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DEPARTMENT OF THE INTERIOR
CANADA

HON. THOMAS G. MURPHY, *Minister*

H. H. ROWATT, C.M.G., *Deputy Minister*

PUBLICATIONS

OF THE

Dominion Observatory

OTTAWA

R. MELDRUM STEWART, *Director*

Volume X

Bibliography of Seismology

1929-1933

BY

ERNEST A. HODGSON

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Bibliography of Seismology

January, February, March, 1929

This issue is the first of a series entitled "*Bibliography of Seismology*," which is to appear henceforward as a part of these Publications. Beginning with the first quarter of 1926, the Eastern Section of the Seismological Society of America published quarterly a "*Bibliographical Bulletin*". This new series is essentially a continuation of that earlier publication.

The *Bibliographical Bulletin* was compiled through the efforts of collaborators in various countries and was prepared at the Dominion Observatory under the editorship of the present writer. It was distributed in mimeographed form to the members of the Eastern Section, and was later re-issued in print in the *Bulletin of the Seismological Society of America*.

At its annual meeting, held April 30–May 1, 1929, in New York City, the Eastern Section decided to relinquish the bibliography provided other means could be found to carry it on. The work has, therefore, with the concurrence of the Eastern Section, been assumed by the Dominion Observatory.

The various lines of collaboration previously established are to be maintained and extended, to the end that the Bibliography of Seismology may serve, as nearly as may be, as a complete register of all papers, books or other publications dealing with seismology, pure or applied, or with other related subjects of interest to seismologists.

The assistance of collaborators is indicated by initials, appended to the items received from each. On the last page of this issue will be found a list of all who have so far assisted in the assembling of references or abstracts for the bibliography as published by the Eastern Section. Their co-operation in the past is much appreciated. It is hoped that they will continue to assist and that many others will join in the work, reporting, if possible with a brief abstract in each case, such papers, their own and others, as should be listed in this bibliography.

1. ABDALIAM, S., "Le grand tremblement de terre de l'Arménie le 22 octobre 1926," *La Nature*, No. 2764, 1, July 1, 1927.
2. AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, "Structure of Typical American Oil Fields," published by the American Association of Petroleum Geologists, 485 pages, 195 illustrations. Price (cloth) \$5, postpaid. Box 1852, Tulsa, Oklahoma, 1929.
Thirty papers on the programme of the Twelfth Annual Convention of the American Association of Petroleum Geologists at Tulsa, Oklahoma, March 24, 25, and 26, 1927; being a symposium on the relation of oil accumulation to structure.
3. ANDREOTTI, G., "Risultati ottenuti dallo studio di telesismi giapponesi registrati a Padova," *La Meteorologia pratica*, 9, No. 3, 107, May-June, 1928.

4. ANTEVS, ERNST, "Late Quaternary Changes of Level in Maine," *American Journal of Science*, Fifth Series, 15, No. 88, 319-336, April, 1928.

The paper presents the results of a study of the late Quaternary changes of level in Maine as carried out by the author in 1926-1927, "partly in collaboration with Mr. Robert W. Sayles, of Harvard University, and Professor J. W. Goldthwait, of Dartmouth College."

The author's table of contents is as follows:

"Late-glacial marine limit: Previous studies; Own determinations; Marine sediments near the marine limit; Marine limit in adjacent regions; Amount of the late-glacial depression; Time of the recording of the marine limit.

"Late-glacial and post-glacial rise of the land; Rise rapid; Rise not broken by oscillations or marked halts; Amount of the uplift.

"Post-glacial transgression.

"Changes of level in Maine as compared with those in other areas.

"References."

The references include thirty-two items—a useful bibliography for anyone interested in the study of the changes of level in the northern part of the Atlantic coast line.

5. ANTEVS, ERNST, "The Last Glaciation: With Special Reference to the Ice Retreat in North-eastern North America," *American Geographical Society, Research Series*, No. 17 (Shaler Memorial Series), x+292 pages, 9 plates. Price \$3.50. New York, 1928.

A review by C. E. P. Brooks appears in *Nature*, No. 3081, 122, 761-762, November 17, 1928.

6. BAILEY, E. B., COLLET, L. W., and FIELD, R. M., "Paleozoic Submarine Landslips Near Quebec City," *The Journal of Geology*, 36, No. 7, 577-614, October-November, 1928.

Although this paper deals with events which are old historically, while still comparatively young geologically, it is of interest to those engaged in a study of the seismicity of Eastern Canada, by reason of the analysis of known faults near Quebec city, and the extended bibliography indicating earlier investigations in that region.

7. BAILEY, E. B., "The Ancient Mountain Systems of Europe and America," *The Scottish Geographical Magazine*, 44, No. 6, 321-334, November 15, 1928.
8. BLACKWELDER, ELIOT, "Mudflow as a Geologic Agent in Semiarid Mountains," *Bulletin of the Geological Society of America*, 39, No. 2, 465-483, June 30, 1928.
9. BLAU, L. W., "An Experimental Investigation of Forced Vibrations," *Journal of the Franklin Institute*, 206, No. 3, 355-378, September, 1928.

A correction note appears in the next number of the same journal at page 502.

10. BOGGS, SAMUEL W., "Physiography of the Roof of the Earth," *The Pan-American Geologist*, 50, No. 3, 189-200, October, 1928, and 50, No. 4, 271-282, November, 1928.

The article describes the physiography of Tibet.

11. BOWIE, WILLIAM, "Causes and Prediction of Earthquakes," (Reprint from book entitled "Papers in Honour of Charles Frederick Johnson—Trinity College, 1928"), Trinity College, Hartford, Conn.; specially circulated, 26 pages, 1928.

Discussion of isostasy with special relation to cause and prediction of earthquakes. Relation of erosion is brought out. Weakness of the earth's crust results in break after slight distortion and strain is relieved. Stresses brought about by processes which result in isostatic adjustment.

N.H.H.

12. BOWIE, WM., "Equilibrium of Outer Crust of Earth is Studied as Basis for Determining Cause of Earthquakes," *United States Daily*, February 14, 1929, Washington, D.C.

The above paper announces: "In these articles, presenting a Topical Survey of the Government, are shown the practical contacts of the various bureaus and divisions." The paper by Dr. Bowie is Article Seventeen—Isostasy; of Topic 40—Physical Science.

13. BRIDGMAN, P. W., "The Thermal Conductivity and Compressibility of Several Rocks under High Pressures," *The American Journal of Science*, 7, No. 38, 81-102, February, 1924.

The pressures used reached a maximum of 12,000 kg. per sq. cm. The last paragraphs of the author's summary read:

"*Geological Consequences.*—As far as the results on thermal conductivity go, only rough conclusions can be drawn, but it would seem that in view of the possible variations found with pressure and temperature one should be prepared in geological speculations to consider that thermal conductivity at a depth of several hundred miles may be several fold greater than the value now accepted.

"That the compressibility is different in different directions suggests that deep in the earth's crust, where there are large differential stresses, with the probability of much greater variations with direction than found here, it may be very far from the truth to represent the elastic behaviour as that of a single homogeneous isotropic solid with two elastic constants. One must furthermore be prepared for the earth's crust to act with different effective elastic constants according as the strains are large or small, and depending on past history."

R.A.D.

14. BRIDGMAN, P. W., "The Compressibility of Several Artificial and Natural Glasses," *The American Journal of Science*, Fifth Series, 10, No. 58, 359-367, October, 1925.

The specimens chosen for the experiments described in this paper were obtained from widely separated sources. The following excerpts may be quoted from the author's discussion of results:

"First, and most important, it is established that compressibility may increase with increasing pressure. In the substances measured here the increase has some intimate connection with the silica content. . . .

"The absolute magnitude of the effect is also of interest; the much lower compressibility of the silica free glass shows that in artificial glasses of the usual range of composition the silica supplies a highly compressible component.

"The interpretation of the results for the natural glasses is more uncertain. . . .

"It is evident that the abnormal variation with pressure of compressibility is associated in some way with the glassy as opposed to the crystalline condition. . . ."

R.A.D.

15. BRIDGMAN, P. W., "The Effect of Pressure on the Rigidity of Steel and Several Varieties of Glass," *Proceedings of the American Academy of Arts and Sciences*, 63, No. 10, 401-420, February, 1929.

The paper presents the results of a determination of the rigidity or shearing modulus under pressure, of various samples of steel and glass, by means of the sliding contact potentiometer method of measuring small displacements.

R.A.D.

16. BROWN, Ernest W., "The Stability of the Earth as a Timekeeper," *Travaux de la Section de Géodésie de l'Union géodésique et géophysique internationale*, Tome 4 (Rapports généraux établis à l'occasion de la deuxième assemblée générale, Madrid, 24 septembre-8 octobre 1924), 2 pages, Paris, 1927.

The concluding paragraph reads: "Hence, finally, to sum up, the only knowledge we have at the present time of a change in the rate of the Earth's rotation is that produced by tidal friction in shallow seas of the amount indicated above."

N.J.O.

17. BYERLY, Perry, "Dispersion of Energy Without Dispersion of Frequencies in Transverse Elastic Waves in the Earth," *Bulletin of the Seismological Society of America*, 14, No. 2, 90-135, June, 1924.

18. CHAMBERLIN, T. C., "The Two Solar Families," published by the University of Chicago Press, 333 pages. Price \$2.50. Chicago, 1928.

A review signed C.A.C. appears in the *Journal of the Royal Astronomical Society of Canada*, for February, 1929, at pages 108-109.

- COLLET, L. W., BAILEY, E. B., and FIELD, R. M., "Palaeozoic Submarine Landslips Near Quebec City." See No. 6 of this list.
19. DELAUNEY, L., "Tremblements de terre et volcans," *Revue de France*, 123, December 1, 1923; reprinted in *Matériaux pour l'Étude des Calamités*, April-June, 1924.
20. DEQUERVAIN, A., "Über die Herdtiefenberechnung aus einer oder zwei herdnahen Stationen und die hierzu erforderliche Zeitgenauigkeit," *Gerlands Beiträge zur Geophysik*, 13, Heft 2, 148-162, 1913.
21. EDITOR, MANUFACTURERS RECORD, "Some Fallacious Arguments Used against Reservoirs in Flood Control," *Manufacturers Record*, 94, No. 22, 43, November 29, 1928.

In discussion of the subject the statement is made that earthquake possibilities are not a factor, since consulting engineers in earthquake regions state that large dams would probably not be affected by great earthquakes. (The point is overlooked that such general changes of level as occurred in the New Madrid earthquake and others would affect all such structures.)

N.H.H.

22. EVANS, Sir Arthur, "The Palace of Minos" (A comparative account of the successive stages of the early Cretan civilization as illustrated by the discoveries at Knossus.) Vol. II, Parts 1 and 2, xxii+844 pages, illustrations, plans and 30 supplementary plates. Price 7 guineas. Macmillan Co., London, 1928.

Crete is subject to earthquakes. The effects of the earthquakes on the earlier palaces of Crete and the resulting modifications in construction in later palaces are an interesting phase of the detailed record of these archaeological explorations.

