GLACIOLOGICAL LITERATURE

THIS is a selected list of glaciological literature on the scientific study of snow and ice and of their effects on the earth; for the literature on polar expeditions, and also on the "applied" aspects of glaciology, such as snow ploughs, readers should consult the bibliographies in each issue of the *Polar Record*. For Russian material the system of transliteration used is that agreed by the U.S. Board on Geographic Names and the Permanent Committee on Geographical Names for British Official Use in 1947. Readers can greatly assist by sending reprints of their publications to the Society, or by informing Dr J. W. Glen of publications of glaciological interest. It should be noted that the Society does not necessarily hold copies of the items in this list, and also that the Society does not possess facilities for microfilming or photocopying.

CONFERENCES

[CLOUD PHYSICS.] *Project Skywater. Proceedings: Skywater Conference I. Physics and chemistry of nucleation.* Denver, Colorado, U.S. Dept. of the Interior, Bureau of Reclamation, [1967]. vi, 419 p. [Proceedings of conference held 10–12 July 1967. Papers include: V. J. Schaefer, "Some thoughts on ice nuclei", p. 3–20; N. Fukuta, "Review of physics of ice nucleation and its application to weather modification", p. 21–126; T. G. Owe Berg, "Nucleation and growth in cloudseeding", p. 127–46; P. V. Hobbs, "The propagation of the ice phase in the atmosphere", p. 147–61; F. P. Parungo and J. P. Lodge, Jr., "Freezing of aqueous solutions of non-polar gases", p. 161–70; F. P. Parungo and J. P. Lodge, Jr., "Amino acids as ice nucleators", p. 171–86; F. P. Parungo and J. Wood, "Freezing of aqueous solutions of macromolecules", p. 187–91; N. Gokhale, "Ice formation by contact nucleation", p. 192–98; L. R. Koenig, "The origin of ice crystals in the atmosphere", p. 199–211; J. Hallett, "Laboratory study of ice nucleating ability of mineral particulates", p. 212–31; T. E. Hoffer, "Some aspects of nucleation on lead iodide", p. 232–44; W. G. Finnegan, "Chemical and physical properties of freezing nuclei from pyrotechnic combustion", p. 246–84; F. K. Odencrantz and R. W. Buecher, "Temperature dependence of the polarity of electrical charges on ice crystals", p. 285–304; P. St.-Amand, "Nucleation by silver iodide and similar materials", p. 305–53.]

RIEHL, N., *and others, ed. Physics of ice: proceedings of the international symposium on physics of ice, Munich, Germany, September 9–14, 1968. Edited by N. Riehl, B. Bullemer, H. Engelhardt.* New York, Plenum Press, 1969. xix, 642 p. [For details of papers see elsewhere in this list.]

GENERAL GLACIOLOGY

GLEN, J. W. Implications of ice physics for problems of field glaciology. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 585–93.) [Review of cross-links between ice physics and other branches of glaciology.]

GLACIOLOGICAL INSTRUMENTS AND METHODS

BLEIL, C. E. A new method for growing crystal ribbons. *Journal of Crystal Growth*, Vol. 5, No. 2, 1969, p. 99–104. [Method of growing crystal ribbons without a shaping aperture. Ice and germanium used.]

KANE, H. S. A neutron probe for the determination of snow density and its use in Antarctica. *Ohio State University. Institute of Polar Studies. Report* No. 28, 1969, vi, 76 p. [Description of apparatus and its use during a traverse in Dronning Maud Land.]

SWANSON, R. H. A system for making remote and undisturbed measurements of snow settlement and temperature. *Proceedings of the Western Snow Conference*, 36th annual meeting, 1968, p. 1–5. [Method for mounting and dropping transducers and subsequently locating and reading them.]

ZELLER, A. N. Preliminary investigation of the effect of deglaciation upon the thermoluminescence of rock. (*In* McDougall, D. J., *ed. Thermoluminescence of geological materials. Proceedings of a NATO Advanced Research Institute on applications of thermoluminescence to geological problems.* London and New York, Academic Press, 1968, p. 519–23.) [Method for determining time since rock was exposed to solar radiation tested with measurements on Rosenlaui Gletscher, Switzerland.]

