeritus since his retirement in 1956. Educational Administration is handled by Dr. Hans Heckel, and at the time of my visit to the Institute it was anticipated that the Department of Educational and Psychological Statistics, then vacant, would be headed by a Dr. Michel, then serving at the University of Freiburg.

Hylla was primarily interested in improving educational measurement in Germany during the six years of active affiliation with the organization. Since 1956 his interests have swung from tests and measurements to what he perceives as Germany's critical educational problems. The basic problem, according to him, is represented by a nation-wide shortage of talent for higher education, due, he believes, to the fact that the student output from secondary schools is impeded by factors associated with a class society. (See ESN-20-2 and 3). He believes that the educational potential of four subgroups in particular is severely neglected. The first is comprised of those individuals normally called the "laboring class." The second consists of individuals from predominantly Catholic regions of Germany. The third, referred to in Germany as "village" residents, corresponds roughly to America's rural population. Finally, Hylla also believes that a large number of qualified girls fail to finish secondary school and become eligible for higher education. He has been spending his time attempting to determine the reasons why these subgroups attend institutions of higher education in proportions far smaller than those they occupy in the general population. Some of this effort is conducted in collaboration with the Department of Educational Sociology via the use of attitude surveys and other sociological data-gathering techniques. The aim is to determine the sociological and educational factors responsible for the fact that only 30-40% of all entering secondary school students complete this phase of their education and hence become eligible to apply for university training.

Most of the temporary research fellows (students) who attend the Institute are teachers who have had practical teaching experience. In general, their qualifications include completion of the gymnasium, plus three to six years in a university

or teacher-training institution. In addition to teachers, school administrators, youth leaders, social workers and the like may also enroll. A definite interest in educational research is a prerequisite for enrollment, as is knowledge of at least one foreign language. Students carry out research projects under the guidance of the Institute staff, and the reports of these studies are published by the Institute. The topics for study may be selected by the students themselves or may be assigned. Students may either work alone or participate in groups in some larger research project. Although lectures and discussions are held, the teaching involved is largely indirect. That is, it evolves from the personal guidance offered by the senior staff members who direct the research of the students. No fees are charged; no degrees or certificates are granted. The Institute will supply upon request a record of the kind, extent and success of a student's research work to qualified educational authorities. Although no tangible evidence of attendance at the Institute is provided, apparently considerable prestige attaches to completion of its one-year course of study. The "graduates" tend to go on to further university training, to industrial training jobs, to teaching positions in secondary schools, or to jobs in school administration. A number have emigrated to the US.

The state of Hesse grants paid leave plus an additional allowance to at least eight teachers annually to attend the Institute. Nearly all the other states of the Federal Republic, and some cities also, send teachers. Some come independently without subsidy. The only costs involved for the students are for meals and lodging.

At one time the state of Hesse was the sole supporter of the Institute. Now support comes from all states of the Federal Republic. The Institute has no formal affiliation with any university, although many working relationships have been established. In the 1950's education enjoyed less prestige than other departments of German universities, and it was felt by the founders that it would be advantageous for the Institute to be free of any university connection. They feel that this belief has been justified and that they have been able to receive much better financial backing without such university affiliation. Hylla emphasized to this writer that the Institute is not a graduate school of education; it is more like a research institute of advanced studies; and he admits to being strongly influenced by the Institute for Advanced Studies at Princeton in his organizational planning. Many tests for use in schools have been developed and are sold, bringing in some income for the Institute, although hardly a significant amount. Also, some of the publications of the Institute are sold to schools and teacher-training institutions throughout Germany.

