SCIENCE

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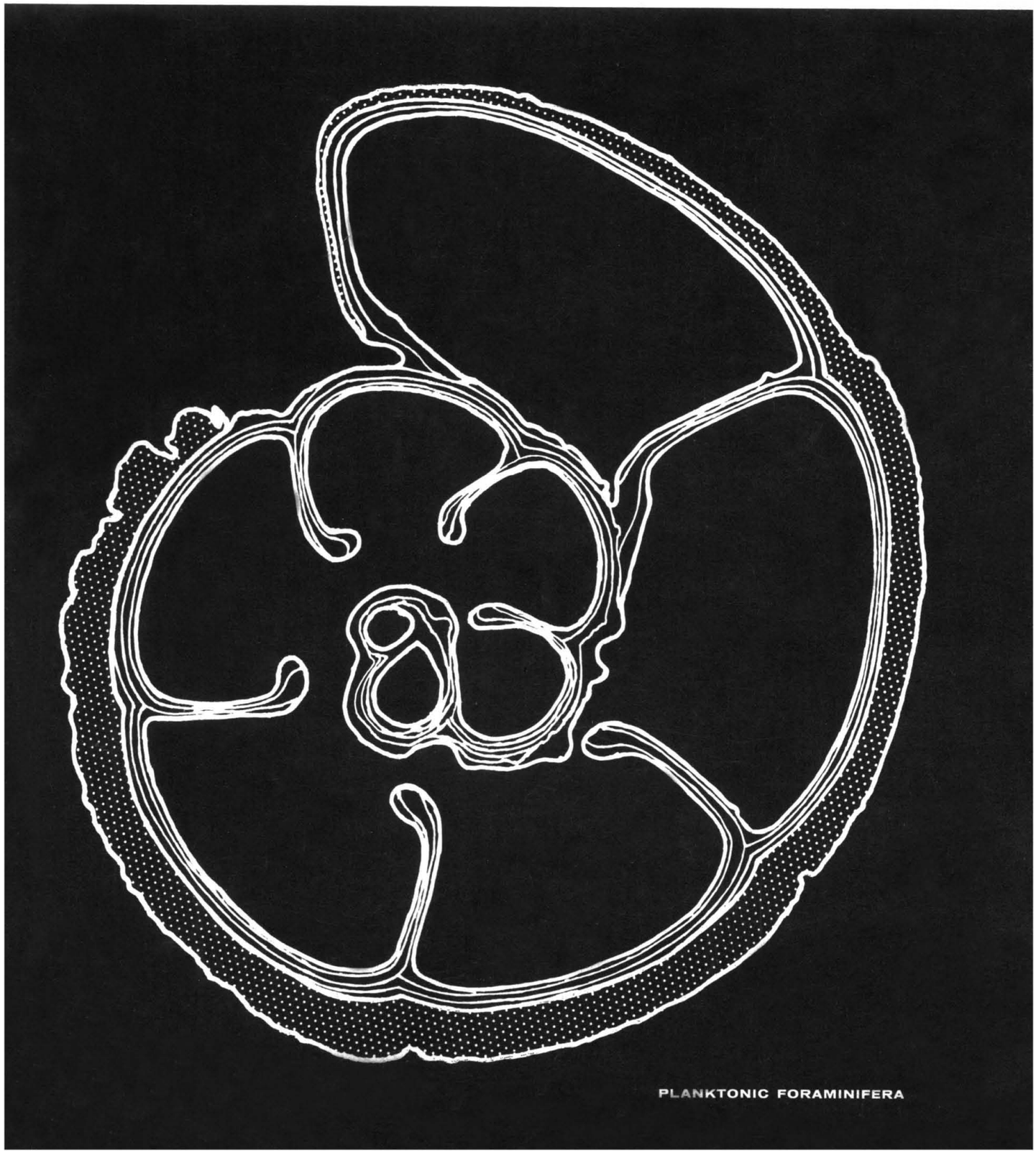
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



PLANKTONIC FORAMINIFERA

Report from

BELL LABORATORIES

THE PIGGYBACK TWISTOR

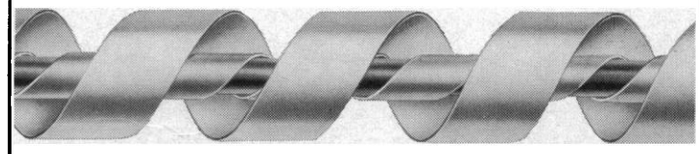
An electronic digital memory should have a fast operating time, a high storage capacity in a small volume, and a low cost. In many data processing systems, such as those used in the control of electronic telephone switching, two other memory characteristics are desirable: electrical alterability and nondestructive read-out.

To provide these characteristics, Bell Laboratories engineers have developed the "piggyback" twistor memory element. It consists of two dissimilar magnetic tapes spirally wrapped on a copper wire. A "soft" (easy to magnetize) magnetic tape is wrapped directly on the copper wire and is overlaid, or piggybacked, by a "hard" (difficult to magnetize) magnetic tape. The information content, or magnetic state, of the outer tape is determined by sensing the magnetic state of the inner tape with a current pulse. Sensing does not destroy the information content of the outer tape. Because the tapes can be made and handled in long lengths, wrapping the piggyback wire and assembling the module are relatively simple.