PHYSICS OF ICE

BISHOP, P. G., *and* GLEN, J. W. Electric polarization effects in pure and doped ice at low temperatures. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 492–501.) [Observations of current which flows when an ice crystal, cooled in an electric field, is reheated.]

BROWNSCOMBE, J. L., *and* THORNDIKE, N. S. C. Freezing and shattering of water droplets in free fall. *Nature*, Vol. 220, No. 5168, 1968, p. 687–89. [Laboratory observations of percentage of droplets which shatter on freezing and of effect of NaCl in suppressing this.]

BULLEMER, B., *and others.* Protonic conduction of ice. Part I: high temperature region, [by] B. Bullemer, H. Engelhardt, N. Riehl. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 416–29.) [Experimental study of D.C. conductivity of ice.]

CAMP, P. R., *and others.* Electrical conduction in ice, [by] P. R. Camp, W. Kiszenick, D. Arnold. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 450–70.) [A.C. and D.C. measurements and their interpretation.]

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COBB, A. W., *and* GROSS, G. W. Interfacial electrical effects observed during the freezing of dilute electrolytes in water. *Journal of the Electrochemical Society*, Vol. 116, No. 6, 1969, p. 796–804. [Measurement of freezing potential, charge separation across phase boundary, and chemical composition of phases during freezing of dilute solutions of about 50 salts, acids and bases.]

COLE, R. H., *and* WÖRZ, O. Dielectric properties of ice I. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 546–54.) [Measurements over wide temperature and frequency range.]

COPE, F. W. Nuclear magnetic resonance evidence using D_2O for structured water in muscle and brain. *Biophysical Journal*, Vol. 9, No. 3, 1969, p. 303–19. [Nuclear magnetic resonance of D_2O in rat muscle and brain shows its structure to be more like ice than water.]

CORIELL, S. R., *and* HARDY, S. C. Morphological stability of a cylinder. *Journal of Research of the National Bureau of Standards*, Sect. A, Vol. 73A, No. 1, 1969, p. 65–78. [Theory of stability of shape of cylindrical ice crystal growing in supercooled water.]

CORIELL, S. R., *and* HARDY, S. C. Morphology of unstable ice cylinders. *Journal of Applied Physics*, Vol. 40, No. 4, 1969, p. 1652–55. [Wave-length of sinusoidal perturbations in the shape of ice single crystal cylinders growing in supercooled water measured as function of supercooling.]

CROSS, J. D. Scanning electron microscopy of evaporating ice. *Science*, Vol. 164, No. 3876, 1969, p. 174–75. [Observations show marked differences between single-crystal and polycrystalline ice.]

CROSS, J. D. Study of the surface of ice with a scanning electron microscope. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 81–94.) [Difference between appearance of polycrystalline and single-crystal ice.]

DANTL, G. Elastic moduli of ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 223–30.) [Ultrasonic measurements of longitudinal and transverse velocity and deduction of single crystal elastic constants down to −140°C.]

EDDY, J. A., *and* MACQUEEN, R. M. Infrared scattering observations in the upper atmosphere. *Journal of Geophysical Research*, Vol. 74, No. 13, 1969, p. 3322–30. [Contribution of scattering by ice crystals and other scatterers assessed. Water drops and ice crystals account for observed phenomena.]

EIBEN, K. Irradiation-produced solvated electrons in ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 184–94.) [Observations of stability of solvated electrons in ice and interpretation.]

ENGEL, J. Hydrogen bonds in biological systems. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 138–51.) [General review of part hydrogen bonds play in biological systems.]

ENGELHARDT, H., *and others*. Protonic conduction of ice. Part II: low temperature region, [by] H. Engelhardt, B. Bullemer, N. Riehl. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 430–42.) [Conduction experiments using proton-injecting electrodes at low temperatures.]