Prof. Schultze is an active participant in a ten-nation cross-cultural study of the comparative achievement of 13- and 18-year-olds in mathematics. His department receives considerable support from the Volkswagen Foundation, which is apparently interested in supporting research which will lead to the development of modern methods in the educational field. He is quite active in the programmed instruction movement in Germany and is engaged, among other things, in a series of exploratory studies aimed at determining the appropriateness of this teaching technique in primary and secondary education. Thus far, the programs which the Institute has developed have been in textbook form and deal largely with the field of elementary science education. Schultze feels that the initial uncritical acceptance of programmed instruction in the US is a practice to be avoided in Germany, and he is therefore proceeding somewhat cautiously. He has an active interest in other educational media also, including television, films, language laboratories, etc. He is a proponent of the belief that computer-based instruction is the most promising educational tool of the future. He appears to be a very dynamic individual who is quite capable of conducting a program for the Institute that will meet or exceed its original objectives. (J.A. Nagay)

A New College at Oxford

Oxford University has received two grants, totalling slightly over £3 million (=$8.4 million), to establish a new graduate college. The new institution will be named for Sir Isaac Wolfson, prominent English industrialist and founder of the Wolfson Foundation, which has provided almost half of the above sum. The remainder has been contributed by the Ford Foundation, in a gesture described by its president, McGeorge Bundy, as an American action to help in countering the "brain drain."

The College is to have a total membership of about 350 fellows, consisting of graduate students, post-doctoral researchers, and visitors. Of this number, it is intended that between ten and fifteen percent will be from Commonwealth nations, the US, and Europe.

Heavy, but not exclusive, stress is to be placed on the sciences and technology, a decision in keeping with the recent report of the Franks Commission. (See ESN-20-6.) Presumably to assure a reasonable balance, however, it is expected that the first master of the College will be Sir Isaiah Berlin, Professor of Social and Political History at Oxford.

The Ford Foundation has also announced a grant of $3 million, on a matching basis,

to an existing graduate college at Oxford, St. Antony's, which emphasizes history, economics, and political science. (B. Epstein)

NAVAL APPLICATIONS

Deeper Voices from the Deep

The Speech Transmission Laboratory is one of the world's leading centers for research in general voice communication. It is a part of the Swedish Royal Institute of Technology, which is located near the center of Stockholm -- just on the northern edge of the shopping and business area.

The Director of the Laboratory is Dr. Gunnar Fant, a man in his late forties. He is a trained electrical/electronics engineer and participates actively in the Laboratory's research activities, in addition to directing his staff and managing the administrative and financial aspects of the Laboratory.

The Laboratory employs about 30 scientists, who are roughly divided into three groups: electronics-oriented engineers, physiologists and psychologists, and linguistic experts. The latter group includes both classic linguistic analysts and mathematicians who are employing the modern techniques of communications theory and information theory.

The research conducted at the Laboratory covers the entire field of speech and hearing: speech communication research on a broad basis, speech analysis, speech synthesis, speech and hearing research of medical interest, and speech analysis and restoration in high ambient air pressures.

The latter topic is of particular interest to deep-sea divers -- particularly in a "sea lab" situation. But all of the other studies also support this highly specialized research.

The problems of speech in sea lab conditions are twofold. The first problem is the distortion caused by pressure. This is an interesting phenomenon, as sound itself is not distorted by differences in pressure -- rather the speech track, principally the soft tissues in the throat and back of the mouth, is distorted and rendered less resonant. This problem has already been studied by Fant for several years. This project has been largely financed by the Swedish Navy and commerical organizations.

The second problem is the distortion of speech in a helium-oxygen atmosphere. While Fant has not worked in this area himself, he is well versed in it. The Swedish Navy has tackled the problem with no noteworthy results, and now, has turned over to Fant its work in this field.

Speech in a helium environment can be studied by several approachs, and it seems that Fant's methods will be to try to configure instrumentation which will shift the frequency spectrum of speech in helium to a range similar to normal conditions. This approach is similar to what has been done in the past. However, Fant does seem to have a particularly good grasp of the problem and may well go considerably further toward a solution.