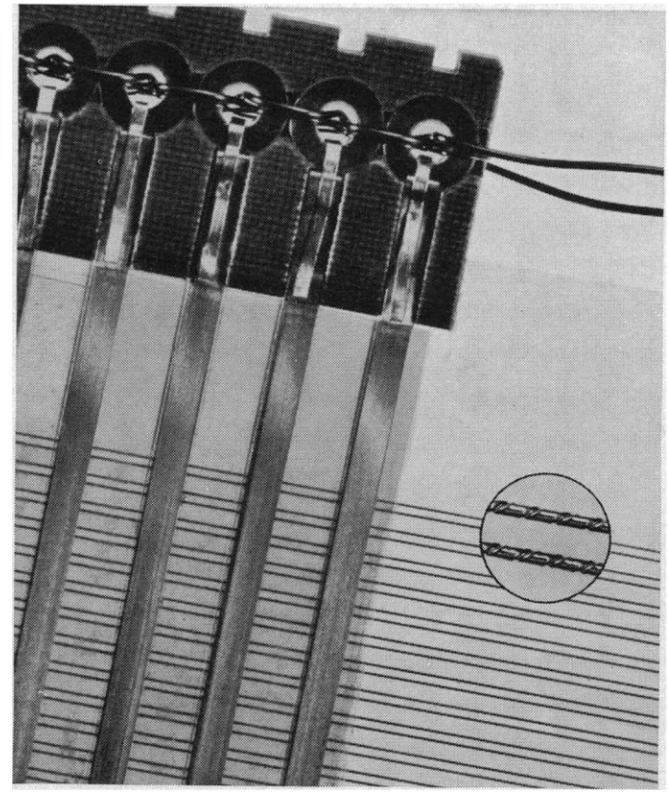
In earlier twistors, information is stored in permanent magnets which are precisely positioned over an array of singly wrapped twistor wires. In the new design, the function of the magnets is taken over by the outer tape, greatly simplifying the memory unit and reducing its volume.

Experimental piggyback twistor memories have been made and tested in modular sizes of a quarter million bits. A read-cycle time of 5 microseconds has been achieved for a 4096-word memory.

BELL TELEPHONE LABORATORIES. Research and Development Unit of the Bell System.



Bit element of the piggyback twistor: A copper wire, 3 mils in diameter, is wrapped with a "soft" magnetic tape 4.5 mils wide by 0.3 mil thick. Piggybacked on the first winding is a "hard" magnetic tape 6.5 mils wide by 0.5 mil thick. The wrapping angle is about 45 degrees, and there are 92 wraps per inch. The outer tape has been "loosened" in the illustration to expose the inner tape.



An array of piggyback twistor wires with their read-write word straps. To write, a current pulse is sent via a ferrite core through a single word strap. Simultaneously, another pulse is sent through a pair of twistor wires, setting the magnetic state of the outer tape. To read, a pulse is sent through the word strap alone. This pulse switches the direction of magnetization in the inner tape, thus inducing voltage in the twistor wires. (Assembly magnified 3X; insert, showing a pair of twistor wires, magnified 15X.)

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SCIENCE

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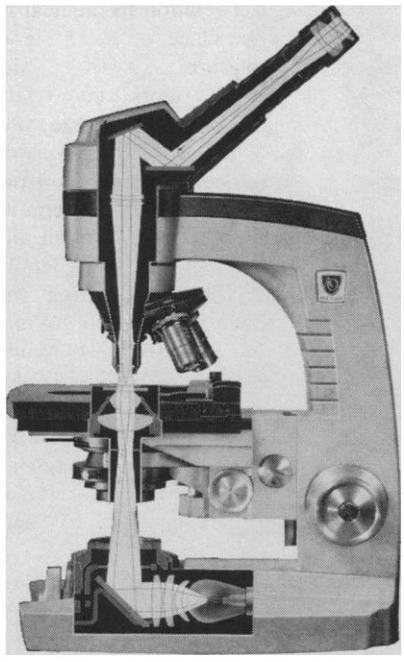
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Shell thickening occurs with increasingly greater depth habitat in this planktonic foraminifer, *Globorotalia truncatulinoides*. As thin-shelled surface forms sink slowly, a calcite crust (stippled area) is secreted up to twice the thickness of the original shell. This schematic cross section of Fig. 1*B* (page 823) has a maximum dimension of 690 μ and a maximum wall thickness of 50 μ ($\times$ 280). See page 823.



Why we can predict this revolutionary microscope will be widely imitated.

This remarkable microscope by American Optical features an infinity-corrected optical system, the most significant basic improvement in microscope design made in this century. It provides two major performance breakthroughs which, we can safely predict, will cause other microscope manufacturers to imitate its design.

First, the new infinity-corrected optical system provides a flatness of field and optical performance never before obtainable. This means crisper, sharper visual images and markedly superior photomicrographs that are flat from edge-to-edge and corner-to-corner of the print. Secondly, the new optical system makes possible a vastly improved focusing concept. Only the objective moves when you focus . . . body and stage remain motionless. The rack-and-pinion, source of 80-90% of all breakdown and maintenance problems, is eliminated. The entire focusing mechanism is enclosed in the arm, lubricated for life and sealed.

Superior optical performance and virtually maintenance-free mechanical performance — two big reasons why this microscope will be widely imitated. We don't mind. We've been imitated many times before! American Optical Company, Instrument Division, Buffalo, New York 14215.

21 August 1964, Volume 145, Number 3634 **SCIENCE**

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office.
ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

Prestige

Thirst for prestige is one of the great human driving forces. We of the Occident sometimes smile at Oriental preoccupation with "face," but in our own way we are just as concerned as they. To the very ambitious, prestige can be almost as important as life itself.

