1966

CAMILLE DREYFUS LABORATORY
Anton Peterlin, Director

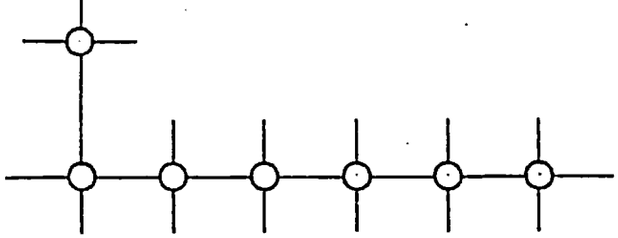
RTI'S Camille Dreyfus Laboratory is an international center for basic studies in the physics and chemistry of polymers. It is dedicated to long-range fundamental research in polymer science, and to the discovery of new materials and the modification of known polymers which may provide the foundation blocks for products and industries of the future.

The Laboratory was created by a $2.5 million grant from the Camille and Henry Dreyfus Foundation as a research memorial to one of the great pioneers of man-made fibers, chemicals and plastics. Sustaining support is also received from corporate and government sponsors.

The Laboratory's general program is about equally divided between research relating to the synthesis and modification of polymer structures, and research relating to pure property investigations. All projects undertaken in the Laboratory serve to advance these objectives. Research findings are published in scientific journals and other publications.

Selected areas of study within the general program include: the dynamics and thermodynamics of polymer solids; polymer morphology; electrical, optical and solution properties of polymers; crystallization, deformation, permeation and diffusion in polymers; radiation chemistry (degradation, grafting, cross-linking, polymerization); stereochemistry; polymerization kinetics.

The work of the Laboratory's permanent staff is enhanced by the knowledge and experience of Resident Visiting Scientists, from this country and abroad, who hold six-month to two-year appointments at RTI.



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RESEARCH TRIANGLE INSTITUTE 1966

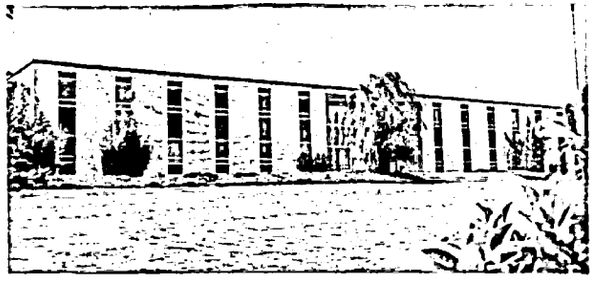
RESEARCH TRIANGLE INSTITUTE is a contract research organization formed at the initiative of business leaders and state and university officials in North Carolina. Initial funding was provided by the Research Triangle Foundation through contributions received from individuals and corporations.

The purpose of RTI's founders was to establish a research center supplementing the activities of its neighboring universities—the University of North Carolina at Chapel Hill, Duke University in Durham, North Carolina State University at Raleigh—in the discovery and application of new knowledge. Created by the Triangle universities to provide professional research services to industry and government, RTI is a scientific resource which contributes directly to the economic well-being and security of the people of North Carolina, its region and the nation.

RTI is a separate corporate entity. Under an independent Board of Governors, Institute management is solely responsible for operating policies and for developing the programs of its research laboratories and divisions.

Non-profit status affirms RTI's independence. Like any business, however, it must rely on its own earnings for continued staff growth and expansion of facilities. RTI's operating surplus is used to provide new laboratory equipment, to underwrite new areas of research, and to fulfill the public service obligations of its charter.

Research operations were under way early in 1959. By 1966 the Institute's staff had grown to nearly 300 professional and support personnel, and contract billings reached the rate of $4 million annually.



FACILITIES

RTI's 200-acre campus is centrally located within the Research Triangle whose geographic points are the University of North Carolina at Chapel Hill, Duke University in Durham, and North Carolina State University at Raleigh. The proximity of the four institutions creates an environment of unique stimulus and challenge for the research scientist.

Activities of the Institute's eight research laboratories and divisions are housed in five modern buildings containing 95,000 square feet devoted to laboratory space, offices, meeting rooms, an auditorium, and library, shop and service areas. As contractual obligations require, RTI project offices are established in foreign countries and throughout the United States.