Fant is an engineer, but he has amazing breadth, including knowledge of the psychology of perception, the mathematics of communication, the physiology of the speech mechanism, the physics of sound, and much information about general linguistics. These are rarely so concentrated in one man and his small organization.
(J.W. Hemann)

NIO Produces NRL "Traction Capstan"

The National Institute of Oceanography at Wormley, Godalming, Surrey has capitalized on an NRL innovation to solve a widespread problem. Increasing usage of faired cables for oceanographic instrument tows in RRS DISCOVERY had disclosed frequent serious damage to the fairing when reeled in over standard capstans. NIO engineers were on the point of giving up any hope of finding a solution when they ran across NRL Technical Report No. 5878 by Chester Buchanan, et al, on the "Traction Capstan." Further inquiries led NIO to seek and obtain permission to apply this idea to an oceanographic winch and to the production of a 1/4-scale working model to prove the concept. The model was so successful that NIO had a full scale (4-ft diameter) capstan fabricated and installed in RRS DISCOVERY, where its performance has exceeded all expectations. The SACLANT ASW Research Center at La Spezia, Italy, has now requested temporary loan of the 1/4-scale model for test and evaluation.

The full-scale "Traction Capstan" (usually referred to as a "Helical Warping Capstan") was constructed in the UK over a period of four months and at a cost of £5000 (about $14,000). The design of this capstan is such that cable turns on the capstan may be kept at a constant separation, thus obviating the need for spreaders to prevent cable/fairing overlap. Equally important, most cable tension is maintained on the capstan, thus permitting cable to be transferred to storage drums under minimal tension. NIO has found that use of this design has all but eliminated the problems associated with handling of faired cables and it is enthusiastic over performance thus far.

The basic idea behind the "Traction Capstan" is that cable reels onto a capstan in a plane perpendicular to that of the

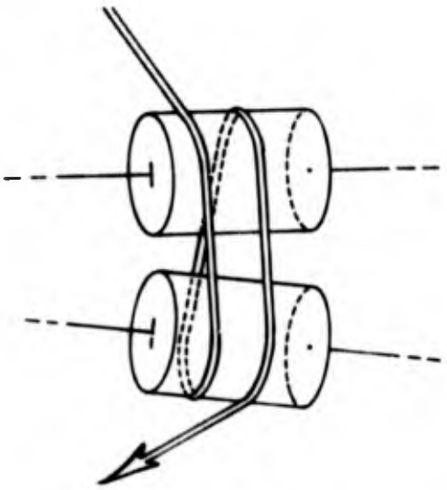


FIG. 1.

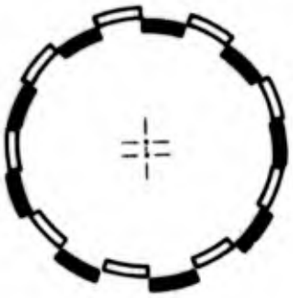


FIG. 2b

NOTE: Relative positions of white and black bars is reversed at opposite ends of capstan

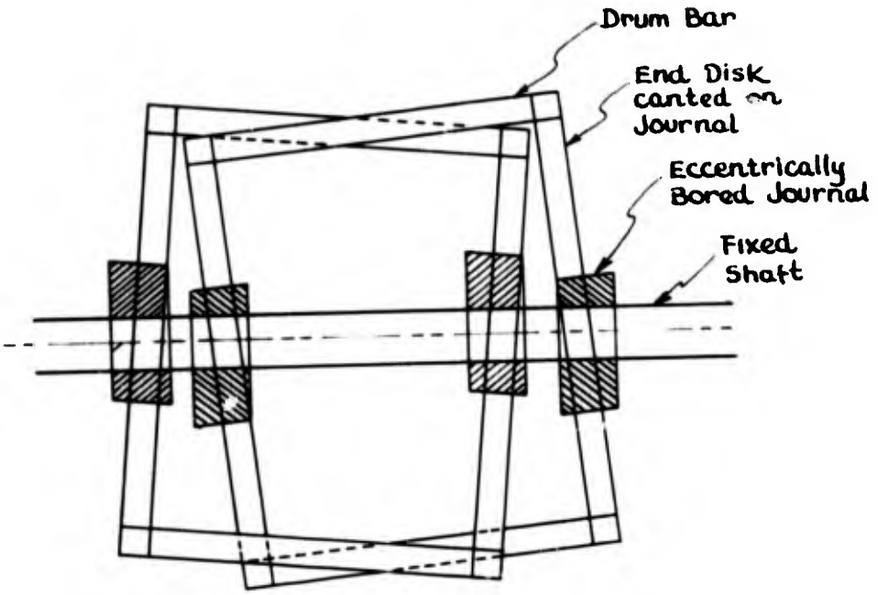


FIG. 2a.