A review signed E.A.P. appears in the *Geographical Journal*, 72, No. 6, 559-562, December, 1928.

23. EVE, A. S. and KEYS, D. A., "Geophysical Methods of Prospecting," United States Department of Commerce, Bureau of Mines, Technical Paper No. 240, 26 pages, Washington, 1927.

Technical Paper No. 434 by the same authors deals with "Geophysical Prospecting—Some Electrical Methods."

N.H.H.—USCGS.

- FIELD, R. M., BAILEY, E. B., and COLLET, L. W., "Palaeozoic Submarine Landslips near Quebec City." See No. 6 of this list.

24. GERLANDS BEITRÄGE ZUR GEOPHYSIK, "Seismische Funkmeldungen der U.S.A.," *Gerlands Beiträge zur Geophysik*, 21, Heft 1, 135-137, 1929.

An outline of the recently completed arrangements for broadcasting the data derived at seismic stations in the United States and Canada for the larger earthquakes.

25. GESZTI, Josef, "Zusammenschub der Erdrinde," *Gerlands Beiträge zur Geophysik*, 21 Heft 1, 36-78, 1929.

The paper is a discussion of the deformations of the earth's crust on the hypothesis that it may be considered as a plastic material.

26. GORANSON, Roy W., "The Density of the Island of Hawaii and the Density Distribution in the Earth's Crust," *American Journal of Science*, Fifth Series, 16, No. 92, 89-120, August, 1928.

In making reference to seismological evidence on page 105 the author makes a statement which should be emphasized by being quoted here. He says: "One of the few sources of direct data relative to the interior of the earth is provided by interpretations of seismological records. Geologists, in building up theories of the earth's interior, have therefore used these interpretations by the seismologists as though they were incontrovertible facts. Although most of our knowledge of the earth's interior will come from this source, nevertheless we should not lose sight of the fact that the data themselves need refining by decreasing the experimental errors; that the mathematical development used in the computations is based on hypotheses some of which the data themselves are not accurate enough to establish with certainty, and furthermore the data indicate that the laws of

reflection and refraction assumed for the mathematical computations are not obeyed exactly; that our knowledge of the physical characteristics of the prevailing rocks and minerals is far from being complete and is capable of greater accuracy. Seismologists realize this and are striving for more accurate data and more trustworthy interpretations of these data, but sometimes we who are less familiar with the details of their work do not realize this as fully as we should."

In the opinion of the reviewer this is a most timely, concise, line-for-line-and-word-for-word-important comment. The fact that the author, after the above prefatory remarks, proceeds to use the seismological evidence for what it is worth (and it is worth a great deal) adds weight to his analysis as quoted above. E.A.H.

27. GUTENBERG, B., "Der Aufbau der Erdkruste in Europa," *Geologische Rundschau*, 19, Heft 6, 433-439, 1928.

The paper is illustrated by four text-figures. It presents the data obtained by means of seismic observations as to structure of the upper earth layers in Europe. A bibliography of eight items is appended.

28. GUTENBERG, B., "Bodenunruhe durch Brandung und durch Frost," *Forschungen und Fortschritte* (Nachrichtenblatt der Deutschen Wissenschaft und Technik), 4, Nr. 34, 357-358, Berlin, December 1, 1928.

The article is illustrated by means of three text-figures. It is a popular presentation of the subject. A footnote lists some of the technical articles by the same author dealing with this subject.

29. HECK, N. H., "Earthquake History of the United States Exclusive of the Pacific Region," United States Department of Commerce, Coast and Geodetic Survey, Special Publication No. 149, 61 pages. 15 cents, from Superintendent of Documents, Government Printing Office. Washington, D.C., 1928.

The earthquakes are classified into four groups:—

- (1) Northeastern Region
- (2) Eastern Region
- (3) Middle Western Region
- (4) Western Mountain Region

Each group is arranged chronologically and gives the outstanding data with regard to each earthquake recorded.

A map shows the location of the reports in graphical form, and a final tabulation gives a chronological list of the quakes reported, indicating the State or States in which each was felt.

The report is introduced by a general description of the plan of the book, followed by an outline of the "Earthquake Condition in the Various States."

30. (1) HECK, N. H., "Research on Conditions in Earth's Interior is Conducted Through Studies of Earthquakes," *United States Daily*, Washington, D.C., February 16, 1929.

The above paper announces: "In these articles, presenting a Topical Survey of the Government, are shown the practical contacts of the various bureaus and divisions." The paper by Commander Heck is Article Nineteen—Exploring the Earth's Interior, of Topic 40—Physical Science. J.J.W.

30. (2) HECK, N. H., "Earthquakes in Northeastern States Studied to Determine Probability of Recurrences," *United States Daily*, Washington, D.C., March 26, 1929.

This paper is Article Fifty of the Series announced in item 30 (1) above. J.A.P.

30. (3) HECK, N. H., "Information Gathered on Effects of Earthquakes to Determine Causes and Probable Frequency," *United States Daily*, Washington, D.C., March 27, 1929.

This paper is Article Fifty-one of the Series announced in item 30 (1) above. J.A.P.

31. HÉE, A., "Sur la fréquence des tremblements de terre dans la période de dix années (1911-1920)," *Revue générale des Sciences*, 683, Paris, 1924.

32. HEHGLANS, F. W., "Über Piezoquarzplatten als Sender und Empfänger hochfrequenter akustischer Schwingungen," *Annalen der Physik*, 86, No. 12, 587-628, 1928. J.B.M.
33. HOFFMEISTER, J. Edward and LADD, Harry S., "Falcon, the Pacific's Newest Island," *The National Geographic Magazine*, 54, No. 6, 757-766, December, 1928.
34. HOLMES, Arthur, "Continental Drift," *Nature*, No. 3073, 122, 431-433, September 22, 1928.
35. IMAMURA, A., "The Tazima Earthquake of 1925," *Bulletin of the Imperial Earthquake Investigation Committee*, 10, No. 3, 71-107, Tokyo, October, 1928.
- Accompanied by a sketch map showing the geology of the region affected, together with the isoseismals of the quake and the resulting changes in level; a second sketch map showing the isoseismals and the direction of the initial phase for the Japanese islands; five plates showing reproductions of seismograph records; thirty-two reproductions of photographs showing destruction caused by the quake; and finally a map showing graphically the damage by quake and fire at the town of Toyo-oka; A similar map for Tuiyama cove and Kumihama bay.
- This paper appears in the same issue of the *Bulletin of the Imperial Earthquake Investigation Committee* as the article by N. Yamasaki (No. 100 of this list) entitled: "On the Cause of the Tajima Earthquake of 1925."
36. INGLADA ORS, V., "El período de las ondas de la fase final de los sismogrammas," *Iberica*, No. 493, Tortosa, September 15, 1923.
37. INGLADA ORS, V., "Procedimientos expeditos de localización de focos sísmicos," *Memorias de la Real Sociedad española de Historia natural*, 13, Memoria 3a, Madrid, June 20, 1927.
38. INGLADA ORS, V., "La condición isostática de la corteza terrestre," Conferencia dada en el Instituto Español de Oceanografía el 17 de Febrero de 1927. Ministerio de Marina, Dirección general de Pesca; Notes y Resúmenes, Serie II, No. 18, Madrid, 1927.
39. JAKOBSEN, B. F., "Relation between Earthquakes and Engineering Substructures," *Proceedings American Society of Civil Engineers*, 55, No. 1, 219, January, 1929.
40. JEFFREYS, H., "The Compression of the Earth's Crust in Cooling," *Philosophical Magazine*, Sixth Series, 32, 575-591, December, 1916.
41. JEFFREYS, H., "On Certain Geological Effects of the Cooling of the Earth," *Proceedings of the Royal Society*, Series A, 100, 122-149, November 1, 1921.
42. JEFFREYS, H., "The Stability of a Layer of Fluid Heated Below," *Philosophical Magazine*, Seventh Series, 2, 833-844, October, 1926.
43. JEFFREYS, H., "On the Earth's Thermal History and Some Related Geological Phenomena," *Gerlands Beiträge zur Geophysik*, 18, Heft 1-2, 1-29, 1927.
44. KERFORNE, F., "Revue sismologique de l'ouest pour 1923," *Bulletin de la Société minéralogique et géologique de Bretagne*, 5, Fascicule 1, 59, 1924.
- KEYS, D. A. and EVE, A. S., "Geophysical Methods of Prospecting." See No. 23 of this list.
45. KÖHLER, R., "Feldapparatur zur Registrierung von Zeit-Zeichen," *Zeitschrift für Geophysik*, 4, Heft 5, 225-226, 1928.
46. KOTO, Bundjirô, "The Twin Earthquake of Tango, in 1927," *Gerlands Beiträge zur Geophysik*, 20, Heft 3-4, 308-311, 1928.
47. KRIGE, A. V., "An Examination of the Tertiary and Quaternary Changes of Sea-Level in South Africa; with special stress on the evidence in favour of a recent world-wide

sinking of ocean level," *Annals, University of Stellenbosch*, 5, Section A, No. 1, 81 pages, 5 plates, one large map, Cape Town, May, 1927.

A review by Ernst Antevs is given in the *American Journal of Science*, Fifth Series, 16, No. 93, 276-278, September, 1928. The first paragraph of the review reads as follows: "This paper gives the results of a remarkable study, begun at the suggestion of Professor R. A. Daly, of the whole coast of the Union of South Africa, excluding Zululand, representing fully 1,800 miles (2,900 km.). It deals with the changes of level of land and sea, with the fluctuations of the shoreline, the title being misleading.

Since the early Tertiary, South Africa has, according to this study, undergone, besides smaller fluctuations of level: (1) Tertiary-Quaternary emergence; (2) Quaternary emergence, and (3) late-Quaternary emergence. However, the history will, no doubt, prove to be more complicated."