Recently the University of Chicago's National Opinion Research Center issued a draft of a report entitled "Occupational Prestige in the United States: 1925–1963." This article, which ranks the relative status of 90 occupations, indicates an astonishingly high standing for scientists. The first nine occupations in the list are *supreme court justice* (1), *physician* (2), *nuclear physicist* (3.5), *scientist* (3.5), *government scientist* (5.5), *state governor* (5.5), *cabinet member in the federal government* (8), *college professor* (8), *and U.S. representative in Congress* (8). Scientists should feel pleased and honored by these ratings. Even possessors of substantial political power do not enjoy so much prestige. Nor does financial power seem to yield so much status. Three occupations in this area included *member of the board of a large corporation* (17.5), *banker* (24.5), *and owner of a factory that employs about 100 people* (31.5).

Professions among the creative arts did not fare very well. Three categories—*artist who paints pictures that are exhibited in galleries, musician in a symphony orchestra,* and *author of novels*—were tied at 34.5. Two occupations in the entertainment world—*radio announcer* (49.5) and *singer in a night club* (74)—were given limited status.

Occupational ratings were elicited from a national sample of adults by asking respondents to judge an occupation as having "excellent, good, average, somewhat below average, or poor standing [along with a 'don't know' option] in response to the item: 'For each job mentioned, please pick out the statement that best gives your own personal opinion of the general standing that such a job has.'" The method employed was identical with that used in a similar survey in 1947. To a first approximation the surveys yielded quite similar results. About half of the occupations had a rank in 1963 three or less numbers removed from their 1947 rating. A major difference in the two distributions was a rise in the prestige of scientists. The most spectacular change was in the status accorded nuclear physicists. In 1947 this occupation ranked 18, while in 1963 it ranked 3.5.

The high position enjoyed by scientists is pleasant to contemplate. However, those who wish to bite the coin of prestige may find their skepticism justified. The public at large seems to have limited knowledge of the activities of scientists. In 1947 only 3 percent of all respondents could describe the activities of a nuclear physicist; in 1963, the corresponding number was 2 percent.

In addition there were some inconsistencies in the prestige ratings. Although *scientist* in 1963 ranked 3.5, and *nuclear physicist* 3.5, *chemist* rated 11 and *biologist* 24.5. But perhaps we should not ask too much of those who admire us. Their ratings indicate a high degree of respect for scholarship and for science. We should be grateful for their good opinion. We should remember that the long-term prognosis is good—that prestige ratings usually change slowly. The continued esteem of the public is to be treasured, and scientists will do well to respond with imaginative scholarship and probity.

—PHILIP H. ABELSON

VERSATILE NEW PACKARD RADIOCHROMATOGRAM SCANNER

Packard 7200 Series Chromatogram Scanning Systems provide accurate, automatic assay of low energy beta-emitting activity deposited on paper strips or TLC glass plates. Analog data presentation is provided in Model 7201; Model 7211 provides digital display.

The new 7200 Series instruments incorporate many features designed to provide optimum detection accuracy, greater instrument utility, and time-saving user convenience. Ultra-sensitive detection is ensured by two windowless gas flow Geiger detectors arranged in 4 pi configuration to scan simultaneously both sides of a paper chromatogram. 2 pi scanning with either upper or lower detector may also be selected with a front panel switch.

Quick, precise positional resolution of activity is achieved by collimators containing slit widths of 2½, 5, 7, and 10mm. Sixteen scanning speeds may be selected by depressing push-button selector switches which are illuminated when they are actuated. A push-button cam on the detector shield permits quick separation of the collimators for fast, easy front loading of the paper strip. Because the chromatogram strip enters the detector at a constant horizontal angle, thick paper (such as Whatman 3M) may be scanned without chromatogram damage.

Collected data are presented on a Packard Model 380 Recording Ratemeter. The Ratemeter offers 8 time constants and 9 linear count ranges. The interrelated Ratemeter and Recorder may be operated in either LINEAR or LOG modes. In the Linear mode, both the Ratemeter and Recorder display cpm on a linear scale; in the Log mode, they display cpm on a logarithmic scale from 10 to 10^6 cpm. Logarithmic presentation of data permits the user to prepare a preliminary run to establish settings for a final linear run or to accurately compare peak values in a minimum of time.

A valuable feature incorporated in this system is precise maintenance of a 1:1 speed ratio between the paper being scanned and the recording chart, enabling the user to quickly compare the strip and chart for precise activity location upon completion of a run. Another time and labor saving feature provided in the 7200 Series instruments is automatic chart indication of origin, solvent fronts, and other areas of interest.

Your Packard Sales Engineer can provide complete details on these versatile new Scanning Systems.

FEATURES:

- **Completely automatic operation**
- **4 pi counting geometry**
- **May be quickly converted for TLC scanning**
- **Automatic shut-off of gas and power**
- **Handle chromatograms ½ to 2 inches wide and lengths to 150 ft; also accommodates thick paper (such as Whatman 3M) without damage**
- **Automatic indication of origin, solvent fronts, etc.**
- **16 scanning speeds, 8 time constants, 9 linear count ranges**
- **Analog or digital data presentation**
- **Linear and Logarithmic display**
- **Quickly demountable components for decontamination**

Packard

PACKARD INSTRUMENT COMPANY, INC.