capstan surface, and that by using two capstans on non-planar axes the cable may be shifted horizontally without overlap, binding or sliding (see Fig. 1). The innovation in design is to make these two inclined capstans "concentric," thus reducing weight, space and primary drive complications (see Fig. 2a). The method of accomplishing this is to construct each "drum" surface from 16 bar segments connected to canted end discs, such that they form two "drums" with inter-meshed bars. Finally, by making the canted end discs of each drum rotate eccentrically (all four end discs rotate about a common fixed shaft) it is possible to present alternate surfaces to the cable each 180° turn of the capstan (see Fig. 2b). The distance separating adjacent turns of cable on this capstan is a function of the cable diameter, capstan diameter and relative inclination angle between the inter-meshed bar surfaces.
(J.E. Bennett)

Gloria

A recent visit to the National Institute of Oceanography disclosed that the design and engineering personnel are absorbed in a new project termed "GLORIA," meaning "Geophysical Long Range Inclined Asdic." Details of this project were not immediately available, but the basic idea is to provide a sideways-looking sonar (operating at 7 kcs with a range of ten miles either side of track) which can be used for geophysical investigations in deep waters -- specifically, along

the mid-Atlantic ridge. Estimated size of the array will be about 35-ft-long and 8-ft-diameter with a cylindrical cross section. It is planned that the array will be towable at a depth of 400 ft (or below the thermocline) and at speeds up to 10 knots. Present efforts are being directed toward the design of a recovery system capable of creating positive buoyancy for the array in an emergency as well as more gradually for routine recovery. It is hoped to have this system operational within about two years, with initial operations in 1968 south of the Azores, for use in searching for fracture zones, seamounts, etc.
(J.E. Bennett)

The Birth of an Industry

Present methods of land and sea transport have evolved over many centuries, while aircraft have reached their current state of development within several decades. In contrast Hovercraft has condensed the period from idea to practice to just eight years. To celebrate this event, "Hovershow 66" was held 15-19 June at Browndown, Gosport, Hants.

Britain urgently needs new industries, and believes that in Hovercraft a new one has been born. The Hovercraft idea became known to a large group of people from an experimental crossing of the Channel in mid-1959, and since then developments have been rapid. About a dozen scheduled commercial passenger-carrying services are already in operation, and in 1968 a 160-ton ferry for both cars and passengers is to commence operation between England and France. Now, Britain wants to sell these "flying machines" to the world, and it held the show to demonstrate their potential and to prove her readiness to manufacture them.

The exhibition did show that the machines move (with rather limited maneuverability), that they are truly amphibious (desert or sea makes little difference to them), and that tents are necessary for any outing in England as cover from rain. Both vintage and recent craft were flown (or driven). Incidentally, there is already somewhat of a jurisdictional dispute concerning entrepreneurs for this kind of machine; should it be under the air people, the sea people or the land dwellers? It travels on land and sea, but it rides on air -- but then, is its altitude sufficient to require a pilot? All craft performed in a satisfactory manner.

In the near future, no attempt will be made to cross large bodies of water. (As of now it is alleged that 8-ft waves can be handled.) But passages over limited routes are practical. As landing craft to get over that unknown sandbar and to actually go up onto the beach, they look promising.

This show demonstrated that the era of Hovercraft has arrived, but it will be some time before hovershows compete with the air shows at Farnborough. Birth has proceeded normally with Britain as the midwife -- if the baby is to grow up healthy, the US may have to play the role of pediatrician.
(P. King)

PHYSICAL SCIENCES

Plasmas at the University of Milan

The Physics Institute of the University of Milan, Headed by Prof. P. Caldirola, is a strong research center. Caldirola was initially a Professor of Theoretical Physics, but is now responsible for a professional staff of approximately 100 which is concerned with both the teaching and research activities in physics at the University. The Physics Institute moved into new quarters about three years ago, and the new buildings are both spacious and well-equipped.