FAURE, P. Étude d'un modèle dynamique du réseau cristallin de la glace. *Journal de Physique*, Tom. 30, Nos. 2–3, 1969, p. 214–20. [Dynamical model of hexagonal ice with two force constants used to deduce low frequency vibration. Deduction of dispersion curves and frequency spectrum and comparison with neutron scattering. English abstract.]

FERNANDEZ, R. Growth of ice in flowing water and sodium chloride solutions. *Dissertations Abstracts*, B, Vol. 29, No. 4, 1968, p. 1337-B. [Rate of growth in basal plane measured and compared with theoretical model. Abstract of Ph.D. thesis submitted to Syracuse University, N.Y. Microfilm or xerographic copy order (University Microfilms, Ann Arbor, Mich., U.S.A.) no. 68–13,824.]

FISCHER, S. F., *and* HOFACKER, G. L. Theory of the mobility of structural defects in ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 369–84.) [One-dimensional theoretical model for electrical point defect migration in ice.]

FISCHER, S. F., *and others*. Spectral behavior of defects in ice—quasiparticle model, [by] S. F. Fischer, G. L. Hofacker, M. A. Ratner. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 385–400.) [Theoretical study of infra-red absorption spectrum of defects in ice.]

FUKUDA, A., *and* HIGASHI, A. X-ray diffraction topographic studies of the deformation behaviour of ice single crystals. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 239–50.) [Observations of dislocation movement, identification of Burgers vectors, dislocation velocity measurements.]

GLEN, J. W. Structure and point defects of ice: their effect on the electrical and mechanical properties. *Science Progress* (Oxford), Vol. 57, No. 225, 1969, p. 1–21. [Review of recent work on high pressure phases of ice and on electrical and mechanical properties of ice and explanation in terms of defects.]

GLOCKMANN, H. P. Conduction anomalies and polarization in ice at low temperatures. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 502–13.) [Observations of charge release when ice crystals, cooled in electric field, are reheated.]

GOSAR, P. Proton-proton and proton-lattice interactions in ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 401–15.) [Theoretical study of Bjerrum defect migration.]

GRÄNICHER, H. Evaluation of dielectric dispersion data. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 527–33.) [Discussion of how to interpret dielectric data from bridge measurements.]

GRÄNICHER, H. On the interpretation of the pressure dependence of properties controlled by lattice defects. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 534–40.)

GRÄNICHER, H. Review on problems of the physics of ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 1–18.) [Survey of present position.]

HAHNE, E., *and* GRIGULL, U. Some experiments on the regelation of ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 320–28.) [Observations of wire penetration rate and comparison with theory.]

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HALLETT, J. Nucleation and growth of ice crystals in water and biological systems. (*In* Hawthorne, J., *ed. Low temperature biology of foodstuffs*. Oxford, New York, Pergamon Press, 1968, p. 23–52.) [Survey of knowledge of nucleation and growth of ice crystals.]

HALTENORTH, H., *and* KLINGER, J. Diffusion of hydrogen fluoride in ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 579–84.) [Measurements with precautions against surface diffusion.]

HAMILTON, W. C., *and others*. Deuteron arrangements in the high-pressure forms of ice, [by] W. C. Hamilton, [W.] B. Kamb, S. J. Laplaca, A. Prakash. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 44–58.) [Neutron diffraction study of D_2O ice II, ice III, ice V and ice IX.]

HANDLER, E. S. Single crystal X-ray diffraction study of H_2O, D_2O, $H_2{}^{18}O$ hexagonal ice. *Dissertations Abstracts*, B, Vol. 29, No. 6, 1968, p. 2002-B. [Lattice constant changes on substituting D and ^{18}O in ice. Abstract of Ph.D. thesis submitted to Polytechnic Institute of Brooklyn. Microfilm or xerographic copy order (University Microfilms, Ann Arbor, Mich., U.S.A.) no. 68–16,247.]