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Kodak reports on:

lecture slides at 50 paces... another flavor in data recording... duplicate radiographs without chaos

Warmth from the projector

Judge a "paper" at a meeting on cogency, originality, comprehensiveness, brevity, ingenuity, precision, soundness, insight, conclusiveness but not on the quality of the slides. You cannot but agree and surely resolve to stifle every groan when next a learned peer assaults you by slide projector with 350 data-points at a blow on a 48-inch screen at 50 paces. He is not necessarily perpetrating a snow job on you. More likely he knows no better. If he could only wait to give the paper in 1974, his management would doubtless arrange for him to turn over his data and his logical inductions to a professional but anonymous presenter skilled in warming up cold fact.

(The actual investigator will as always be available for the bull sessions that justify the travel expense. The thespian *alter ego* cannot be expected to field hard questions.)

Where management does not yet provide the full service, a temporary expedient worthy of consideration by the non-professional presenter is to request the free pamphlet "Effective Lecture Slides" from Eastman Kodak Company, Sales Service Division, Rochester, N.Y. 14650. The management itself may even appreciate knowing that it can order this pamphlet in lots of 100 at $6 per 100.

Price subject to change without notice.

Why CEC now sells Genesee River tape

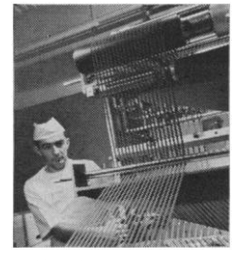
A certain kind of sausage that must have originated in the Italian city of Bologna brings joy to unnumbered millions. Quite a different kind, identified with the Thuringian duchies of olden Germany, also sells very well. Wieners, still another kind of sausage, are loved by virtually every American with little thought to the Austrian capital or its possible rival Frankfurts on the Main or Oder.

Inedible but more up-to-date commodities can likewise be geographically identified, though manufactured by companies instead of guilds. One such is magnetic tape for aerospace telemetry and other raw-data recording applications. One company on the Mississippi and a smaller rival near the Pacific shore have won eminence in the field. Now an unfettered economy further widens the choice that faces the instrumentation-tape buyer. He must now consider tape from the banks of the Genesee in New York State.

For the benefit of his conscience as an engineer, he must be told that while the three principal sources of supply can equally assuage the hunger of his data recorders, their products are no more identical than are wieners, thuringer, and bologna. The engineers of Consolidated Electrodynamics Corporation, a leading manufacturer of recorder/reproducers that use instrumentation tape, now announce their decision to give their preference and "CEC" name to our Rochester-made tape on the following grounds:

• **Smoothness:** Pleasant in shaving, drinking, or riding and essential in recording frequencies up to 1.5 mc. Well known rule-of-thumb says you lose 55 db when oxide surface jumps one wavelength from polepiece. At 1.5 mc and 120 in/sec, a wavelength is 0.00008". Pimples had better be low, few, and far between on "wideband"-class tape. We also do very well by CEC in this respect on the three other classes down to "standard telemetry," which claims only 100 kc at 60 in/sec. Differences come in particle-size distribution. Each of our classes excels in response out to its frequency limit. When you can afford to reduce gain in the amplifier at high frequencies, you are cutting broad-band noise. Signal-to-noise ratio is the cause worth fighting for. In audio tape, which we also make, it's low print-through. The human brain balks at strange echoes. The human ear needs no frequencies above 20 kc and little power above 5 kc. But signal power at high frequency keeps the instrumentation-tape user in business.

• **Straightness of edge:** Wandering out of alignment with the polepiece gap after a few thousand feet can be as fatal as a coating defect. We have slit film to better accuracy than that from time immemorial.



We don't even have to slit in the dark.

• **Uniformity of characteristics end-to-end and reel-to-reel:** CEC, who have tested plenty of tape in their day, say they have never before encountered any so uniform. We think we can do better later.

• **Little things:** Extreme cleanliness is the price of admission to the tape-making game. We had to pay it a generation before magnetic tape came in. It seems a pity to risk sifting dust from paperboard packaging over such a clean product. Therefore we put all our tape for CEC in metal cans and the cans in rectangular cartons that can be stored on edge and marked for identification. On the tape itself we print our name and a code number every few inches. We wonder why the others don't.

Any questions? Ask Eastman Kodak Company, Magnetic Products Division, Rochester, N.Y. 14650.

Notice to x-ray labs

A request for a duplicate of a radiograph need no longer arouse the old resentment. Far more rational it is to ask the Kodak X-ray Representative or dealer to explain how to copy on the new KODAK Radiograph Duplicating Film. The result rolls right out of the KODAK X-OMAT Processor (or manual processing system) just like whatever originals are going through at the moment.

So what:

Hospitals have to run on routine or chaos reigns. X-ray labs handle x-ray film. Rarely can they spare time, staff, or facilities to fuss with other kinds of film and exposure methods. Copying a radiograph, since it is done with light, has been considered photographic technique, not radiographic.

That's why you may have found a duplicate of a radiograph exasperating to come by.*

Ordinary paper prints simply don't deliver the information that an experienced x-ray man gets from film. Now the x-ray department routine can crank out film duplicates easier than paper prints. From now on, patients passing from Dr. A's care to Dr. B's can come complete with radiographs and no robbery of Dr. A's files. The radiologist, the surgeon or other specialist who must plot procedures or therapy, and the family physician who calls his colleagues in, can all be looking at the same picture in their separate offices while the radiologist interprets it.

Perhaps the biggest benefit will be that a young doctor preparing to convince the American Board of Radiology of his fitness to practice diagnosis by x-ray will have digested even more of other doctors' radiographs than he manages to wangle now.