Laboratory equipment and specialized instrumentation to support the Institute's wide-ranging research interests represent an investment of over $1.2 million by RTI, including appropriations from the State of North Carolina and gifts. Major items include a general purpose scientific computer center, a Cobalt-60 radiation facility, nuclear magnetic resonance equipment, x-ray diffraction units, infra-red and ultra-violet spectrophotometers, gas chromatographs, electron microscope, facilities for fabricating solid state and thin film devices, seismic installations for field and laboratory studies, atmospheric chemistry sampling stations, and Craig counter-current equipment. RTI also maintains an animal colony for the evaluation of biologically active substances.

The Camille Dreyfus Laboratory for fundamental research in polymer science was created under a $2.5 million, ten-year grant from the Camille and Henry Dreyfus Foundation. Research findings from this international center are distributed on an unrestricted basis.

UNIVERSITY AFFILIATIONS

RTI's privileges and relationships within the Triangle university family are the Institute's greatest assets. Strong university orientation is a distinctive feature of RTI operations. The universities are its corporate parents, and faculty members and department heads have played key roles in planning and developing major research areas at RTI. Exchange of information and the sharing of research facilities occurs both at formal levels and through many informal and personal associations.

- The libraries of the three universities contain by far the largest collections in the south. RTI's staff has access to a combined total of nearly 2.5 million volumes, cross-referenced and readily obtainable.
- Other university facilities available to RTI include high-speed computers, research reactors, particle accelerators, wind tunnels, low- and high-temperature laboratories, and extensive general purpose and specialized equipment.
- Consulting assistance from faculty members is of great importance to RTI as a means of supplementing the capabilities of its permanent staff.
- Numerous projects in support of university programs are performed at RTI in such fields as public health, agriculture, economics, marketing and instrumentation.
- A number of RTI senior staff members hold adjunct faculty appointments, many of them involving special teaching assignments. Many RTI employees are enrolled in credit courses for graduate training.
- Seminars and symposia are attended by members of the four institutions. A distinguished visiting lecturer series is presented on a regular basis by RTI's Camille Dreyfus Laboratory.

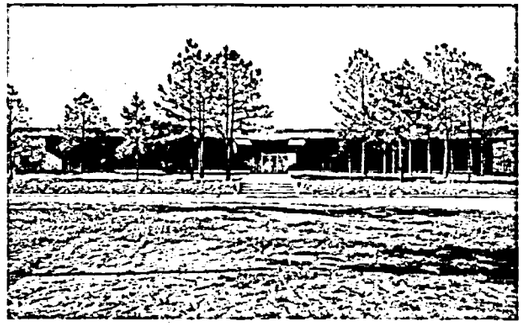
CONTRACT PROCEDURE

Sponsors of research at RTI include industry, government agencies and foundations. Many contracts call for cooperation and mutual assistance between the Institute and departments of the Triangle universities.

Senior scientists plan and carry out research programs at RTI. They participate to an unusual degree in the conduct of project work. Close contact is maintained with sponsors through frequent meetings and informal communications, as well as through regular written reports.

A typical project is developed through preliminary discussion and direct negotiation between the sponsor and senior RTI staff members. Proposals for research are prepared by a project team and approved by RTI management. Each proposal describes objectives of the research, and contains an outline of work including technical staff assignments, duration, and estimated cost.

Contract work is held in any degree of confidence the sponsor may desire. RTI personnel hold clearances at the highest level for the conduct of government-classified research. All research results, including patentable discoveries, become the property of the sponsor.



AREAS OF RESEARCH

Ideas and innovation are the hallmarks of RTI's research approach. Staff scientists pursue original investigations along lines consistent with sponsor objectives. Publication is encouraged. These policies attract scientists, engineers, mathematicians and economists of unusual attainment and experience. Over sixty per cent of RTI's professional staff members have training at the graduate level; of these, nearly half hold the Ph.D. degree.

Advances in modern technology spring from the successful application of new facts and new knowledge in the physical and economic sciences. RTI's primary service lies in its trained, professional capability to perform the analysis and planning necessary to achieve the most productive matching of scientific and technical opportunity with the objectives of industrial and government sponsors.

Areas of Major Research Interest

Aeronomy / Agricultural Statistics / Antennas / Area Development / Biochemistry / Biological Assays / Circuit Theory / Civil Defense / Deep-space Communications / Design of Experiments / Economic Analyses / Electrical Properties of Organic Materials / Electrochemical Techniques / Guidance Systems / Industrial Operations / Information Processing / Instrument Development / International Development / Management Systems / Marketing / Mathematical Modeling / Medical Instrumentation / Meteorology / Microelectronics / Network Control / Oceanography and Oceanographic Instrumentation / Organic Chemistry / Performance Evaluation / Pharmaceutical Chemistry / Pharmacology / Phytochemistry / Polymer Science / Process Design and Analysis / Production Economics / Propagation Studies / Radar Target Studies / Radioisotope Applications / Sampling / Seismology / Sensors / Silicon Technology / Solid State Devices / Statistical Theory / Steroid Synthesis / Systems and Device Reliability / Thin Film Devices / Transportation Analysis / Weapons System Evaluation.