HANSEN, J. E., *and* CHEYNEY, H. Theoretical spectral scattering of ice clouds in the near infrared. *Journal of Geophysical Research*, Vol. 74, No. 13, 1969, p. 3337–46. [Calculations for wave-lengths 1–4 μm show reflectivity is sensitive to particle size.]

HAZLEWOOD, C. F., *and others*. Evidence for the existence of a minimum of two phases of ordered water in skeletal muscle, by C. F. Hazlewood, B. L. Nichols [and] N. F. Chamberlain. *Nature*, Vol. 222, No. 5195, 1969, p. 747–50. [Evidence for ice-like structures for the water near proteins from nuclear magnetic resonance spectrometry.]

HELMREICH, D. Elastic anomalies of ice at low temperatures. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 231–38.) [Anomalies in elastic constant measurement on pure and HF-doped ice near 105 K.]

HIGASHI, A. Mechanical properties of ice single crystals. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 197–212.) [Review of present knowledge.]

HOBBS, P. V., *and* KETCHAM, W. M. The planar growth of ice from the pure melt. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 95–112.) [Study of mechanism of growth and of development of preferred orientation.]

HOLMES, D. E., *and others*. Effect of oxygen on the determination of hydrogen atom yields in irradiated ice matrices, [by] D. E. Holmes, N. B. Nazhat and J. J. Weiss. *Zeitschrift für Naturforschung*, Bd. 24A, Ht. 3, 1969, p. 481. [Dissolved oxygen molecules have important effect on electron spin resonance signal due to hydrogen atoms in irradiated acid ices.]

IKAWA, S.-I., *and* MAEDA, S. Infrared intensities of the stretching and librational frequencies of H_2O, D_2O, and HDO in solids. *Spectrochimica Acta*, Vol. 24A, No. 5, 1968, p. 655–65. [Measurement and interpretation of infra-red spectra of ice and discussion of resulting frequencies.]

JACCARD, C. Thermoelectric effect in ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 348–62.) [Review of experiments and discussion of their theoretical interpretation.]

JOHNSON, D. A. The separation of charge due to the fracture of freezing water drops. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 603–10.) [Experimental measurements.]

JONES, S. J., *and* GLEN, J. W. Impurity effects on the plasticity of ice and their explanation in terms of hydrogen reorientation. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 217–22.) [Marked softening of ice single crystals at low temperatures by dissolved HF and possible interpretation.]

KAHANE, A. Experimental and theoretical studies on the DC conductivity of ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 443–49.) [Determination of activation energies in experiments using ion exchange membranes.]

KAHANE, A., *and others*. Dopage selectif de la glace monocristalline avec de l'hélium et du néon, [par] A. Kahane, J. Klinger, M. Philippe. *Solid State Communications*, Vol. 7, No. 15, 1969, p. 1055–56. [Experiments show that He and Ne, but not A, can be dissolved in ice.]

KETCHAM, W. M., *and* HOBBS, P. V. An experimental determination of the surface energies of ice. *Philosophical Magazine*, Eighth Ser., Vol. 19, No. 162, 1969, p. 1161–73. [Determination of ice–water vapour, ice–water and ice–ice (grain boundary) surface free energies.]

KRAUSZ, A. S. An experimental investigation of strain relaxation in ice. *Scripta Metallurgica*, Vol. 2, No. 11, 1968, p. 615–19. [Experiments on the reverse plastic deformation of columnar grained ice when stress is removed are interpreted in terms of dislocation mobility theory.]

KVAJIĆ, G., *and others*. Rejection of impurities by growing ice from a melt, [by] G. Kvajić, V. Brajović, E. R. Pounder. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 120–31.) [Use of radioactive tracer technique to locate impurities.]

LEVI, L., *and* AUFDERMAUR, A. N. Orientation of ice crystals grown by accretion of supercooled droplets. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 620–30.) [Experiments and their interpretation.]

MASCARENHAS, S. Charge and polarization storage in ice crystals. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 483–91.) [Studies of Costa Rabeiro effect, thermo-electrets and possible ferroelectricity.]