*Oldtime x-ray technicians when they found time often used to check a new batch of film to see if it solarized well, i.e. could be made to work like a direct positive by enormously exaggerated exposure to light. When they found such an emulsion, they set some aside for making duplicates. Modern x-ray film has better things to do than solarize. Nor does it vary much. Nor do the technicians find time. The real oldtimers have retired.

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

ly dangerous contamination, and (iii) the development of measures to remove contaminants whose introduction we have been unable to prevent.

Biologic and toxicologic research, chemical and physical methodology, engineering for prevention of pollution, the use of substitute and less toxic materials where contamination is inevitable, and eventually further development of methods to restore polluted water insofar as possible are all essential. Anderson also cautioned about the creation of other hazards in solving a problem. The elimination of enteric infections ranked high on Anderson's list of accomplishments but he cautioned again on our lack of knowledge concerning viruses and chemicals.

JOSEPH E. FLANAGAN, JR.
Department of Environmental Health, American Medical Association, Chicago, Illinois 60610

Forthcoming Events

August

27–29. Pacific Slope **Biochemical** Conf., San Francisco, Calif. (M. P. Gordon, Dept. of Biochemistry, Univ. of Washington, Seattle 98105)

27–29. **Reactive Intermediates in Organic Chemistry**, symp., Quebec City, P.Q., Canada. (C. R. Engel, Faculté des Sciences, Université Laval, Quebec City)

28–3. **Neurology**, 8th intern. congr., Vienna, Austria. (H. Hoff, Medizinische Fakultät, Neurologische und Psychiatrische Abteilung, Vienna 9)

29. **Gravity Research Foundation**, annual, New Boston, N.H. (The Foundation, Gravity Village, New Boston)

29–5. International **Epidemiological** Assoc., 4th intern. meeting, Princeton, N.J. (L. Breslow, Div. of Preventive Medical Services, California Dept. of Public Health, 2151 Berkeley Way, Berkeley 95704)

30–2. Electronic Properties and Applications of **Solid-Solid Interfaces**, Boston, Mass. (F. S. Gardner, Office of Naval Research, 495 Summer St., Boston, Mass.)

30–3. **Illuminating Engineering** Soc., Miami Beach, Fla. (A. D. Hinckley, IES, 345 E. 47 St., New York 10017)

30–4. American **Chemical** Soc., fall natl. meeting, Chicago, Ill. (A. H. Emery, 1155 16th St., NW, Washington, D.C.)

30–4. Institute of **Mathematical Statistics**, annual, Amherst, Mass. (D. M. Gilford, Mathematical Sciences Division, Office of Naval Research, Washington, D.C.)

30–4. American **Ornithologists'** Union, Lawrence, Kan. (L. H. Walkinshaw, 1703 Wolverine Tower, Battle Creek, Mich.)

30–5. **Applied Mechanics**, 11th intern. congr., Munich, Germany. (Organisations-Sekretariat des Mechanik-Kongresses, Inst. für Mechanik, Arcisstr. 21, Munich 2)

30–5. **Cell Biology,** 11th intern. congr., Providence, R.I. (J. W. Wilson, Dept. of Biology, Brown Univ., Providence)

30–5. **Haematology,** 10th intern. congr., Stockholm, Sweden. (L. E. Bötiger, P.O. Box 638, Stockholm 1)

30–5. Sensitivity Analysis of **Nonlinear Systems,** Dubrovnik, Yugoslavia. (J. E. Gibson, Electrical Engineering Dept., Purdue Univ., Lafayette, Ind.)

31–2. **Electric Propulsion,** 4th conf., Philadelphia, Pa. (J. M. Sellen, Jr., Physical Research Div., TRW/Space Technology Laboratories, One Space Park, Redondo Beach, Calif.)

31–3. American **Psychopathological** Assoc., Birmingham, Ala. (Secretary, APA, 503 Medical Arts Bldg., Wilmington, Del.)

31–3. American **Sociological** Assoc., 59th annual, Montreal, Canada. (G. M. Sykes, 1755 Massachusetts Ave., NW, Washington, D.C. 20036)

31–4. **Low Temperature Physics,** 9th intern. conf., Columbus, Ohio. (The Conference, P.O. Box 3073, University Station, Columbus 43210)

31–4. British Assoc. of **Paediatric Surgeons,** 11th congr., Rotterdam, Netherlands. (Secretariat, c/o Holland Organizing Centre, 16, Lange Voorhout, The Hague, Netherlands)

31–9. **Peaceful Uses of Atomic Energy,** 3rd intern. conf., Geneva, Switzerland. (J. Gaunt, United Kingdom Atomic Energy Agency, 11 Charles II St., London, S.W.1, England)

31–9. **Soil Science,** intern. congr., Bucharest, Rumania. (N. Giosan, Comite Roumain d'Organisation, The Congress, Bucharest 33)

September

1–4. **AAAS, Alaska Div.,** College. (G. Dahlgren, Dept. of Chemistry, Univ. of Alaska, College)

1–4. **Aerospace Power Systems,** 3rd biennial conf., Philadelphia, Pa. (American Inst. of Aeronautics and Astronautics, 2 E. 64 St., New York, N.Y. 10021)

1–4. **Gas,** 9th intern. conf., The Hague, Netherlands. (R. H. Touwaide, General Secretary, Intern. Gas Union, 4, Avenue Palmerston, Brussels, Belgium)

1–5. **Biological Standardization,** 9th intern. congr., Lisbon, Portugal. (C. de Oliveira, c/o Inst. Bacteriologico Camara Pestana, Rua do Instituto Bacteriologico, Lisbon)

1–5. American Soc. of **Ichthyologists and Herpetologists,** Morehead City, N.C. (J. R. Bailey, Dept. of Zoology, Duke Univ., Durham, N.C.)