48. KUNITOMI, S., "Note on the Destructive Earthquake of Middle Etigo, occurred on October 27, 1927," *The Geophysical Magazine*, 1, No. 5, 238-254, Tokyo, 1928.
49. LACOSTE, J., "Sur le mouvement microséismique à Strasbourg," *Comptes rendus de l'Académie des Sciences*, 179, 568, Paris, 1924.
- LADD, HARRY S. and HOFFMEISTER, J. EDWARD, "Falcon, the Pacific's Newest Island." See No. 33 of this list.
50. LAMB, HORACE, "The Propagation of Tremors over the Surface of an Elastic Solid," *Philosophical Transactions, Royal Society, Series A*, 203, 1-42, London, 1904.
51. LAWSON, ANDREW C., "The Geological Implications of the Doctrine of Isostasy," *Bulletin of the National Research Council*, 8, Part 4, No. 46, Washington, June, 1924.
52. LINK, THEODORE A., "En Échelon Folds and Arcuate Mountains," *Journal of Geology*, 36, No. 6, 526-538, August-September, 1928.
- The author's abstract reads: "En échelon folds and miniature arcuate mountain systems were produced experimentally in several ways. Differential stress transmission in the horizontal plane, through rigid materials bordering incompetent beds, gave rise to en échelon folds the arcuate systems even though non-rotational compression was applied. The same phenomena were also produced by applying differential (rotational) compression in the horizontal plane against homogeneous materials.
- Application of principles derived from the performed experiments are made to specify examples in nature."
53. LOVE, A. E. H., "Some Problems of Geodynamics—Being an Essay to which the Adams Prize in the University of Cambridge was adjudged in 1911," Cambridge University Press: 178 pages, royal octavo. Price \$6.75. London, 1911. Second Edition, 1928.
- Chapter XI of this book, comprising pages 144-178, deals with the "Theory of the Propagation of Seismic waves," and forms the classic presentation of the theory of the "Love-Waves" which appear in the surface-wave section of the seismogram.
54. LYNCH, EDWARD, "Solar Physics and Earthquakes," published by the Tribune News Publishing Co., 40 pages. South Gate, Los Angeles Co., California, 1928.
- The publication is accompanied by tables and diagrams which give the results of a study of comparison of solar activity and records of destructive earthquakes. Various theories are reviewed, with however, too much tendency to accept theories as established which are not yet generally accepted as to earthquake causes and condition of interior of earth. Statistics are worthy of investigation by the student of seismicity.
- N.H.H.—USCGS
55. MACCARTHY, GERALD R., "Experiments in Underthrusting," *American Journal of Science*, Fifth Series, 16, No. 91, 51-67, July, 1928.
56. MAINKA, C., "Ergebnisse der Erdbebenstation Adventbay auf Spitzbergen in der Zeit vom 27. Oktober 1911 bis 18. Juni 1912," *Gerlands Beiträge zur Geophysik*, 13, Heft 3 (Kleine Mitteilungen), 103-113, 1914.

57. MASCART, J., "Les tremblements de terre et la météorologie," *Bulletin de l'Observatoire de Lyons*, **199**, October 1923.
58. MAURAIN, Ch., "Propagation dans le sol et dans l'air des ondes produites par de fortes explosions," *Comptes rendus des Congrès de l'Association française pour l'Avancement des Sciences, Liège*, **362**, 1924.
59. MAURAIN, Ch., "Isostasie et Séismologie," *Comptes rendus des Congrès de l'Association française pour l'Avancement des Sciences, Grenoble*, **264**, 1925.
60. MCKINLEY, Carl, "A Descriptive Narrative of the Earthquake of August 31, 1886," prepared expressly for the Year Book of the City of Charleston, S.C., for 1886. Walker, Evans and Cogswell Co., 97 pages, Charleston, 1887.

This graphic account was written by a newspaper man who experienced the earthquake and the trying days which followed and who was in an exceptionally good position to obtain information from others also.

61. MILLER, Wm. J., "Geology of Deep Spring Valley, California," *Journal of Geology*, **36**, No. 6, 510-525, August-September, 1928.

The following is an excerpt from the author's abstract: ". . . The recency of the dislocation along the main fault is proved by many miles of sharply faulted alluvial cones; the occurrence of river beds on the top of a great fault block; and a field of very fresh lava which has been dislocated 1,500 feet, vertically. . . ."

62. MOHOROVIČIĆ, S., "Die reduzierte Laufzeitkurve und die Abhängigkeit der Herdtiefe eines Bebens von der Entfernung des Inflexionspunktes der primären Laufzeitkurve. (1 Mitteilung: Die Ausbreitung der Erdbebenstrahlen in den obersten Schichten der Erde.)," *Gerlands Beiträge zur Geophysik*, **13**, Heft 3, 217-240, 1914.
63. MONTESSUS DE BALLORE, F., "Tremblements de terre d'origine épirogénique probable dans le Michigan et le Wisconsin," *Comptes rendus de l'Académie des Sciences de France*, **155**, 1042-1043, Paris, November, 1912.
64. NATHAN, Mathew, et al., "Geophysical Surveying Report of a Sub-Committee of the Committee of Civil Research," issued by the Empire Marketing Board, Publication No. 6, 21 pages, November, 1927.

It is priced at 7 shillings (postpaid) and may be obtained from His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C. 2.

It is the work of a committee composed of the following:

Matthew Nathan
G. P. Lenox-Conyngham
T. W. Edgeworth David
H. S. Winterbotham
W. F. T. McLintock
G. F. Herbert Smith.

The Secretary to the Sub-committee is A. F. Hemming, 2 Whitehall Gardens, London, S.W.1.

65. NATURE, "The Circulation of Seismological Information by Wireless Telegraphy," *Nature*, No. 3086, **122**, 968, December 22, 1928, and No. 3091, **123**, 148-149, January 26, 1929.

The first of these articles deals with the arrangements made for broadcasting early information concerning important earthquakes. The second gives the location obtained in this way for the Kamchatka earthquake of January 13, 1929.

66. NEUMANN, Frank, "Seismological Report, October, November, December, 1926," United States Department of Commerce, Coast and Geodetic Survey, Serial No. 431; may be obtained from the Superintendent of Documents, Government Printing Office at the nominal price of 10 cents: Washington, 1928.

Besides the regular reports on the earth tremors for the last quarter of 1926, the publication gives a "Seismological Summary for 1926," showing for the entire year the distribution of the earthquakes in geographical position.

67. NEUMANN, Frank, "Seismological Records," *United States Daily*, Washington, D.C., February 20, 1929.

The article describes the work of the Coast Survey in collecting seismological data, and the uses to which the data are put. The geophysical nature of the work is emphasized, also its international aspects. The general nature of seismic activity is described. F.N.

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The same issue of the *Engineering News-Record* contains a companion article, written by Irving B. Crosby and Sherwin F. Kelly, entitled "Electrical Subsoil Exploration and the Civil Engineer." Each article deals mainly with the problem of determining the depth of the soil and the character of the rock surface immediately beneath it.

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The paper lists more than eighty related publications in the concluding bibliography.

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This paper forms the classic presentation of the theory of the so-called "Rayleigh-waves," which appear in the surface-wave section of the seismogram.

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76. ROTHÉ, E., "Observations séismologiques en France," *Comptes rendus, Congrès des Sociétés savantes*, 115, Paris, 1925.

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Following an introduction by Rothé, the instrumental constants and the personnel of the collaborating stations are listed. Part I then tabulates the earthquakes registered during 1923. Part II is devoted to a tabulation of the microseismic activity registered. Part III, prepared by Rothé and Madame Hée, deals with "Les Tremblements de Terre en France et aux Colonies." The seismicity is discussed regionally. Part IV, prepared by Rothé, deals with "Macroséismes signalés," listing the data regarding earthquakes of marked intensity experienced in other countries during the year and reported to Strasbourg by the consuls of France stationed in those countries. On pages 104-105, C. Bois presents a "Note sur les sismes en équateur pendant l'année 1923." On page 106 Rothé gives a short report on the Chinese earthquake of March 24, 1923, and on page 107 the same author presents an obituary of Alfred Angot (1849-1924) and Charles Dufour (1866-1923).

79. ROTHÉ, E., et al., "Annuaire de l'Institut de Physique du Globe," Bureau central séismologique français, Deuxième Partie (Séismologie), 99 pages, Strasbourg, 1925.

After an introduction of three pages by Rothé, the report lists the constants of the collaborating stations, their personnel, the earthquakes registered in 1925, and the microseismic activity, this part of the publication being prepared by Eblé. Part III "Les Tremblements de Terre en France et aux Colonies," is issued under the joint authorship of Rothé, Lacoste and Madame Hée. The outline discusses the seismicity by regions and then gives more complete details of those earthquakes which were the more important. Part IV, "Macroséismes signalés," is prepared by C. Bois. It gives the details reported to Strasbourg by consulates in various foreign countries regarding earthquakes experienced in those countries.

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84. SCHAFFER, FRANZ X., "Major Earth Features and Their Transformation," *Pan-American Geologist*, **50**; No. 2, 121-130, September, 1928.

The text of a lecture delivered at the University of California, August 15, 1927. The author traces the application of the theory of Böhm-Böhmersheim, that mountain building with its attendant seismic disturbances, may be the result of the gradual decrease of the earth's flattening, resulting from the retardation of rotation speed, and from the shrinkage due to cooling.

85. SCHUMANN, R., "Zu den Beziehungen zwischen Polhöschwankung und Erdbebenhäufigkeit," *Gerlands Beiträge zur Geophysik*, **13**, Heft 1 (Kleine Mitteilungen), 2-9, 1913.

86. SCHWEYDAR, W., "Notiz zu der Abhandlung von R. Spitaler: Die Achsenschwankungen der Erde als Ursache der Auslösung von Erdbeben," *Gerlands Beiträge zur Geophysik*, **13**, Heft 2 (Kleine Mitteilungen), 53-55, 1913.
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88. SIEBERG, A., "Aufbau und physikalische Verhältnisse des Erdkörpers unter besonderer Berücksichtigung der Erdrinde," *Geologische Rundschau*, **12**, Heft 6-8, 346-359, Leipzig, 1922.
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89. SPITALER, R., "Horizontale Druckkräfte infolge der Achsenschwankungen der Erde," *Gerlands Beiträge zur Geophysik*, **20**, Heft 3-4, 388-396, 1928.
- SPITALER, R., "Zur Notiz von W. Schweydar über meine Abhandlung: Die Achsenschwankungen der Erde als Ursache der Auslösung von Erdbeben." See No. 86 of this list.
90. STAUB, R., "Der Bewegungsmechanismus der Erde, dargelegt am Bau der irdischen Gebirgssysteme," Gebrüder Borntraeger, viii+270 pages, 44 text-figures, 1 map. Price RM 18. Berlin, 1928.
A review by B. Gutenberg, appears in *Petermanns Mitteilungen*, **74**, Heft 9-10, 309, 1928.
91. STÖLTING, H., "Zu Wegeners Kontinental-Verschiebungstheorie," *Gerlands Beiträge zur Geophysik*, **21**, Heft 1, 112-115, 1929.
92. TALMAN, Charles F., "What's Inside the Globe?" *Nature Magazine* (Washington, D.C.), **12**, No. 6, 385, December, 1928. J.B.M.
93. TSUBOI, Chuji, "On the Postseismic Block Movements in the Tango Earthquake District," *Proceedings of the Imperial Academy (Japan)*, **4**, No. 9, 529-532, November, 1928.
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95. TURNER, H. H., "The International Seismological Summary for 1925, April, May, June," 81-180, Oxford, 1929.
96. ULLER, Karl, "Die elastischen Wellen von elementarer Schwankungsform in schweren, festen und isotropen Mitteln," *Gerlands Beiträge zur Geophysik*, **20**, Heft 3-4, 397-409, 1928.
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98. WALKER, George W., "Surface Reflexion of Earthquake Waves," *Philosophical Transactions of the Royal Society of London*, Series A, **218**, 373-393, London, 1919.
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The above paper announces: "In these articles, presenting a Topical Survey of the Government, are shown the practical contacts of the various bureaus and divisions." The paper by Dr. Wenner is Article Twenty—Earthquakes; of Topic 40—Physical Science.