In addition to his other duties, Caldirola directs a group of 12 physicists who are doing theoretical and experimental research in plasmas, and also a group of seven physicists who are working with lasers. It appears that the interest in plasmas was initially stimulated by a desire to learn more about radio and microwave propagation in the ionosphere. The group does not make ionospheric propagation studies, but according to Caldirola, diagnostic techniques are being developed that can be used for satellite-borne measurements of electron density. Most of the work is either theoretical and associated with the physics of plasmas, or is experimental and associated with weakly-ionized plasmas generated in the laboratory. Caldirola says that the group will soon investigate the physical mechanisms concerning a cyclotron resonance ion propulsion system. Such a system would employ microwave excitation and a static magnetic field. Caldirola plans to focus his attention on the energy balance of the resonance transfer and on a theoretical model for the prediction of the optimum conditions for energy transfer.

The largest research group (30 physicists) within the Institute is concerned with space physics and is under the direction of Prof. G. Occhialini. Prof. G. Tagliaferri is head of a low-energy group , which is developing a fixed-energy (about 50 MeV for protons), cyclotron that is being constructed in a separate building. A group under Prof. Loinger is concerned with the theory of fundamental particles, quantum electrodynamics, symmetries, potential theory and scattering matrices. Prof. Germagioli heads the solid state group, and efforts concerned with the use of facilities at CERN are under Prof. E. Fiorini. (Technical Report ONRL-61-64 by N. Seeman and ONRL-2-66

by J.G. Brennan, describe the nuclear and high-energy programs at the University.)

The electron gyromagnetic frequency, ω_H, and the plasma resonance frequency, ω_p, are used frequently in the discussion which follows. They are angular frequencies, and the corresponding frequencies in cycles per second are $\omega_H/2\pi$ and $\omega_p/2\pi$, respectively. The gyromagnetic frequency ($\omega_H = eB/mc$) is directly proportional to the magnetic field and is the rate at which an electron gyrates in orbit under the influence of a steady, uniform magnetic field in the absence of an electric field. Gyromagnetic frequency is often called cyclotron resonance frequency because it is the angular frequency at which electrons gyrate in a cyclotron, as long as the speed of the electron is in the non-relativistic range. The plasma frequency ($\omega_p = \sqrt{4\pi n_e e^2/m}$) is proportional to the square root of the electron density n_e and is the oscillation frequency of the plasma electrons about an equilibrium charge distribution.

Theoretical Investigations - The Plasma Group is strongly motivated toward the theoretical studies, possibly because Caldirola is himself a Professor of Theoretical Physics. Dr. O. de Barbieri, is, with the possible exception of Caldirola, the leading theoretician in this group. Apparently de Barbieri's strongest interests are currently in non-linear phenomena of slightly ionized plasmas under the influence of an external magnetic field and of an electromagnetic wave.

Taking into account both elastic and inelastic collisions between electrons and molecules, Caldirola and de Barbieri have calculated (Radio Science, 69D, No. 1, 33-58, January 1965) the mean electronic energy due only to the absorption of the extraordinary wave of the electric field, and have shown that it is a maximum at the gyromagnetic resonance frequency. They have also calculated the electronic distribution function and the components for the complex dielectric permittivity tensor for an amplitude-modulated wave with carrier frequency near the gyromagnetic resonance frequency. Beat frequencies generated by plasma nonlinearities were considered, but according to de Barbieri, more research is needed on this subject.

The electronic distribution function and the complex dielectric tensor have also been calculated (Nuovo Cimento, 42B, 266-289, 11 April 1966) by another method. In this work, Caldirola, de Barbieri, and C. Maroli considered the conditions under which it is permissible to employ the usual expressions for the complex permittivity for the study of electromagnetic propagation in weakly ionized plasmas. The calculation starts with the Boltzmann equation for the electronic distribution function and uses a multiple-time-scale method to obtain a set of equations which describe the interaction processes between an electromagnetic field and a weakly ionized magnetoplasma; the calculation is restricted to cold and slightly ionized plasmas.