1–5. **Nuclear Magnetic Resonance and Relaxation in Solids,** intern. conf., Louvain, Belgium. (L. Van Gerven, Naamsestraat 61, Louvain)

1–8. **Photographic and Spectroscopic Optics,** conf., Tokyo and Kyoto, Japan. (H. Kubota, Science Council of Japan, Ueno Park, Tokyo)

2–4. Structure and Properties of **Coordination Compounds,** Bratislava, Czechoslovakia. (Czechoslovak Chemical Soc., Hradcanske nam. 12, Prague 1)

3–5. Czechoslovak **Orthopedic** Congr., Prague. (M. Jaros, Libuslna 5, Prague 2)

3–8. International Soc. of **Blood Transfusion**, 10th biennial congr., Stockholm, Sweden. (C. Högman, P.O. Box 434, Stockholm 1)

4–5. Great Basin **Anthropological** Conf., Reno, Nev. (W. L. d'Azevedo, Desert Research Inst., Univ. of Nevada, Reno)

4–6. **Gout and Uric Lithiasis**, intern. congr., Evian, France. (R. J. Réveillaud, 4 Boulevard de la Bastille, Paris 12)

4–6. **Parapsychological** Assoc., 7th annual, Oxford, England. (K. R. Rao, 6847 College Station, Durham, N.C.)

4–6. American **Philosophical** Assoc., Pacific Div., Seattle, Wash. (L. E. Hahn, Dept. of Philosophy, Southern Illinois Univ., Carbondale)

4–9. American **Psychological** Assoc., Los Angeles, Calif. (A. H. Brayfield, 1333 16th St. NW, Washington, D.C.)

6. **Spacesuits and Human Performance**, symp., Soc. of Engineering Psychologists, Los Angeles, Calif. (N. M. Molesko, 4918 Castana Ave., Lakewood, Calif.)

6–7. International Acad. of the **History of Medicine**, Basel, Switzerland. (N. Poynter, c/o Wellcome Historical Medical Library, 183 Houston Rd., London, N.W.1, England)

6–11. **Physical Medicine**, 4th intern. congr., Paris, France. (J. P. Held, French Natl. Soc. of Physical Medicine, 15, rue de l'Ecole de Medicine, Paris 6e)

6–13. **Animal Reproduction and Artificial Insemination**, 5th intern. congr., Trento, Italy. (T. Bonadonna, Via Monte Ortigara 35, Trento)

7–9. **Psychometric** Soc., Los Angeles, Calif. (W. G. Mollenkopf, Procter and Gamble, P.O. Box 599, Cincinnati 1, Ohio)

7–10. **High-Energy Electrons**, symp., European Assoc. of Radiology, Montreux, Switzerland. (P. L. Cova, Casa di Cura S. Ambrogio, Via Faravalli 16, Milan, Italy)

7–11. **Coordination Chemistry**, 8th intern. conf., Vienna, Austria. (V. Gutmann, Verein Osterreichischer Chemiker, 1 Eschenbachgasse 9, Vienna 1)

7–11. **Magnetism**, intern. conf., Nottingham, England. (Deputy Secretary, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

7–11. **Microwaves, Circuit Theory, and Information Theory**, intern. conf, Tokyo, Japan. (K. Morita, Inst. of Electrical Communication Engineers of Japan, 2–8 Fujimicho, Chiyoda-ku, Tokyo, Japan)

7–12. **Astronautics**, 15th intern. congr., Warsaw, Poland. (Intern. Astronautical Federation, 250 rue St. Jacques, Paris 5e, France)

7–12. **Laurentian Hormone** Conf., Bolton Landing, N.Y. (J. C. Foss, 222 Maple Ave., Shrewsbury, Mass. 01545)

7–12. **Odontological** Federation of Central America and Panama, 7th congr., Guatemala City, Guatemala. (E. Estrada H., Apartado Postal 513, Guatemala City)

7–12. **Pharmaceutical Sciences**, 24th intern. congr., Amsterdam, Netherlands. (Congress Secretariat, 4 Sint Agnietenstraat, Amsterdam-C)

7–12. **Surface Active Substances**, 4th intern. congr., Brussels, Belgium. (Secretary General, The Congress, 49, Square Marie-Louis, Brussels 4)

7–19. **Photogrammetry**, 10th intern. congr., Lisbon, Portugal. (A. Paes Clemente, Intern. Soc. for Photogrammetry, c/o Instituto Geografico e Cadastral, Praça da Estrela, Lisbon)

8–10. **Gas Chromatography**, 5th intern. symp., Brighton, England. (Organizing Office, 61 New Cavendish St., London, W.1, England)

8–10. **Nonsteroidal, Antiinflammatory Drugs**, intern. symp., Milan, Italy. (S. Garattini, Instituto di Richerche Farmacologische "Mario Negri," Via Eritrea 62, Milan)

9–11. **Applied Spectroscopy and Analytical Chemistry**, 11th symp., Ottawa, Ontario, Canada. (Chemical Inst. of Canada, 48 Rideau St., Ottawa 2)

9–11. Kinetics of **Pyrolytic Reactions**, Ottawa, Ontario, Canada. (K. J. Laidler, Dept. of Chemistry, Univ. of Ottawa, Ottawa 2)

9–11. European Organization for **Quality Control**, 8th conf., Baden-Baden, Germany. (Secretariat, Weena 700, Rotterdam 3, Netherlands)