J.J.W.

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J.J.W.

100. YAMASAKI, N., "On the Cause of the Tajima Earthquake of 1925," *Bulletin of the Imperial Earthquake Investigation Committee*, 10, No. 3, 109-113, Tokyo, October, 1928.

Accompanied by a contour map of the shaken area and two reproductions from photographs.

This paper appears in the same issue of the *Bulletin of the Imperial Earthquake Investigation Committee* as that by A. Imamura (No. 35 of this list) entitled "The Tazima Earthquake of 1925."

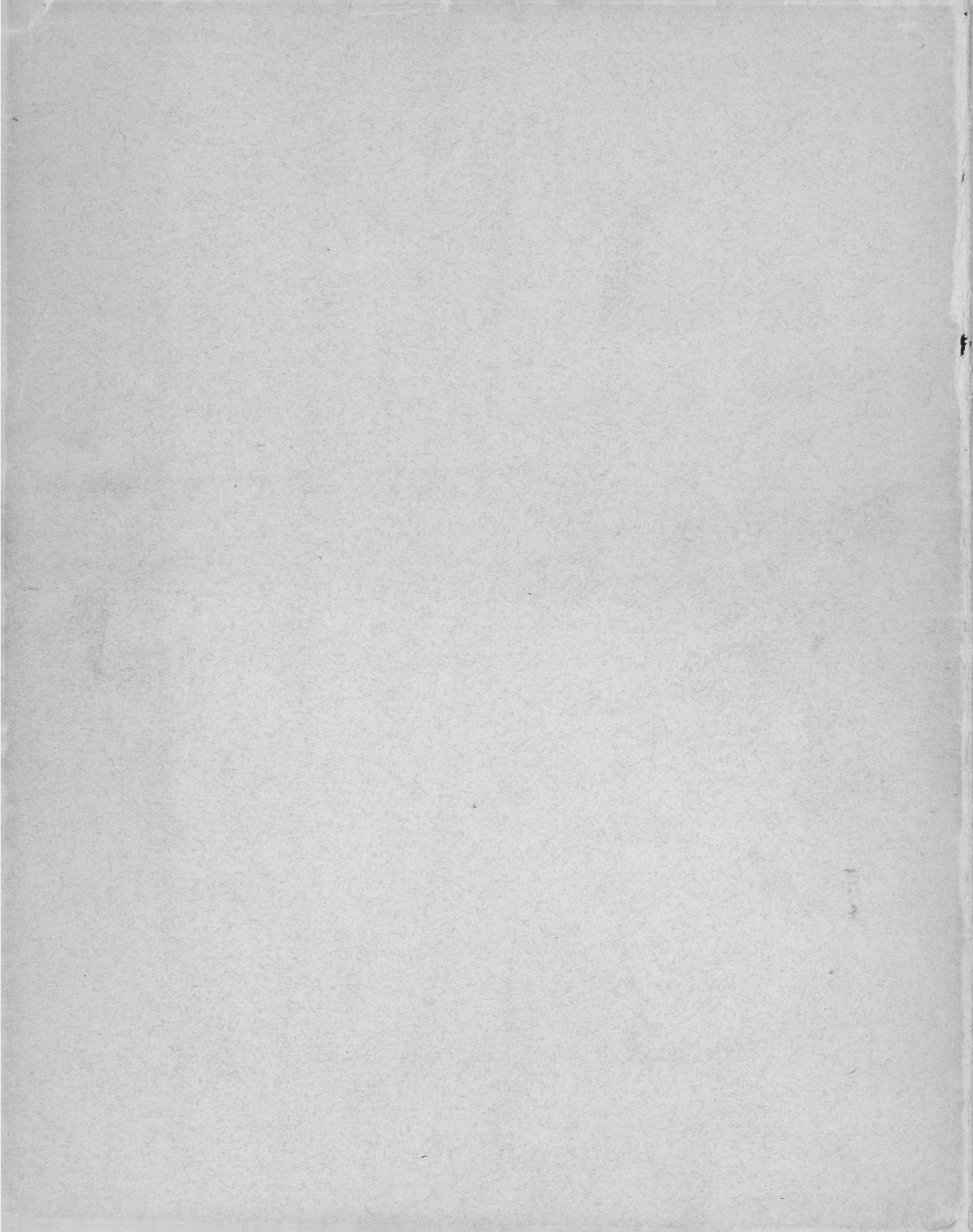
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APR 1 1930

DEPARTMENT OF THE INTERIOR
CANADA

HON. CHARLES STEWART, *Minister*

W. W. CORY, C.M.G., *Deputy Minister*

PUBLICATIONS

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R. MELDRUM STEWART, M.A., *Director*

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Bibliography of Seismology

April, May, June, 1929

This, the second issue of the Bibliography of Seismology as a publication of the Dominion Observatory, has been compiled with the assistance of a number of collaborators whose names are listed in the appendix. (A complete list of those who have assisted previously may be found in the appendix to the first issue.) Initials appended to various items of this bibliography indicate the names of those from whom references or abstracts were received dealing with the respective publications. The co-operation is requested of all interested in making this bibliography as nearly as possible a complete index of publications dealing with the various branches of seismology or its applications.

101. ALDEN, Wm. C., "Landslide and Flood at Gros Ventre, Wyoming," American Institute of Mining and Metallurgical Engineers, Technical Publication No. 140 (Class I, Mining Geology, No. 17), New York, 1928.
- AMBRONN, Richard, "Methoden der angewandten Geophysik," Theod. Steinkopff, 258 pages, 84 illustrations, Dresden and Leipzig, 1926.
A translation of this entitled "Elements of Geophysics," has been made by Margaret C. Cobb. See No. 104 of this list.
102. BROCKAMP, B., "Registrierung von radio-gegebenen Zeichen," *Zeitschrift für Geophysik*, 4, Heft 7-8, 404-405, 1928.
103. CAVASINO, A., "Bollettino Sismico, Anno 1924," Real Ufficio Centrale di Meteorologia e Geofiscia, 133 pages, Rome, 1928.
Fascicule 1, indicated above, deals with "Microsismi." See index to Fascicule 2 as No. 130 of this list.
104. COBB, Margaret C., "Elements of Geophysics," A translation of Ambronn's "Methoden der angewandten Geophysik," McGraw Hill, xi + 372 pages. Price \$5. New York, 1928.
A review of the translation, written by Walter D. Lambert, appears in the *American Journal of Science*, Fifth Series, 15, No. 89, 444-446, May, 1928.
105. CONRAD, Victor, "Das Schwadorfer Beben vom 8. Oktober 1927: (Ein Beitrag zur Kenntnis der Konstitution der oberen Erdkruste)," *Zeitschrift für Geophysik*, 4, Heft 6, 286-289, 1928.
The following is the author's summary of this paper: "The examination of 24 diagrams, which reach from 26 to 1268 kilometers distance from the epicentre, confirms the P*-wave which had been found by the writer in the records of the Tauernbeben. The hodograph of the S*-wave discovered by H. Jeffreys could be also confirmed.
"Besides, hodographs were given for a new Px-wave and the co-ordinated distortional Sx-wave. The velocity of the Px-wave is only about three per cent smaller than that of the normal P-wave. The hodographs of both these waves are nearly parallel to each other. These circumstances suggested the writer to think the Px-wave is not directly transmitted but caused at the great discontinuity which A. Mohorovičić found 60 kilometers deep under the earth's surface.
"This explanation follows the idea of W. Schweydar who in case of artificial concussions comes to the conclusion that optical analogy is not always sufficient for explaining the ways of the elastic-waves in the interior of the earth.

"Several methods applied show practically alike that the focus lies in a depth of 28 kilometers. This depth may indicate a thickness of the granitic layer (H. Jeffreys) of 40 kilometers. These results, especially the great frequency of focus, situated in a depth of 30 kilometers, led to considerations regarding the manner of the origin of earthquakes. Mechanical explanations alone do not seem to be sufficient."

106. COTTON, Leo A., "Earthquake Frequency with Special Reference to Tidal Stresses in the Lithosphere," *Bulletin of the Seismological Society of America*, 12, Nos. 2 and 3, 47-198, 1922.

A bibliography of 116 items is appended.

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108. DAVISON, Charles, "The Annual Periodicity of Earthquakes," *Bulletin of the Seismological Society of America*, 18, No. 4, 246-266, December, 1928.

The author introduces his subject by means of an historical review of previous analyses carried out for the purpose of determining the annual periodicity of earthquakes. Then, after describing the mathematical basis for the method of overlapping means used in his investigation, he proceeds to apply the method to a list of 461 Austrian earthquakes (1865-1884) as recorded by Fuchs. By means of tables he presents the results of his analyses of more than 100 lists of earthquakes in various parts of the world. It would be difficult to present his conclusions satisfactorily in a form shorter than that used by the author on pages 263-265. He discusses the results under the headings, "Ordinary earthquakes," "Slightly destructive earthquakes," and "Great destructive earthquakes." A bibliography of thirty-three items in addition to about twenty footnote references to publications accompanies the paper.

109. DAVISON, Charles, "The Eleven-year and Nineteen-year Periods and Other Related Periods of Earthquake Frequency," *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 7, No. 43, 580-586, March, 1929.

The author concludes that:—

(1) In the earthquakes of the Northern Hemisphere, there are periods of 11, 22, 33, 19, and 38 years, with maximum epochs in 1709, 1716, 1724, 1715-16, and 1724-25, respectively.

(2) All over the Northern Hemisphere the maximum epoch of each period is approximately the same.

(3) The periods of 11, 33, and 19 years affect similarly the destructive earthquakes of each intensity. The periods of 22 and 38 years are apparently confined to destructive earthquakes of intensities 3 and 2 only.

110. DEGOLYER, E. L., et al., "Geology of Salt Dome Oilfields" (A Symposium on the Origin, Structure and General Geology of Salt Domes with Special Reference to Oil Production and Treating Briefly of the Salt Domes of North America), American Association of Petroleum Geologists, 797 pages, numerous maps, sections and diagrams. Price \$6. Tulsa, Oklahoma, 1926.

This was a special publication without any designation other than its title. It forms a compilation of thirty-four papers, written by thirty authors. The papers therein published were presented at a symposium on salt domes, held at the Houston meeting of the American Association of Petroleum Geologists. They appeared originally in the Bulletin of the Association, but were later collected and reprinted in the above volume. Although the compilation deals chiefly with American domes, there are also good descriptions of those of Germany and Roumania.
D.C.B.

111. DEVIK, Olaf, "Ein Accelerograph für das Praktikum," *Physikalische Zeitschrift*, 29, No. 10, 308-311, 1928.

An abstract appears in *Physikalische Berichte*, 10, No. 4, 343, February, 1929. J.B.M.