Analysis of theoretical problems concerning the propagation of electromagnetic fields in slightly ionized magneto-plasmas is continuing. According to de Barbieri, an electromagnetic wave which is initially transverse can generate longitudinal waves, and the latter, in turn, generate transverse waves. He is continuing his studies on the physical mechanisms associated with the generation of these waves, and he feels that the generation of beat frequencies in plasmas can be explained by this process.

Plasma Generation with Radio Waves - Laboratory studies have been made on the creation of a weakly ionized plasma by propagating a radiofrequency wave through a low-pressure gas. An 84-mc wave is sent between two rectangular plates between which is located a glass bulb filled with spectroscopic helium at pressures of 10^{-3} - 10^{-2} mmHg. A magnetic field (0 - 40 gauss) is applied perpendicular to the electric field of the 84-mc wave. Cylindrical, spherical and parallelepiped bulbs were used, none with overall dimensions exceeding 20 cm. When the gyromagnetic frequency of the electrons approaches (by variation of the magnetic field) the radiofrequency, breakdown is brought about by sharp increase of ionization. For this type of discharge, examined by Lax, Allis, and Brown (Journal of Applied Physics, 21, p. 1297, 1950), in the microwave range, only a low intensity of electric field is required for breakdown.

In a radiofrequency discharge, the energy supplied to the plasma is absorbed primarily by the electrons. Electron kinetic temperature can thus reach very high values, while atomic temperature, which is not directly influenced by the exciting fields, can be considered equal to the temperature of the plasma container. The energy of these electrons has been determined to be between 15 and 20 ev by a technique of optical spectroscopy proposed by Sovie (Physics of Fluids, 7, No. 4, 1964).

Measurements of the breakdown field, made by means of an rf voltmeter, as a function of applied magnetic field, have been made at different pressures and with different bulbs. For magnetic fields far removed from that required for gyromagnetic resonance, an electric field of approximately 15 v/cm produces breakdown. For a magnetic field such that the gyromagnetic frequency is approached, 4 v/cm and 9 v/cm were needed to cause breakdown

at pressures of 4×10^{-3} and 2×10^{-2} mmHg, respectively. From graphs of electric field required for breakdown versus magnetic field, electrons-neutrals collision frequency can be calculated. It may be seen from equations for "effective field" (see above reference by Lax, et al) that collision frequency is equal to the half-width of the electric field versus magnetic field (expressed in $\omega_H 2\pi$) resonance curve.

It was found that the collision frequencies for the three bulbs were different, indicating that the walls of at least two of the containers were controlling breakdown. From detailed analyses and the data on electronic energy and collision frequencies, it was concluded that the walls of the cylinder (length 20 cm and diameter 10 cm) do not influence the discharge for pressures between 10^{-3} and 10^{-2} mmHg, providing the cylinder axis is oriented parallel to the magnetic field. Collision frequency was found to be approximately linearly proportional to pressure and of the order of 10^7 sec^{-1}. Since the cylinder walls do not affect breakdown, it has been possible to evaluate how gyromagnetic resonance controls breakdown of radiofrequency discharge in a range of pressure of the order of that existing in the ionospheric E-layer.

Photometric and Electron Density Measurements - Light emitted as a function of static magnetic field has been measured. The plasma was produced by a fixed-frequency radio wave (84 mc) and the intensity of the light emitted by the plasma was measured with a photomultiplier. For an rf-electric field of 2 v/cm, maximum light was emitted with a magnetic field corresponding to $\omega_H/2\pi$ equal to 70 mc; for a field of 10 v/cm, maximum light was emitted for a magnetic field corresponding to $\omega_H/2\pi$ equal to 65 mc. Caldirola and others at Milan state that the magnetic field for maximum light emission seems to obey the hybrid resonance relationship

$$\omega_H = \sqrt{\omega^2 - \omega_p^2} \quad ,$$

where ω is the radio-excitation frequency and ω_p is the plasma frequency (proportional to electron density).