9–11. International College of **Surgeons**, North American Federation, congr., Chicago, Ill. (Secretariat, 1516 Lake Shore Dr., Chicago 60610)

9–12. Society of **General Physiologists**, Woods Hole, Mass. (R. Milkman, Dept. of Zoology, Syracuse Univ., Syracuse, N.Y. 13210)

9–12. American **Political Science** Assoc., annual, Chicago, Ill. (The Association, 1726 Massachusetts Ave., NW, Washington, D.C. 20036)

10–13. **General Practice**, 6th intern. congr., Salzburg, Austria. (K. Engelmeier, Intern. College of Medical Practice, Lange Str. 21a, 474 Oelde, Germany)

11–12. **Diseases Common to Animals and Man**, annual West-Northcentral conference, Omaha, Nebr. (N. G. Miller, College of Medicine, Univ. of Nebraska, Omaha 5)

11–12. Scandinavian **Neurosurgical** Soc., 18th annual, Oslo, Norway. (K. Kristiansen, Neurosurgery Dept., Ulleval Sykehus, Oslo)

11–14. German Soc. of **Metallurgy and Mining**, general assembly, Hanover. (Gesellschaft Deutscher Metallhütten und Bergleute, Paul-Ernststr. 10, Clausthal-Zellerfeld, Germany)

13–16. **Electrical Insulation**, conf., New York, N.Y. (J. Lenkey, Anaconda Wire and Cable Co., 605 Third Ave., New York, N.Y. 10016)

13–16. American **Fisheries** Soc., Atlantic City, N.J. (E. A. Seaman, 1404 New York Ave., Washington, D.C.)

13–17. **Power**, World conf., Lausanne, Switzerland. (U.S. Natl. Committee, World Power Conf., c/o Engineers Joint Council, 345 E. 47 St., New York 10017)

14–15. **Chromatography**, 3rd intern. symp., Brussels, Belgium. (Belgian Soc. of Pharmaceutical Sciences, rue Archimede 11, Brussels 4)

14–15. **Nutrition**, Canadian-U.S. conf., Toronto, Ont., Canada. (J. M. R. Beveridge, Dept. of Biochemistry, Queen's Univ., Kingston, Ont.)

14–16. **Military Electronics** (MIL-E-CON 8), intern. conf., Inst. of Electrical and Electronics Engineers, Washington, D.C. (H. M. O'Bryan, Bendix Corp., 1730 K St., NW, Washington, D.C. 20006)

14–17. International Assoc. of **Milk and Food Sanitarians**, Hartford, Conn. (H. L. Thomasson, Box 437, Shelbyville, Ind.)

14–18. **Aeronautical Research and Development**, NATO advisory group, 14th general assembly, Lisbon, Portugal. (The Assembly, 64, rue de Varenne, Paris 7°, France)

14–18. **Analogue Computation**, 4th intern., Brighton, England. (E. L. Harder, Westinghouse Electric Corp., East Pittsburgh, Pa.)

14–18. **Aviation and Space Medicine**, intern. congr., Dublin, Ireland. (S. O'Quigley, Aer Lingus–Irish International Airlines, Dublin Airport, Dublin, Ireland)

14–18. **Mass Spectrometry**, intern. conf., Paris, France. (Secretariat, Groupement pour l'Avancement des Méthodes Spectrographiques, 1, rue Gaston-Boissier, Paris 15°)

14–18. **Microwave Tubes**, 5th intern. congr., Paris, France. (Secretariat, B.P. No. 20, Bagneux, Seine, France)

14–18. **Operational Research and the Social Sciences**, intern. conf., Cambridge, England. (Operational Research Soc., 64 Cannon St., London, E.C.4, England)

14–18. **Radio Meteorology**, world conf., Boulder, Colo. (J. W. Herbstreit, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder 80301)

14–18. **Weather Radar**, 11th conf., Boulder, Colo. (J. W. Herbstreit, Central Radio Propagation Laboratory, National Bureau of Standards Boulder Research Laboratories, Boulder)

14–19. **Ceramics**, 9th intern. congr., Brussels, Belgium. (European Assoc. for Ceramics, 13, rue des Poissoniers, Brussels 1)

14–19. **Instruments and Measurements**, 6th intern. conf., Stockholm, Sweden. (RESO Congr. Service, Stockholm 1)

15–17. **Armed Forces Management** Assoc., 11th natl. conf., Detroit, Mich. (The Association, P.O. Box 7603, Washington, D.C.)

15–17. **Luminescence**, conf., Hull, Yorkshire, England. (G. F. J. Garlick, Physics Dept., Univ. of Hull, Hull)

15–17. **Chemical Reaction Engineering**, 3rd European symp., Amsterdam, Netherlands. (J. G. van de Vusse, c/o Kon. Shell Laboratorium, Badhuisweg 3, Amsterdam)

15–18. **Nuclear Photography**, intern. conf., Geneva, Switzerland. (Scientific Conf. Secretariat, European Organization for Nuclear Research, Geneva 23)

15–19. **Industrial Chemistry**, 35th intern. congr., Warsaw, Poland. (Secretariat, Rydgiera 8, Warsaw 86)

16–18. American Assoc. of **Medical Clinics**, annual, Bal Harbour, Fla. (The Association, Box 58, Charlottesville, Va.)

17–18. **Computing**, 7th annual Northwest conf., Seattle, Wash. (R. K. Smith, Northwest Computing Assoc., Box 836, Seahurst, Wash.)