112. FLAMMARION, Camille, "L'Éruption du Krakatoa, et les Tremblements de Terre," Ernest Flammarion, editor, 249 pages, 18 illustrations. Price 60 centimes. Paris.
113. FREUDENBERG, W., "Die Graübunder Erdbeben und Wetterstürze im August, 1927," *Geologische Rundschau*, 19, Heft 4, 319-320, 1928.
114. FUJIWHARA, Sakuhei and TAKAYAMA, Takeo, "On the Mechanism of the Great Sagami Bay Earthquake on September 1, 1923," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 149-176, March, 1929.
The table of contents and synopsis given by the authors read as follows:—
"1. Introduction.
"2. Sketch of the former theories.
"3. Facts to be explained.
"4. Outline of the proposed theory.
"5. Explanation of the facts from the proposed theory.
"6. Discussions on the proposed theory.
"7. Comparison with other theories.
"8. Discussions on the recognized facts.
"A theory of the earth vertical formation is proposed for the explanation of the mechanism of the great Sagami Bay Earthquake, 1923, based on the observed facts and results of survey, making use of model experiments."
115. GALITZIN, B., "Étude comparative du mouvement du sol dans la phase principale d'un tremblement de terre," *Saint Petersburg Comptes rendus, Commission sismique permanente*, 7, Book 1. P.B.
116. GALITZIN, B., "Détermination de la profondeur du foyer d'un tremblement de terre et de la vitesse de propagation des ondes sismiques dans les couches superficielles de l'écorce terrestre," *Comptes rendus de l'Académie des Sciences de France*, 155, 375-379, Paris, July, 1912.
117. GEIJER, Per, "A Fault Surface," *Economic Geology*, 23, No. 7, 804-805, November, 1928. J.B.M.
118. GHERZI, E., "Microséismes et déferlement des vagues sur les côtes," *Zeitschrift für Geophysik*, 1, Heft 4, 163, 1924-25.
119. GHERZI, E., "Note sur des microséismes solitaires (ondes "Z") de longue période et sur microséismes à groupes," *Zeitschrift für Geophysik*, 4, 422-424, 1928.
120. GUTENBERG, B., "Die seismische Bodenunruhe," Dissertation Göttingen 1911, *Beiträge zur Geophysik*, 11, 314-353, 1912.
121. GUTENBERG, B., "Untersuchungen über die Bodenunruhe mit Perioden von 4^s-10^s in Europa," *Veröffentlichungen des zentralen Bureau der internationalen seismologischen Assoziation*, 106 pages, 121 figures, Strassburg, 1921.
122. HARBOE, E. G., "Das Erdbebenobservatorium auf der Disko-Insel," *Beiträge zur Geophysik*, 11 (Kleine Mitteilungen), 9-28, Leipzig, 1911.
The paper reports the earthquakes recorded at Disko island from October 20, 1907, to August 9, 1909. The instruments used were two components of a mechanically-recording Bosch horizontal seismograph having a stationary mass of 100 kilograms, a magnification of 100, and a paper speed of 18 millimeters per minute. A total of 66 earthquakes were recorded of which the majority were weak and gave records which were illegible. The local or near quakes occurred in groups, practically all being felt in the period from November to February in each year. None were severe. The report concludes with a tabulation of the microseismic activity observed during the above period.

123. (1) HECK, N. H., "Some Joint Needs of Oceanography and Seismology in the Pacific Region," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 1*, 200-202, 1926.

The paper stresses the need of maps showing the configuration of the ocean bottom. USCGS+N.H.H.

123. (2) HECK, N. H., "Report on Network of Earthquake Observations of Countries Bordering the Pacific," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 2*, Section E, Article 1, 1486-1497, five maps, 1926.

The paper calls attention to changes made in the network of Pacific earthquake stations. The maps show the principal epicentres which have occurred beneath the sea in the Pacific region from 1904 to 1922, exclusive of 1912. Projected changes in the network are outlined. USCGS+N.H.H.

123. (3) HECK, N. H., "Transmission of Earthquake Waves Across the Pacific," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 2*, Section E, Article 5, 1504-1507, 1926. USCGS+N.H.H.

123. (4) HECK, N. H. and SERVICE, Jerry H., "Correct Values of the Velocity of Sound for Echo Soundings in the Pacific Ocean," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 1*, 202-204, 1926.

The paper gives an abstract of a paper by the same authors published as Special Publication No. 108 of the United States Coast and Geodetic Survey. USCGS+N.H.H.

124. HECKER, O., "Ergebnisse der Beobachtungen der mikroseismischen Bewegungen an den europäischen Stationen an vier Tagen des Winters 1911/12," *Beiträge zur Geophysik, 13* (Kleine Mitteilungen), 13-32, 1914.

125. HEILAND, C., "Geophysical Methods of Prospecting, Principles and Recent Successes," *Quarterly of the Colorado School of Mines, 24*, No. 1, 163 pages. Price \$1. March, 1929.

The Seismic Method is dealt with on pages 82-98. The author describes the method in a general way, indicates the areas in the United States and Mexico in which the seismic method has been known to have been used, reproduces some typical records obtained, lists the 70 salt domes which have been located by seismic methods, and discusses the depth which can be penetrated by the use of such methods, and the cost per acre to carry on the work. On page 86 he notes a third method developed by Prof. James Fisher to determine the depth of overburden in prospective dam sites, etc. This method appears to have great possibilities as the cost of surveying is greatly reduced.

126. HERITSCH, F., "Analogien im seismischen Verhalten der nordöstlichen Alpen und der West-Karpathen," *Geologische Rundschau, 10*, 118-125, 1920.

127. IMAMURA, Akitune, "On the Seismic Activity of Central Japan," *Japanese Journal of Astronomy and Geophysics, 6*, No. 2, 119-137, with 9 figures, Tokyo, 1928.

128. IMAMURA, Akitune, "On the Kurile Earthquake of January 13, 1929," *Proceedings of the Imperial Academy, 5*, No. 3, 133-135, Tokyo, 1929.

The author describes the records of the earthquake which occurred on the above date, at approximately $\phi=47^{\circ}\text{N.}$, $\lambda=155^{\circ}\text{E.}$ The records obtained on seismographs having a free period of more than a minute show well-marked movements, of period approximately one minute, which are not recorded on the instruments of shorter period.

129. IMAMURA, Akitune and NASU, Nobuji, "Supplement to the Report of the Network of Earthquake Observations in Japan. Synopsis of the Seismological Observatories of the Imperial Universities," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 2*, Section E, Article 3, 1498-1503, 1926.

The paper to which the above is a supplement is one by Shin'ichi Kunitomi on "Organization of the Seismic Observation in Japan," published by the Central Meteorological Observatory, Tokyo, October, 1926.

130. INGRAO, G., "Bollettino Sismico, Anno 1924," Real Ufficio Centrale di Meteorologia e Geofisica, 25 pages, Rome, 1928.
Fascicule 2, indicated above, deals with "Macrosismi." See index to Fascicule 1 as No. 103 of this list.
131. ISHIMOTO, Mishio, "Construction d'un pendule horizontal de quartz et observations sur les variations de l'inclinaison de la surface terrestre," *Japanese Journal of Astronomy and Geophysics*, 6, No. 2, 83-118, 16 figures, 4 tables, Tokyo, 1928.
132. ISHIMOTO, Mishio, "Sur le mécanisme de la production des ondes sismiques," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 127-147, March, 1929.
In Japanese with an abstract in French.
- ISHIMOTO, Mishio and SUYEHIRO, Kyoji, "On the Vibration of Low Monolithic Buildings." See No. 183 of this list.
133. (1) ISHIMOTO, Mishio and TUZI, Kōnosuke, "Variations diurnes de marche d'une horloge astronomique et leurs relations avec l'apparition des tremblements de terre," *Proceedings of the Imperial Academy*, 5, No. 1, 17-20, Tokyo, January, 1929.
133. (2) ISHIMOTO, Mishio and TUZI, Kōnosuke, "Monthly Means of the Daily Rates of the Riefler Clock in the Tokyo Astronomical Observatory and their Bearing on the Occurrence of Earthquakes," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 355-360, March, 1929.
134. KABURAKI, Tokio, "Effect of the Kwantō Earthquake upon Marine Organisms," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, 2, Section E, Article 12, 1523-1527, 1926. USCGS.
135. KOTÔ, Bundjiro, "The Iwatsuki Seismic Zone as a Factor of the Great Tokyo Earthquake of 1923," *Proceedings of the Imperial Academy*, 5, No. 3, 130-132, Tokyo, March, 1929.
136. LAMBERT, Walter D., "The Variations of Latitude, Tides and Earthquakes," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, 2, Section E, Article 10, 1517-1522, 1926. USCGS.
137. (1) LA NATURE SUPPLÉMENT, "L'aviation pendant le tremblement de terre du Japon," No. 2610, 113, April, 12, 1924.
137. (2) LA NATURE SUPPLÉMENT, "Les automobiles et le tremblement de terre du Japon," No. 2619, 185, June 14, 1924.
137. (3) LA NATURE SUPPLÉMENT, "Le tremblement de terre du Japon du 1^{er} septembre 1923," No. 2626, 33, August, 2, 1924.
137. (4) LA NATURE SUPPLÉMENT, "Tremblements de terre en Algérie," No. 2642, 161, November 22, 1924.
137. (5) LA NATURE SUPPLÉMENT, "Les tremblements de terre du 8 janvier 1925 dans la Côte-d'Or (Observations de M. Bidault de l'Ile)," No. 2655, 57, February 21, 1925.
137. (6) LA NATURE SUPPLÉMENT, "Un nouveau tremblement de terre au Japon," No. 2670, 177, June 6, 1925.
137. (7) LA NATURE SUPPLÉMENT, "Le tremblement de terre de Californie," No. 2675, 9, July 11, 1925.
138. MACHATSCHKE, F., "Eine neue geotektonische Theorie," *Petermanns Mitteilungen*, 74, Heft, 7-8, 197-199, 1928.