The conductivity and dielectric permittivity of a plasma depend on electron density; therefore, the latter can be determined by performing an admittance measurement. To accomplish this, a sample of the plasma-generating radio wave is fed to a dipole radiator, so that the complex reflection coefficient (with and without plasma) can be determined. The reflection coefficient is determined by means of a directional coupler from which magnitude of incident wave, reflected wave, and a combination (including phase) of the two is obtained. These measurements, in combination with various numerical calculations, provide an estimate of electron density.

Electron density calculations have been performed for different values of the electric field (plasma-generating radio wave) and for values of static magnetic field for which electron gyrofrequency is near the radiofrequency. As this visitor understands it, the electron density versus magnetic field obtained has the same behavior as that of the light intensity emitted as a function of magnetic field.

Diagnostic Method Using Plasma Resonances -- A preliminary report has been published (Applied Physics Letters, 7, No. 11, 300-302, 1965) by Caldirola and others on a method being considered for measuring electron density in a satellite. Considerable theoretical and experimental effort has been directed toward this problem since the first results were published. The method is related to that employed by T.H.Y. Yeung and J. Sayers (Proceedings of the Physical Society, 70B, 663, 1957) for an isotropic plasma. In that case the electric field close to (induction field) an antenna insulated from and immersed in the plasma is a maximum if the transmitted frequency is equal to the plasma frequency; at this frequency the dielectric constant is zero.

In the case of anisotropic plasma (magnetic field present) the dielectric properties are represented by a tensor, and there are four peaks in the induction field as a function of frequency. Assuming that the electrons-neutrals collision frequency is much smaller than the transmitted frequency, the peaks occur at frequencies corresponding to

$$\omega = \omega_p \quad , \quad \omega = (\omega_p^2 + \omega_H^2)^{\frac{1}{2}} \quad ,$$

$$\omega = \tfrac{1}{2}\left[\pm \omega_H + (4\omega_p^2 + \omega_H^2)^{\frac{1}{2}}\right] \quad .$$

The characteristic plasma frequencies have been studied and used as a diagnostic method for determining electron densities. In order to pick out the resonant frequencies, a sweep-frequency signal is sent into the plasma and received with a similar probe; the amplitude versus frequency of the received signal is studied. The instrumentation and measurement techniques are complicated by the fact that the received signal varies as a function of frequency not only because of the plasma, but also because of variations in the gains of the transmitting and receiving antennas. To alleviate this problem, measurements are made with and without plasma present.

For initial experiments the magnetic field was fixed (ω_H approximately 74 mc). The plasma was produced in a cylindrical bulb (10-cm radius and length of 20 cm) by a transmitter with frequency near ω_H. The dipoles were perpendicular to the

to the static magnetic field and were insulated from the plasma by a thin glass layer. Output powers available from the probe and plasma-generating transmitters were several milliwatts, and helium pressure in the glass bulb was 10^{-3} - 10^{-2} mmHg. Four resonant frequencies were obtained for each value of electric field producing the plasma, i.e., for each electron density. Measurements have now been performed for several values of magnetic field and for several rf-electric fields producing the plasmas. The frequencies at which the peak signals occur are in good agreement with those predicted by theory.

Plasma studies have been at radio-frequencies, but steps are now being taken to extend the measurements to microwave and millimeter wave frequencies. (M.W. Long)

NEWS AND NOTES

The British Heart Foundation has announced awards amounting to £100,000 ($2.8 million) among which is the Fraser Research Award of £12,000 to Dr. T.D.V. Lawrie of the Royal Infirmary, Glasgow, for the purchase of recording equipment. This apparatus will consist of multi-channel magnetic tape recording systems for the collection of cardiograms in the hospital wards, and a processing system based on a small computer to transform the recordings into numerical data for computer storage. The next stage will be to produce paper tape of all the recordings for fast analysis on the more powerful KDF9 computer at Glasgow Univ. Another award of £10,800 is made to Dr. R. Niedergerke (University College, London) for research concerned with the physiological mechanism of the heart beat.