17–18. **Engineering Management**, conf., Cleveland, Ohio. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York, N.Y. 10021)

17–18. **Polypropylene Fibers**, symp., Southern Research Inst., Birmingham, Ala. (W. C. Sheehan, SRI, 2000 Ninth Ave. S., Birmingham, Ala. 35205)

17–19. **Cancer**, 5th natl. conf., Phila-

delphia, Pa. (American Cancer Soc., 219 E. 42 St., New York, N.Y. 10017)

17–19. British Assoc. of **Urological Surgeons**, annual, Sheffield, England. (Joint Secretariat, 47 Lincoln's Inn Fields, London, W.C.2, England)

17–20. **Science Education**, intern. conf., Banff, Alberta, Canada. (S. Trieger, Faculty of Education, Univ. of Alberta, Edmonton, Canada)

18. Hungarian **Chemical** Soc. Tihany. (M. T. Beck, Szabadsag ter 17, Budapest 5, Hungary)

19–26. **Gynecology and Obstetrics**, 4th world congr., Buenos Aires, Argentina. (R. Lede, Primera Catedra de Ginecología, Hospital de Clínicas, Córdoba 2149, Buenos Aires)

19–27. **Scientific Films** Assoc., 18th intern. congr., Athens, Greece. (SFA, 38, Avenue des Ternes, Paris 17e, France)

20–23. **Ceramic-Metal Systems**, American Ceramic Soc., French Lick, Ind. (ACS, 4055 North High St., Columbus, Ohio)

20–23. American Inst. of **Chemical Engineers**, Las Vegas, Nev. (F. J. Van Antwerpen, 345 E. 47 St., New York, N.Y. 10017)

20–24. American Soc. of **Oral Surgeons**, Chicago, Ill. (E. W. Gilgan, 119 North Michigan Ave., Chicago 11)

20–25. **Neuroradiology**, 7th symp., New York, N.Y. (J. M. Taveras, Neurological Inst., Columbia-Presbysterian Medical Center, New York, N.Y. 10032)

20–26. **Anaesthesiology**, 3rd world congr., São Paulo, Brazil. (L. Rodrigues Alves, Caixa Postal 330, São Paulo)

21–24. **Agricultural Engineering**, intern. congr., Lausanne, Switzerland. (P. Regamey, Etat de Vaud, 14. Cite-Devant, Lausanne)

21–24. German Soc. for **Psychology**, 24th congr., Vienna, Austria. (J. Rohracher, Deutsche Gesellschaft für Psychologie, Am Hof le, 5300 Bonn, Germany)

21–25. **Animal Care Panel**, 15th annual New York, N.Y. (ACP, P.O. Box 1028, Joliet, Ill. 60434)

21–26. **Documentation**, 30th intern. conf., The Hague, Netherlands, (Intern. Federation for Documentation, 7 Hofweg, The Hague)

21–26. **Electrochemical Thermodynamics and Kinetics**, intern., London, England. (M. Fleischmann, Dept. of Physical Chemistry, Univ. of Newcastle upon Tyne, England)

21–26. **Parasitology**, 1st intern. congr., Rome, Italy. (A. Corradetti, Instituto di Parassitologia, Citta Universitaria, Rome)

22–24. **Many-Body Problems** in Physics and Chemistry, conf., Manchester, England. (Administration Assistant, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

22–25. Middle East **Neurological** Soc., Ankara, Turkey. (N. Avman, c/o Hacettepe Tip Fakültesi, Ankara)

22–25. **Soil Micromorphology**, 2nd intern., Arnhem, Netherlands. (A. Jongerius, Stichting voor Bodenmartering, Postbus 10, Bennekom, Netherlands)

22–28. **Radiology**, 11th intern. congr. Rome, Italy. (L. Turano, Instituto de Radiologia, Univ. of Rome, Rome)

23–26. British Assoc. for **Cancer Research**, annual, Edinburgh, Scotland. (J. G. Bennette, Courtauld Inst., Middlesex Hospital, London, W.1, England)

23–26. Viral Diseases of **Poikilothermic Vertebrates**, New York, N.Y. (S. P. Snieszko, Eastern Fish Disease Laboratory, Leestown, P.O. Kearneyville, W.Va 25430)

24–27. **American Medical Writers'** Assoc., annual, Philadelphia, Pa. (American Medical Writers Assoc., 2000 P St., NW, Washington, D.C.)

25–26. **Communications**, 3rd Canadian symp., Montreal, Quebec. (F. G. R. Warren, P.O. Box 802, Station B, Montreal)

27–30. Society of American **Foresters**, 64th annual, Denver, Colo. (SAF, Mills Bldg., Washington, D.C. 20006)

27–1. **Water Pollution Control** Federation, 37th annual, Bal Harbour, Fla. (WPCF, 3900 Wisconsin Ave., Washington, D.C. 20016)

27–2. Society of **Motion Picture and Television Engineers**, 96th technical conf., New York, N.Y. (SMPTE, 619 W. 54 St., New York, N.Y. 10019)

28–30. **Circuit and System Theory**, conf., Monticello, Ill. (W. R. Perkins, Dept. of Electrical Engineering, Univ. of Illinois, Urbana)

28–2. Society for **Applied Spectroscopy**, 3rd natl. conf., Cleveland, Ohio. (E. Yeager, Dept. of Chemistry, Western Reserve Univ., Cleveland 44106)

29–1. Physics of **Failure in Electronics**, 3rd annual symp., Chicago, Ill. (M. Goldberg, IIT Research Inst., 10 W. 35 St., Chicago 60616)