RTI programs emphasize the multidisciplinary approach. Most work benefits from the active participation of professionals within the Institute and at the Triangle universities who are skilled in a variety of disciplines.

Close and continuing association among specialists in many fields extends the resources of RTI's research managers and enhances the quality of scientific enterprise throughout the Institute.

During 1965 RTI's research groups worked under contract on 115 separate projects for foundations, federal and state government agencies, and industrial sponsors ranging from local companies to national corporations.

RESEARCH TRIANGLE INSTITUTE
RESEARCH TRIANGLE PARK, NORTH CAROLINA

STATISTICS RESEARCH DIVISION
Alva L. Finkner, Director

The science of statistics is yielding increasingly powerful techniques and tools for use in all fields of scientific research and development, and in the technical and business operations of industry, government bureaus and other public agencies. The growing complexity of decision-making processes in manufacturing, distribution, marketing and public service functions requires improved methods of identifying, collecting and analyzing information.

At RTI research in the classical fields of experimental design, sampling and statistical theory is conducted in support of and concurrently with extensive programs in reliability and in the control and optimization of industrial processes. The approach is often multidisciplinary, involving the skills of statisticians, mathematicians and engineers in various subject fields. Research objectives in the analysis of functional relationships are, in general, to:

- Develop meaningful probabilistic or stochastic models which describe a process, system or piece of equipment.
- Identify those points where controllable variation enters the system.
- Design experiments so that the effect of variation at control points can be measured.
- Optimize the system with respect to some meaningful criteria for the output.

Emphasis is given to the following program areas:

Design and Analysis of Experiments
Sampling and Data Collection
Statistical Theory
Reliability
Analysis and Control of Industrial Processes

GEOPHYSICS LABORATORY
James J. B. Worth, Director

Geophysics research at RTI encompasses the study of physical phenomena occurring throughout the earth-ocean-atmosphere environment. It is conducted on an inter-disciplinary basis in cooperation with the Institute's other laboratories and divisions. Major research areas include:

Geology—Physics, chemistry and mathematics are applied to problems concerning the composition, structure and energy balance of the solid earth.

Meteorology—Study of the atmospheric environment gives particular attention to engineering and industrial problems, and to aviation and military weapon systems.

Oceanography—Evaluation of the environmental influence of ocean boundaries and the chemistry and physics of sea water, including ocean dynamics and ocean-atmosphere interactions.

Aeronomy—Research on energy exchange processes in the ionosphere and their influence on electromagnetic propagation, communications and control, and the performance of instrumentation in satellites and rocket-propelled vehicles.

OPERATIONS RESEARCH AND ECONOMICS DIVISION
Edgar A. Parsons, Director

The objective of operations research is to provide explicit, quantitative understanding of the essential elements in an operating system and of the factors controlling them. OR techniques add a new dimension to the scope of problems in which trained research personnel can contribute to increased effectiveness and profitability.

Operations research and economics research at RTI bring together many skills and disciplines to aid business and governmental decision making. Staff members have professional training and experience in the economic sciences, the physical sciences and engineering, agriculture, government, finance and mathematics.

Economic analysis, mathematical models, statistical techniques and high speed computers are among the basic tools of the Division. RTI analysts use them to discover and highlight significant patterns of interaction within industrial, military, national and international operating systems. Their purposes are to identify and evaluate alternative choices facing management in its policy, planning and action decisions, and to determine the most effective utilization of natural, physical, financial and human resources.

Program capabilities at RTI include industrial and regional economics, resource development, military systems, international economics, investment planning, civil defense, marketing and distribution, transportation, communications, and information and command and control systems.

RADIATION SYSTEMS LABORATORY
P. Gene Smith, Director

Theoretical and applied research is directed toward communications, radar, navigation, guidance and control systems. Theoretical studies cover information systems, probability applications, electromagnetic systems, circuit design and feedback systems. Applied work includes studies in wave propagation, antennas, microwave devices, low-noise receivers, networks, storage devices, control circuits, displays, and development and use of special components and materials.