139. MACK, K., "Die Ermittlung der Herdentfernung eines Erdbebens mittels Oberflächenwellen," *Zeitschrift für angewandte Geophysik*, **1**, Heft 2, 39-42, December, 1922.
140. (1) MAINKA, C., "Über mikroseimische Bodenunruhe und Oberflächenwellen," *Physikalische Zeitschrift*, **14**, No. 12, 555-557, June 15, 1913.
140. (2) MAINKA, C., "Über die Häufigkeit einzelner Mi.U.-Perioden," *Physikalische Zeitschrift*, **14**, No. 25, 1285-1286, December 15, 1913.
141. MAINKA, C., "Ortsbestimmung von Erdbebengebieten mit Hilfe des Zeitunterschiedverfahrens und anderes," *Zeitschrift für angewandte Geophysik*, **1**, Heft 2, 43-56, December, 1922.
142. MARTEL, R. R., "The Southern California Council in Earthquake Protection," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section D, Article 1, 1433-1438, 1926.
The paper outlines the organization of the above-mentioned council—a body formed shortly after the Santa Barbara earthquake of 1925, through the initiative of Dr. Millikan.
143. MATSUZAWA, Takeo, "Preliminary Notes on the Transmission of Earthquake Waves across the Pacific," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 7, 1508-1509, 1926. USC&GS.
144. (1) MATSUZAWA, Takeo, "Observation of some Recent Earthquakes and their Time-distance Curves," (Part II), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 177-204, March, 1929.
The paper discusses the time-distance curves of the following earthquakes:—
(1) Etigo, October 27, 1927.
(2) Hokkaidô, February 4, 1926.
(3) Hokkaidô, July 13, 1927.
(4) Tango, March 7, 1927.
(5) Haneda, August 3, 1926.
(6) South-western Japan, June 5, 1926.
(7) Kii-Suidô, July 7, 1928.
It is fully illustrated.
144. (2) MATSUZAWA, Takeo, "Observation of Some Recent Earthquakes and Their Time-distance Curves," (Part III), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 205-212, March, 1929.
This paper summarizes the results outlined in the two first parts for the *P* phase.
144. (3) MATSUZAWA, Takeo, "Observation of Some Recent Earthquakes and their Time-Distance Curves," (Part IV), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 213-229, March, 1929.
This paper outlines the results obtained from the analyses in Parts I and II and having reference to the surface waves. The conclusions are as follows:—
"In this paper the real existence of two kinds of surface waves, that is Rayleigh waves and waves of Love's type, has been affirmed from the seismometrical point of view. Especially in the case of trans-Pacific waves from a remote origin, they can be distinctly identified. They both undergo dispersion of a certain character which is to be expected from the theory of elasticity, qualitatively, at least. From the dispersion of waves across the Pacific it would seem justifiable to assume that the superficial earth's crust under the Pacific also is stratified.
"Velocities of propagation of the *S*, *S** and \bar{S} waves determined in part II are quite consistent with the mode of dispersion of the waves of Love's type here obtained. Under the Pacific, however, it seems that the layer in which the velocity of propagation of the distortional movement is 3.15 km/sec. may be absent. Comparison of Fig. 5-a with

Fig. 6 will show that the thickness of the upper layer may be much less than 50 km. As the density of each layer is not known for certain, the author will not attempt to find, by arbitrarily adjusting the constants, a value for the thickness by means of which the observed dispersion might be explained in a plausible manner.

"It is also remarkable to note that the dispersion of trans-Pacific waves is different, quantitatively, from that of transcontinental waves, which difference would furnish plausible evidence for the existence of a different crustal stratification in both regions, as has been suggested by some European writers."

145. MEISZNER, O., "Über den Zusammenhang der mikroseismischen Bewegung mit meteorologischen Faktoren," *Beiträge zur Geophysik*, 13 (Kleine Mitteilungen), 204-209, 1914.
146. MENDEL, Henry, "Die seismische Bodenunruhe in Hamburg und ihr Zusammenhang mit der Brandung," 47 pages, 6 figures, 12 tables, Hamburg, 1929.
This paper is the author's doctorate thesis in the Faculty of Science and Mathematics of the University of Hamburg.
147. MEYERMANN, B., "Die Änderung der Rotationsgeschwindigkeit der Erde," *Naturwissenschaften*, 16, Heft 20, 353-354, 1928, and 16, Heft 24, 494, 1928.
A brief review by Güntherschulze is given in *Physikalische Berichte*, 9, Heft 19, 1818, October 1, 1928.
- MIYABE, Naomi and TERADA, Torahiko, "Experimental Investigations of the Deformation of Sand Mass by Lateral Pressure." See No. 188 of this list.
- MIYABE, Naomi and TERADA, Torahiko, "A Long Period Fluctuation in Latitude of the Seismic Activity on the Earth." See No. 189 of this list.
148. MOHOROVIČIĆ, A., "A Critical Review of the Seismic Instruments Used Today and of the Organization of Seismic Service," *Bulletin of the Seismological Society of America*, 14, No. 1, 38-59, March, 1924.
The changes in the seismic service within the past five years is quite forcibly brought home by a reading of this paper. Some of the criticisms, unfortunately, still apply.
149. (1) MONTESSUS de BALLORE, F., "Périodes de Brückner et tremblements de terre destructeurs," *Comptes rendus de l'Académie des Sciences de France*, 155, 379-380, Paris, July, 1912.
149. (2) MONTESSUS de BALLORE, F., "Tremblements de terre et taches solaires," *Comptes rendus de l'Académie des Sciences de France*, 155, 560-561, Paris, September, 1912.
149. (3) MONTESSUS de BALLORE, F., "Observations sismologiques faites à l'île de Pâques," *Comptes rendus de l'Académie des Sciences de France*, 155, 625-626, Paris, September, 1912.
149. (4) MONTESSUS de BALLORE, F., "Sur les tremblements de terre des provinces baltiques de la Russie (Esthonie, Livonie et Courlande)," *Comptes rendus de l'Académie des Sciences de France*, 155, 1200-1201, Paris, December, 1912.
150. MORISHITA, Masanobu, "Some Interesting Geological Features Observed on the Median Line of Southwest Japan," *Proceedings of the Imperial Academy*, 5, No. 1, 38-41, Tokyo, January, 1929.
- MUTO, K., UCHIDA, Y., and SAIDA, T., "An Investigation of the Vibration of a Steel Frame." See No. 194 of this list.
151. NAITO, Tachu, "Earthquake-proof Construction" (Abstract only), *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, 2, Section D, Article 5, 1474-1481, 13 illustrations, 1926. USCGS.
152. NAKANO, H., "Rayleigh Waves in Cylindrical Co-ordinates," *The Geophysical Magazine*, 1, No. 6, 255-303, Tokyo, September, 1928.

153. NASU, Nobuji, "On the Aftershocks of the Tango Earthquake," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 245-331, March, 1929.
In Japanese with a long abstract in English.
154. NASU, Nobuji, "On the Crustal Block that Played an Important Role in the Destructive Tango Earthquake of 1927," *Proceedings of the Imperial Academy*, 5, No. 4, 164-166, Tokyo, 1929.
- NASU, Nobuji and IMAMURA, Akitune, "Supplement to the Report of the Network of Earthquake Observations in Japan." See No. 129 of this list.
155. NEUMANN, Frank, "The Southern Appalachian Earthquake of November 2, 1928", *Bulletin of the Seismological Society of America*, 18, No. 4, 243-245, December, 1928.
The paper presents the results of a questionnaire campaign carried on by the United States Coast and Geodetic Survey. The origin indicated was northwest of Asheville, N.C., and close to the boundary between North Carolina and Tennessee.
156. (1) NIKIFOROV, P., "Reorganization of the Seismological Service of the U.S.S.R. on the Pacific," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, 2, Section E, Article 14, 1528-1529, 1926. USCGS.
156. (2) NIKIFOROV, P., "A New Seismograph of Short Reduced Length," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, 2, Section E, Article 15, 1529-1530, 1926.
The author describes a seismograph of very short reduced length, and points out that it was announced in 1924 previous to the publication by Wood and Anderson of the description of their torsion seismometer. He compares the two instruments as to freedom from horizontal displacements of the hanging weight and expresses the opinion that the Wood-Anderson seismograph is weaker than the Russian design in this regard.
- NISHIMURA, Genrokuro and SEZAWA, Katsutada, "Generation of Rayleigh Waves from an Internal Source of Multiplet Type." See No. 174 of this list.
- NISHIMURA, Genrokuro and SEZAWA, Katsutada, "Elastic Equilibrium of a Spherical Body under Surface Traction of a Certain Zonal and Azimuthal Distribution." See No. 175 of this list.
157. ODDONE, E., "Tremblements de terres et taches solaires," *Comptes rendus des Séances de la deuxième Réunion de la Commission permanente et de la première Association générale de l'Association internationale de Sismologie*, page 213, Strasbourg, 1908.
158. ODDONE, E., "Per l'interpretazione delle onde sismiche superficiali," *Atti della Reale Accademia Nazionale dei Lincei*, 8, Fascicoli 1-2, 64-70, 1928. USCGS.
159. (1) OMORI, F., "Preliminary Note on the Formosa Earthquake of March 17, 1906," *Bulletin of the Imperial Earthquake Investigation Committee*, 1, 53-69, Tokyo, 1907.
159. (2) OMORI, F., "Notes on the Secondary Causes of Earthquakes," *Bulletin of the Imperial Earthquake Investigation Committee*, 2, No. 2, 101-135, Tokyo, 1908.
159. (3) OMORI, F., "The Semi-destructive Earthquake of April 26, 1922," *Imperial Earthquake Investigation Committee, Seismological Notes*, No. 3, 1-30, Tokyo, December, 1922.
160. PIGOT, E. F., S. J., "Some Remarkable Seismograms from Pacific Epicentres," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, 2, Section E, Article 13, 1527, 1926.

Only the abstract appears, which reads as follows: "Out of a large number of Pacific seismograms obtained at Riverview Observatory, near Sydney, from 1909, March, to date, a few have been selected exhibiting certain characteristics which seem of considerable interest. Among these are:—

"(1) The existence of certain wave-forms, apparently not yet published as having been observed.

"(2) Divergence in wave-length for corresponding phases.

"(3) Large amplitude of iP wave-front, and consequent accuracy in azimuth determination by Galitzin method.

"A brief description of instrumental equipment at Riverview is added."

In the same volume of the Proceedings, Father Pigot is reported as having presented a "Note on Sub-oceanic Wave-velocities in Pacific Region" (Vol. 2, page 1507). The abstract alone appears, as follows: "Evidence is adduced from large earthquakes (in the New Guinea region especially) supporting the Angenheister contention of increased velocity of surface-waves under oceanic areas."

161. REID, Harry Fielding, "Note on Surface Earthquake Waves," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 2*, Section E, Article 16, 1531-1533, 1926. USCGS.
162. REID, Harry Fielding, "The Advance of an Earthquake Disturbance," *Terrestrial Magnetism* 33, No. 3, 148, 1928.
163. RENQUIST, Henrik, "Über kartographische Darstellung der Seismizität," *Zeitschrift für Geophysik*, 4, Heft 7-8, 348-352, 1928.
164. ROTHÉ, E., "Summary of the Note Presented to the Pan-Pacific Congress of October, 1926," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 2*, Section E, Article 8, 1926. USCGS.
165. RUAÑO, Roque (Rev.), "How Earthquakes Affect Different Types of Structures and the Means by which such Structures, Especially Their Foundations, May be Protected Against Earthquakes" (Summary only), *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 2*, Section D, Article 3, 1460, 1926. USCGS.
166. RUDOLPH, O. C., "Recording Vibration Meter," *Instruments*, 2, No. 3, 103-104, March, 1929.
The instrument as described does not seem to be astatic. While it is said to be modeled on the Wiechert vertical component seismograph, it seems to omit the most essential element of that instrument. J.B.M.
167. RUDSKI, M. P., "Über die Bewegung des horizontalen Pendels," *Gerland's Beiträge zur Geophysik*, 6, 138-155, 1904. P.B.
- SAIDA, T., MUTO, K., and UCHIDA, Y., "An Investigation of the Vibration of a Steel Frame." See No. 194 of this list.
168. SAITA, Tokitaro, "Earthquake-proof Construction in Japan," *Proceedings of the Third Pan-Pacific Science Congress. Tokyo, 2*, Section D, Article 2, 1438-1459, 1926.
This is a most valuable summary of the papers published in Japan on the above subject. Brief abstracts are given of the more important papers. The data obtained are presented in condensed form.
169. SANO, Riki, "Notes on Earthquake-proof Building Construction," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo, 2*, Section D, Article 4, 1461-1473, 1926.