MOGENSEN, O. E. Positron annihilation in the water–ice system. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 171–77.) [Phenomena observed when positrons annihilate in water or ice and possible relation to peculiar behaviour of protons in ice.]

MOSSOP, S. C., *and* JAYAWEERA, K. O. L. F. AgI–NaI aerosols as ice nuclei. *Journal of Applied Meteorology*, Vol. 8, No. 2, 1969, p. 241–48. [Laboratory cloud chamber study. Comparison of results with different theories.]

MOUNIER, S., *and* SIXOU, P. A contribution to the study of conductivity and dipolar relaxation in doped ice crystals. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 562–70.) [Measurements using blocking electrodes.]

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MPEMBA, E. B., *and* OSBORNE, D. G. Cool? *Physics Education*, Vol. 4, No. 3, 1969, p. 172–75. [A beaker of hot water, placed in a refrigerator, freezes quicker than a beaker of cool water. Possible explanation.]

MÜLLER-KRUMBHAAR, H. Neutron and gamma activated nucleation of Tyndall-flowers in ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 132–37.) [Experimental study of Tyndall flower formation in irradiated ice.]

MUGURUMA, J. Influence of the surface layer on the plastic deformation of ice single crystals. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 213–16.) [Removal of mechanically worked surface layer greatly increases maximum stress in constant strain-rate tests.]

NOLL, G. Segregation of ammonium fluoride into ice single crystals. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 113–19.) [Ammonium fluoride is not taken up into ice stoichiometrically; acid components predominate.]

ONSAGER, L. Protonic semiconductors. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 363–68.) [Review of electrical conductivity by mobile protons in ice and similar materials.]

PICK, M. A. The specific heat of ice Ih. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 344–47.) [Measurements from 80 to 230 K show anomaly near 120 K.]

PLUMMER, W. T. Infrared reflectivity of frost and the Venus clouds. *Journal of Geophysical Research*, Vol. 74, No. 13, 1969, p. 3331–36. [Laboratory data for frost particles <2 μm in diameter in spectral range 0.9–3.4 μm. Similarity of results with reflectivity of Venus clouds.]

RABIDEAU, S. W., *and* FINCH, E. D. Structural studies of ice polymorphs by neutron diffraction, proton and deuteron nuclear magnetic resonance. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 59–80.) [Studies on ice Ih, Ic, II, V and IX.]

REITER, R., *and* CARNUTH, W. Charge separation in ice needles containing traces of NO_3^- ions. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 611–19.) [Observation of different behaviour of ice crystals with traces of NO_3^- ions and discussion of explanation.]

RENKER, K. B., *and* BLANCKENHAGEN, P. VON. Lattice dynamics of ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 287–304.) [Calculation of frequency distribution function and comparison with inelastic neutron scattering, infra-red and thermal results.]

RONCA, L. B. Thermoluminescence of ice. (*In* McDougall, D. J., *ed. Thermoluminescence of geological materials. Proceedings of a NATO Advanced Research Institute on applications of thermoluminescence to geological problems.* London and New York, Academic Press, 1968, p. 257–66.) [Peak height ratios for frost crystals, snow and ice after various stress histories.]

ROULLEAU, M. The influence of an electric field on the freezing of water. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 631–40.) [Observations on effect of uniform and non-uniform fields on nucleation of supercooled water droplets.]

RUEPP, R., *and* KÄSS, M. Dielectric relaxation, bulk and surface conductivity of ice single crystals. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 555–61.) [Measurements over wide temperature and frequency range.]

RUNNELS, L. K. Diffusion and relaxation phenomena in ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 514–26.) [Review of work on point defects in ice including dielectric relaxation, elastic relaxation, spin-lattice relaxation and diffusion.]

RYAN, B. F., *and* MACKLIN, W. C. The growth of ice in supercooled aqueous solutions. *Journal of Crystal Growth*, Vol. 2, No. 6, 1968, p. 337–40. [Growth rates parallel and normal to basal plane in KF, CsF and LiI and sucrose solutions.]