The following areas are of specific research interest:

- Field Programs—Special antenna studies, propagation measurements, target reflectivity, and special problems associated with data acquisition and tracking stations.
- Feasibility Programs—Conceptual, analytical and experimental studies of the applicability of new devices and materials; state-of-the-art component and system studies.
- Development of special components and sub-system techniques for meeting future radiation systems requirements.

NATURAL PRODUCTS LABORATORY
Monroe E. Wall, Director

The Natural Products Laboratory uniquely includes chemists and biologists working together on problems which require inter-disciplinary approaches. Broad programs are pursued in screening natural products for potential drugs or biologically active compounds, with particular emphasis on isolation, structure proof and synthesis.

Although organic chemistry is the major discipline, there are also excellent facilities and subject matter specialists in biochemistry, pharmacology and microbiology. Specialties include steroid and alkaloid chemistry, sulfur and phosphorous chemistry, heterocycles, photochemistry, metalo-organic chemistry, proteins and peptides.

Activity within the Laboratory's closely inter-related areas of research interest includes:

Production of new, structurally modified steroids and testing them for hormonal and anti-tumor properties.

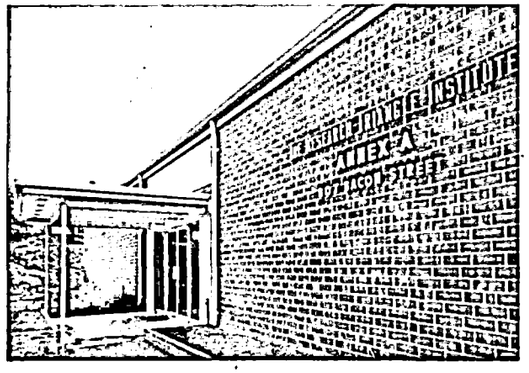
Synthesis of compounds that may reduce the effects of radiation upon living cells.

Exhaustive effort to discover, isolate and identify cancer-retarding agents in growing plants.

Bio-assay of crude extracts from natural products.

Characterization of unidentified natural resins in flue-cured tobacco.

Preparation of a new family of chemicals for possible agricultural applications.



REGIONAL SERVICES

Within the scope of its long-range objective to provide research assistance in the industrial and economic growth of its region, RTI maintains an Office of Industry Services and a Regional Development Office. Working closely with other private and state organizations, these two groups bring the skills and experience of the Institute's professional staff to bear upon specific research problems of industry and on regional development programs.

SOLID STATE LABORATORY
Robert M. Burger, Director

Ranging from basic exploratory research to application and product development, activities of the Solid State Laboratory focus on microelectronics, silicon technology, sensors, and device and system reliability.

Microelectronic processes, devices and systems are the subject of an intensive research effort which includes a comprehensive technical information program.

Advances in gas source diffusion, device design theory and electrochemical processes, as well as broad fundamental studies, are the product of continuing research programs in silicon technology.

Sensors—for micrometeoroids in space, for acceleration, for medical research and for other applications—provide the opportunity for applying the results of electronic systems research to the measurement of external phenomena. The piezotransistor effect, as one phenomenon for application, has been given particular attention.

Device reliability is studied by modeling performance in terms of all the factors which influence it. The time dependent variations in the factors are then translated into performance.

System reliability, based upon probabilistic modeling, is given practical interpretation for application to a variety of industrial, military and space systems.

MEASUREMENT AND CONTROLS LABORATORY
John C. Orcutt, Director

Three interdisciplinary groups provide theoretical and applied research capability in process analysis and optimization, unique measurement problems, and the study of physical processes.

Engineering Analysis emphasizes the application of fundamental concepts of transport phenomena, reaction kinetics, and equilibrium data to descriptions of physical and chemical processes. Mathematical models are incorporated into systems studies for determining the behavior, economics, and design criteria of industrial processes, such as those used in desalting sea water.

The Chemistry Group specializes in development of analytical instrumentation by combining chemical and radiochemical principles with electronic and mechanical measurement techniques. A primary contribution has been "radio-release" analysis, in which the extreme sensitivity of radioisotope methods is used to detect trace amounts of non-radioactive elements.

Studies in Instrumentation stress new methods of measuring specific properties for which standard techniques are inadequate. Primary emphasis is on the use of radioisotopes to evaluate models of evironmental systems and physical processes, and to solve problems in mass and heat transfer. Staff members are also highly experienced in the theory and operation of non-nuclear techniques and devices.

NOTE:
8/4/22
missing A.R.