Personal News

Dr. W.C.J. Ross has had the title Professor of Organic Chemistry conferred on him at the Institute of Cancer Research, Royal Cancer Hospital, London.

Dr. W. Galbraith, at present group leader, High Energy Physics Group, Nuclear Physics Division, Atomic Energy Research Establishment, has been appointed Professor of Physics at Sheffield Univ.

Dr. G.W. Kirby, at present lecturer in the Dept. of Chemistry, Imperial College of Science and Technology, London, has been appointed to a Chair in Organic Chemistry at the Univ. of Technology, Loughborough.

Dr. P.R. Davis, Reader in Anatomy at the Royal Free Hospital School of Medicine, has been appointed to the Chair in Human Biology at the Battersea College of Technology (the proposed Univ. of Surrey).

Dr. Kingsley Dunham, FRS, President of the Geological Society of London, has been appointed Director of the Institute of Geological Sciences to succeed Sir James Stubblefield, FRS, who will retire at the end of 1966. Dunham has been Prof. of Geology at Durham since 1950.

Prof. A.D.M. Greenfield is to be the first Dean and Professor of Physiology at the new Medical School at Nottingham Univ. from 1 Oct 1966.

Prof. H.W. Thompson, Professor of Chemistry in the Physical Chemistry Laboratory, Oxford, is to receive the John Tate Gold Medal and $1,000 from the American Institute of Physics.

G.S. Nelson, MD, Reader in Medical Parasitology at the London School of Hygiene and Tropical Medicine, has been appointed to the William Julien Courtauld Chair of Helminthology tenable at the School from 1 Oct 1966.

D.W. Davies has been appointed Superintendent of the Autonomics Division at the National Physical Laboratory, Teddington, from 1 Aug 1966.

J. Aitchison, Reader in Mathematical Statistics in Liverpool Univ., has been appointed titular Professor in the Dept. of Statistics, at Glasgow Univ.

Dr. E. Clar, Reader in Chemistry, has been appointed titular Professor in the Dept. of Chemistry at Glasgow Univ.

Dr. Joel Mandelstam, who has been working for the National Institute of Medical Research, London, has been appointed Iveagh Professor of Chemical Microbiology at Oxford Univ.

I.G.K. Williams, Head of the Administrative Division in the Health and Safety Branch of the Atomic Energy Authority, has been appointed Deputy Director-General of the European Nuclear Energy Agency, effective 1 Sept 1966.

Dr. John Stringer of the Battelle Memorial Institute, Columbus, Ohio, has been appointed Prof. of Physical Metallurgy at the Univ. of Liverpool.

Technical Reports of ONRL

The following reports have recently been issued by ONRL. Copies may be obtained gratis by Defense Dept. and other US Government personnel, ONR contractors, and other American scientists who have a legitimate interest. However, because of the frequent content of proprietary and prepublication information, the reports cannot be sent to libraries or to citizens of foreign countries. Requests for ONRL reports should be

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ONRL-29-66	Microwave and Radar Research at Philips Research Labs, Eindhoven by M.W. Long
ONRL-30-66	Nuclear Physics in England by J.G. Brennan
ONRL-31-66	Some Aspects of Biomedical Research and Medical Education in Israel by C.N. Peiss

The following conference reports are releasable to European scientists:

ONRL-C-11-66	Fourth International Congress for Infectious Diseases, Munich, 26-30 April 1966 by C.H. Miller
ONRL-c-12-66	Informal Meeting on Electrochemistry and Electrolyte Solutions, 14-15 April 1966, University of Reading by S.Y. Tyree

Prepared by the Scientific Staff
Submitted by P. King

W.W. SCHAEFER
Captain, U.S. Navy
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13. ABSTRACT

This is a monthly publication presenting brief articles concerning recent developments in European scientific research. It is hoped that these articles (which do not constitute part of the scientific literature) may prove of value to both American and European scientists by disclosing interesting information well in advance of the usual scientific publications.

The articles are written by members of the scientific staff of ONRL, with an occasional article contributed by a visiting stateside scientist.

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