This paper is a valuable tabulation of regulations which have been found useful in reducing the damage to buildings in earthquake areas. The regulations are listed under the following headings:—

- (1) Building Site and Foundation.
- (2) Brickwork.
- (3) Steel Skeleton Construction.
- (4) Reinforced Concrete Construction.
- (5) Wooden Frame Construction.

A total of sixty concise specifications are listed in this article. It is illustrated by means of twenty text-figures.

170. SARNETZKY, Heinrich, "Grundzuge der Luft- und Erdbildmessung," Gebrüder Borntraeger, Sammlung Borntraeger, 14, 236 pages, 117 figures, 4 tables. Berlin, 1928.

A beautifully printed, fully illustrated presentation of the theory and practice of aerial surveying and mapping. This book should prove of interest and value to those investigating field conditions after an earthquake by means of aerial photographs.

171. SCHWINNER, Robert, "Zur Deutung der Transversalbeben in den nordöstlichen Alpen," *Zeitschrift für Geophysik*, 5, Heft 1, 16-31, 1929.

- SERVICE, Jerry H. and HECK, N. H., "Correct Values of the Velocity of Sound for Echo Soundings in the Pacific Ocean." See No. 123 (4) of this list.

172. SEZAWA, Katsutada, "Formation of Deep-water Waves due to Subaqueous Shocks," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 19-46, March, 1929.

The author summarizes his results as follows:—

"(1) In spite of very small displacements of the compressional waves in the neighbourhood of the origin in the interior of the water, the excited surface waves have relatively large amplitudes.

"(2) The generated surface waves are chiefly the ordinary gravity waves having the same frequency as that of the origin together with their wave length proper to the period.

"(3) The distribution of the wave motion on the surface of water always conspires with the modes of oscillation at the origin.

"(4) This fails in a three-dimensional case where a doublet oscillates horizontally. In this, notwithstanding the maintenance of the natures of the vertical and the horizontal components of displacement in wave profile and in azimuthal distribution, the azimuthal component of displacement quickly disappears as the distance from the disturbed portion is increased."

173. SEZAWA, Katsutada, "Further Studies on Rayleigh-waves having Some Azimuthal Distribution," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 1-18, March, 1929.

The author's summary is as follows:—

"(1) Rayleigh-waves having azimuthal distribution can be transmitted on the surface of a semi-infinite solid or a spherical surface without diffusion of displacements in each wave front.

"(2) Though in the case of the propagation of Rayleigh-waves on plane surface the nature of the vertical and the horizontal components of displacement in wave profile and in azimuthal distribution is maintained for all distances, the azimuthal component of displacement quickly disappears as the distance from the origin increases, showing the nature quite different from the bodily elastic waves.

"(3) The law of pull and push is applicable even to the surface waves, with the condition that the azimuthal component is out of consideration. This law is also valid in the case of the transmission of waves caused by the arbitrary disturbance.

"(4) When the disturbance acts on an interior point of the body the azimuthal distribution of displacement on the surface is in conformity with the motion of the source to a certain extent.

"(5) Even at the equatorial circle of the sphere long Rayleigh-waves as affected by the curvature of the surface have the azimuthal and the ordinary components of comparable magnitudes; in the vicinity of the seismic pole these waves have the large azimuthal component compared with the vertical and the radial components.

"(6) Short waves show the nature of giving the large azimuthal component only in very vicinity of the seismic epicentre."

174. SEZAWA, Katsutada and NISHIMURA, Genrokuro, "Generation of Rayleigh Waves from an Internal Source of Multiplet Type," *Proceedings of the Imperial Academy*, 5, No. 2, 75-77, Tokyo, February, 1929.
175. SEZAWA, Katsutada and NISHIMURA, Genrokuro, "Elastic Equilibrium of a Spherical Body under Surface Traction of a Certain Zonal and Azimuthal Distribution," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 47-62, March, 1929.
176. SHIDA, Toshi, "On the Elasticity of the Earth and the Earth's Crust," *Memoirs of the College of Science and Engineering, Kyoto Imperial University*, 4, No. 1, 112, 1912.
177. SIMMONS, W. C., "The East African earthquake of January 6, 1928," *Nature*, No. 3056, 121, 844, 1928.
178. SKUTSCH, Rudolf, "Über Apparate zur Aufzeichnung von Bewegungen," *Glassers Annalen*, 103, No. 9, 109-113, 1928.
An abstract appears in *Physikalische Berichte*, 10, No. 4, 347, February, 1929. J.B.M.
179. SOHON, F. W., S. J., "A Graphical Determination of the actual amplitude of the Earth's Motion from Seismological Data," *Bulletin of the Seismological Society of America*, 14, No. 3, 185-196, September, 1924.
180. SPIESS, Commandant, "Note sur le tremblement de terre de Provence du 11 juin 1909," *Comptes rendus, Congrès de Sociétés savantes, Poitiers*, 1926.
181. SUYEHIRO, Kyoji, "A Device for Preventing the Instability of Horizontal Seismometers," *Proceedings of the Imperial Academy*, 4, No. 10, 597-699, Tokyo, December, 1928.
182. SUYEHIRO, Kyoji, "On the Damped Transversal Vibration of Prismatic Bars," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 63-70, March, 1929.
183. SUYEHIRO, Kyoji and ISHIMOTO, Mishio, "On the Vibration of Low Monolithic Buildings," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, 2, Section D, Article 6, 1482-1486, 1926. USCGS.
184. TAKAHASHI, Ryûtarô, "Tilting Motion of the Earth Crust Caused by Tidal Loading," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 6, 85-108, March, 1929.

His summary reads:—

"(1) The tilting of the earth crust near a sea shore follows quite faithfully the ebb and flood of the oceanic tides. At Aburatubo a rise of sea water by 34 cm. produces a tilting of 0".22 at a point of 23 metres apart from the beach line.

"(2) Almost the whole of the observed amount of tilting may be explained by the effect of the tidal loading. The deflections of the tiltmeter from the other possible causes are all less than the order of 0".01.

"(3) Even the small secondary undulations of tides or the seiches in the Aburatubo Bay produce a sensible tilting of the ground.

"(4) Neither Boussinesq's solution nor any other known is not fitted for the present case. Shida's postulate of increase of the effective rigidity of the earth crust with distances does not hold good in this case.

"(5) The most plausible way of explaining the tilting phenomena seems to be of assuming a sudden jump in the value of the effective rigidity of the crust at a distance of about 150 metres from the observing station, taking for the rigidity of the earth crust within the distance of the discontinuity that of the rock underlying the observing station and for the effective rigidity of the crust beyond the discontinuity one of the order of 10^{11} c.g.s."

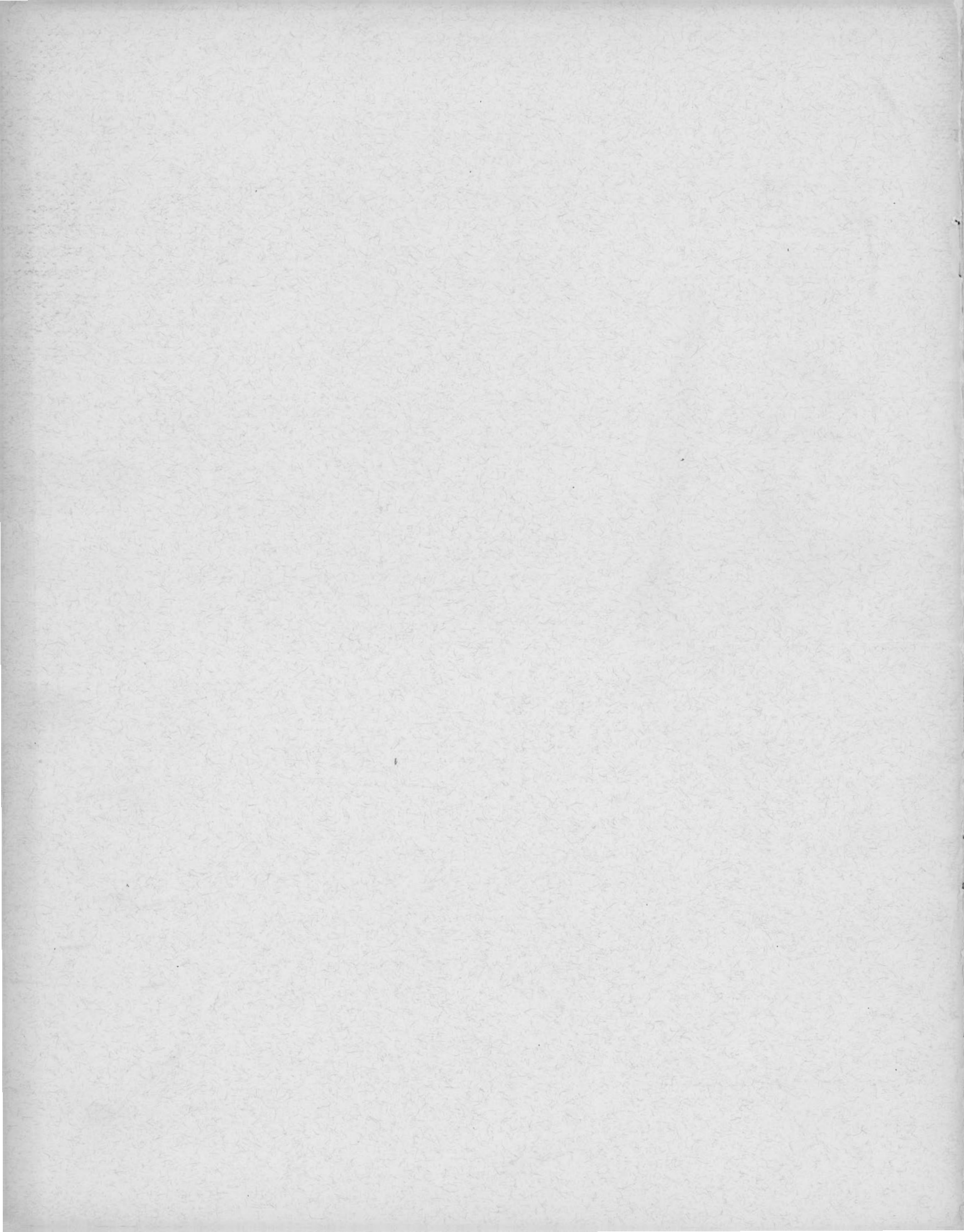
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 6. Abnormal Distribution of Seismic Intensity.
 7. (P-S) Wave.
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 9. Deep Earthquakes.
 - III. On the Deep Earthquake of July 27th, 1926.
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 11. Epicenter.
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 13. Determination of Depth of Focus.
 14. Numerical Calculations.
 15. Discussion on the Calculation.
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 - IV. The Deep Earthquake Zone and Other Problems.
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R.H.F.