SAFFORD, G. J., *and others*. Neutron inelastic scattering and X-ray studies of aqueous solutions of dimethylsulphoxide and dimethylsulphone, [by] G. J. Safford, P. C. Schaffer, P. S. Leung, G. F. Doebbler, G. W. Brady and E. F. X. Lyden. *Journal of Chemical Physics*, Vol. 50, No. 5, 1969, p. 2140–59. [Data indicate that dipole interactions and hydrogen bonding of dimethylsulphoxide inhibit formation of ice Ih on freezing and explain its cryoprotective properties.]

SEIDENSTICKER, R. G., *and* LONGINI, R. L. Impurity statistics in ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 471–82.) [Calculation of effect of impurities and surfaces on defect concentrations.]

SIEGLE, G., *and* WEITHASE, M. Interpretation of the proton spin-lattice relaxation in hexagonal ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 571–78.)

SIKSNA, R. Models for the water molecule and related ions. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 178–83.) [Descriptions of plastic models of use in discussing pure and doped ice.]

STATZ, G., *and* LIPPERT, E. The nature of the hydrogen bond. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 152–70.) [General review of hydrogen bonding.]

SUGISAKI, M., *and others*. Calorimetric study of glass transition of the amorphous ice and of the phase transformation between the cubic and the hexagonal ices, [by] M. Sugisaki, H. Suga and S. Seki. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 329–43.) [Calorimetric measurements.]

SUSSMANN, J. A. Electric resonance: application to the hydrogen bond. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 541–45.) [Possibility of resonance absorption by protons in hydrogen bonds.]

TAKAHASHI, T. Electric charge generation by the breaking of frost under a temperature gradient. *Journal of the Meteorological Society of Japan*, Vol. 47, No. 1, 1969, p. 23–28. [Laboratory experimental study of electric charge when frost bridging gap between two ice hemispheres is broken.]

WEISS, J. J. Formation and structure of colour centres in irradiated ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 195–96.) [Discussion of paper by K. Eiben in same symposium. Suggests vacancy-D-defect complex as trapping site for electrons in ice.]

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WEISS, J. J. Trapping of electrons in irradiated ice. *Philosophical Magazine*, Eighth Ser., Vol. 20, No. 164, 1969, p. 259–65. [Discussion of the form of trap, believed to be a vacancy associated with Bjerrum defects.]

WHALLEY, E. Infrared spectrum of ice Ih in the range 4 000 to 15 cm^{-1}. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 271–86.) [Explanation of observed spectrum in terms of processes occurring in ice and of proton disorder.]

WHALLEY, E. Structure problems of ice. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 19–43.) [Review of knowledge of the crystal structure of ice including the high-pressure phases.]

WOLFF, H. The vapor pressure isotope effect of ice and its isomers. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 305–19.) [Theoretical interpretation of effect.]

WOLFF, H., *and* WOLFF, E. Über den Dampfdruck-Isotopie-Effekt von Wasser und Eis. *Berichte der Bunsengesellschaft für physikalische Chemie*, Bd. 73, Nr. 4, 1969, p. 393–99. [Vapour pressure ratios of different isotopic water molecules of water and ice calculated and compared with published data. English summary.]

WORKMAN, E. J. Atmospheric electrical effects resulting from the collision of supercooled water drops and hail. (*In* Riehl, N., *and others, ed. Physics of ice* . . . . New York, Plenum Press, 1969, p. 594–602.) [Laboratory simulation experiments and their interpretation.]

YOUNG, I. G. Improved technique for electrical measurements on ice and other doped solids. *Journal of Applied Physics*, Vol. 40, No. 5, 1969, p. 2345–50. [Suggests resistivity measurements should be made perpendicular, rather than parallel to growth direction. Results for ice doped with HCl including partition coefficient.]

LAND ICE. GLACIERS. ICE SHELVES

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GLACIAL GEOLOGY

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FROST ACTION ON ROCKS AND SOIL. FROZEN GROUND. PERMAFROST

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