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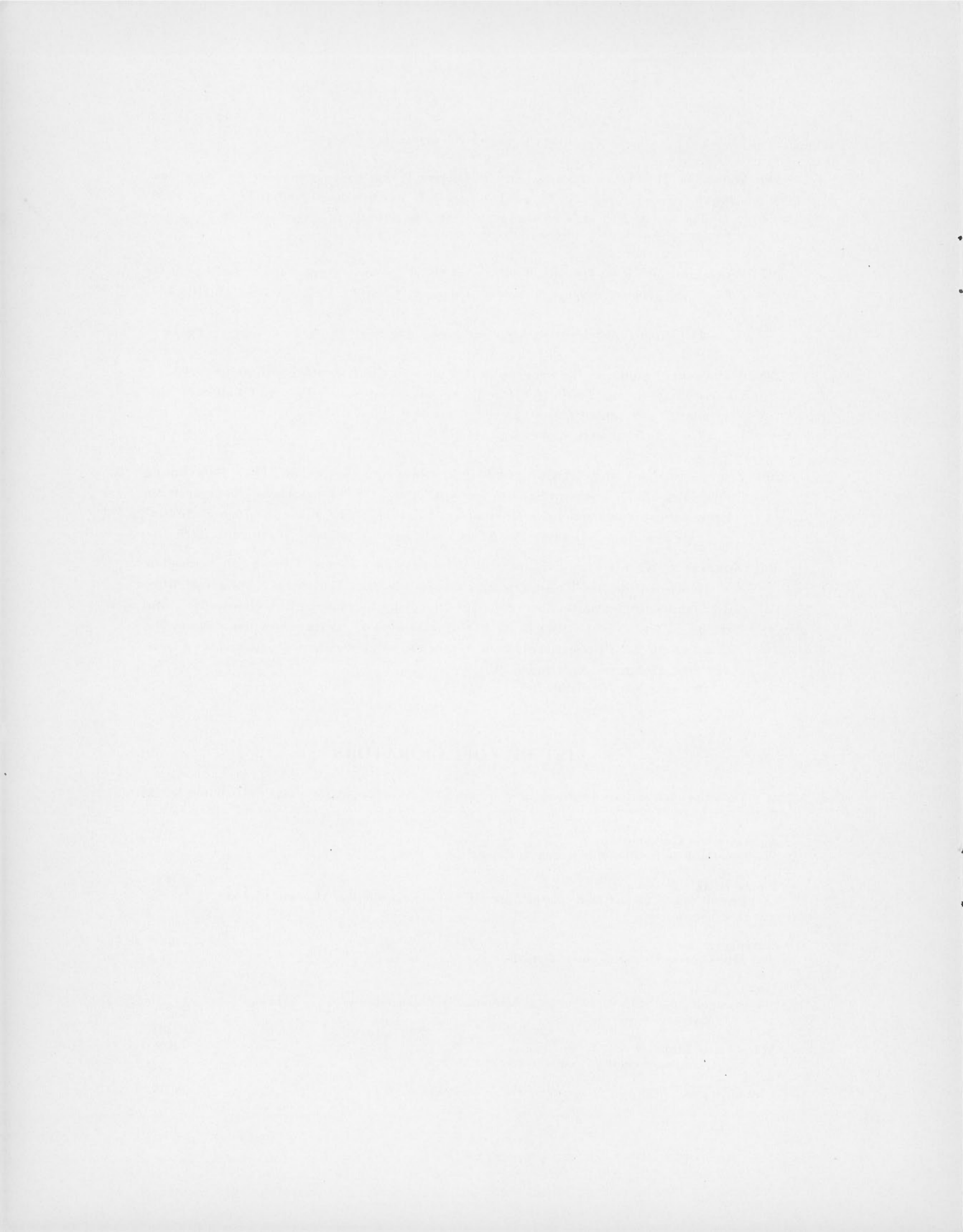
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See also No. 229 of this list.

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- FINCH, R. H. and JAGGAR, T. A., "Tilt Records for Thirteen Years at the Hawaiian Volcano Observatory." See No. 346 of this list.
330. GELLA, Norbert, "Elektrische Untersuchungen auf Ölfeldern von Texas," *Petroleum*, 23, No. 21, 4, Berlin, 1927.
An abstract appears in *Geologisches Zentralblatt*, 38, No. 8, 372, Leipzig, January 15, 1929. J.B.M.+O.P.R.O.
331. GENTRY, Frank M., "The Internal Temperature of the Earth's Crust," *Science*, No. 1814, 70, 332-334, New York, October 4, 1929.
332. GUTENBERG, B., "Theorie der Erdbebenwellen," Gebrüder Borntraeger (Handbuch der Geophysik, 4, Lieferung 1), 298 pages, 146 text-figures, 85 tabulations. Price RM 30. Berlin, 1929.
The Handbuch der Geophysik, published by Borntraeger is to be edited by Prof. Gutenberg. Lieferung 1 of Band 4, is the first section to appear. It is proposed to complete this Band and begin the issue of Band 6, at an early date. The above presentation, written by Gutenberg, is a most important contribution to seismological literature. His discussion of the theory of seismic waves is brought up to date including the contributions of Uller and Sezawa. The Lieferung is divided into three sections as follows: (1) Theorie der Erdbebenwellen, (2) Beobachtungen von Erdbebenwellen, (3) Die seismische Bodenunruhe.
333. HEILAND, C. A., "Annotated Bibliography of Geophysical Prospecting" (pages 272-331 of the Annotated Bibliography of Economic Geology for 1928), Economic Geology Publishing Co., 1, Nos. 1 and 2, Manchester, Pa., July, 1929.
The Annotated Bibliography of Economic Geology is compiled under the auspices of the National Research Council (Washington). The subscription price (for 1928 issue) is \$5. The Annotated Bibliography of Geophysical Prospecting, prepared by Dr. Heiland of the Colorado School of Mines, lists 224 items, giving for most of them an outline of the scope of the papers respectively designated.
This bibliography meets a most definite demand for a comprehensive list of the growing numbers of papers dealing with geophysical prospecting. C.A.H.+O.P.R.O.+E.A.H.
- HEILAND, C. A., "Modern Instruments and Methods of Seismic Prospecting." See No. 304 of this list.
334. HERGLOTZ, G., "Über das Benndorfsche Problem der Fortpflanzungsgeschwindigkeit der Erdbebenstrahlen," *Physikalische Zeitschrift*, 8, 145-147, Leipzig, 1907.
In connection with the same subject see papers by Wiechert and Geiger (No. 293 of these lists) and by Bateman (No. 306 of this list).
335. HILLER, Wilhelm, "Die Herdform des Schwäbischen Bebens am 30. August 1928," *Beiträge zur Geophysik*, 22, Heft 1-2, 103-114, Leipzig, 1929.
The author's abstract reads: "From the records obtained at six next and most favourably situated stations—the times of \bar{P} - and \bar{S} -wave have an accuracy of some tenths of seconds—results the focus cannot have the form of a "point," but must have a certain length. The form of a "point" would only be possible, if the azimuthal velocity of \bar{P} and \bar{S} was different; but that is not in accordance with former observations made at earthquakes in Southern Germany. The length of the focus-line was found to be about 19 kilometers, the breadth can be practically neglected; the depth of the focus lies between 10 and 25 kilometers. Also the form of the interior isoseists suggests a like focus-line."

336. HYDROGRAPHIC DEPARTMENT, IMPERIAL JAPANESE NAVY, "Searches for the 'Hyūga' Reef," *Suiko Yōhō (Hydrographic Bulletin)*, 7, 49-56, Tokyo, 1928.

A review signed S. Ogura appears in the *Japanese Journal of Astronomy and Geophysics*, 7, No. 1 (4), Tokyo, 1929. The original paper is in Japanese, the review (presenting the more important data in concise form) is in English.

337. IKEBE, Tsuneto, "Galvanometer Coil with Maximum Sensitivity," *Proceedings of the Imperial Academy*, 2, No. 4, 163-166, Tokyo, 1926.

338. IMAMURA, Akitune, "On the Chronic and Acute Earth-tiltings in the Kii Peninsula," *Japanese Journal of Astronomy and Geophysics*, 7, No. 1, 31-45, Tokyo, 1929.

The author introduces his paper thus: "As the writer has discussed elsewhere, the seismicity of the southern part of Central Japan has, during the last six hundred years, recurred with an average period of about one hundred and twenty-three years. Fully seventy-five years having now elapsed since the culmination of the last activity of 1854, and assuming that the cycle is to be repeated, the urgent need of taking advantage of the present for devising ways and means of meeting the contingency in order to render the occurrence comparatively harmless, can scarcely be gainsaid. A step in this direction lies in the careful and unrelaxing study of conditions as may be observed in the regions concerned, that is to say, of topographical changes going on as the result of earth-tiltings, both chronic and acute."

339. IMAMURA, Akitune, "Chronic Earth-tilting in the Kii Peninsula: An Indication of the Accumulation of Seismogenic Forces," *Proceedings of the Imperial Academy*, 5, No. 4, 161-163, Tokyo, April, 1929.

340. IMAMURA, Akitune, KISHINOUE, Fuyuhiko, and KODAIRA, Takeo, "The Effect of Superficial Sedimentary Layers upon the Transmission of Seismic Waves," *Proceedings of the Imperial Academy*, 5, No. 5, 206-209, 2 tables, 4 text figures, Tokyo, 1929.

The author examines the factor K of the empirical formula of Omori ($D = KT$) for near quakes, where D is the distance of the seismic focus from a station and T the duration of the preliminary tremors at the said station. He treats K as a function of the transit velocities of the dilatational and distortional waves (hence of the focal depth) and, assuming the crustal formation of Matuzawa for the Kwanto district, tabulates the values of K for values of D from 0 to 150 km. and for various focal depths up to 100 km.

341. INGLADA ORS, V., "Nota acerca del cálculo de la profundidad del foco sísmico por el procedimiento S. Mohorovičić y otros analogos, basados en los sismogrammas registrados en las estaciones próximas," *Revista de la Real Academia de Ciencias exactas, físicas, y naturales, de Madrid*, 24, 9-18, 1928.

342. INGLADA ORS, V., "Cálculo de las coordenadas del foco y del instante inicial de un sismo por medio de las horas de las ondas \bar{S} registradas en las estaciones próximas," *Revista de la Real Academia de Ciencias exactas, físicas, y naturales, de Madrid*, 24, 175-201, 1928.

343. INOUE, Win., "Statistical Regularities regarding the Altitudes of Mountain Ranges and the Amounts of Dislocations of the Earth's Surface," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 153-173, June, 1929.

In Japanese with a one-page résumé in English, the first paragraph of which reads: "The present author investigated the statistical distribution of the altitudes of mountain ranges and the amounts of dislocations of the earth's surface and found some regularities existing among them. A brief summary of the results obtained is given in the following lines with some discussions."

344. ISHIMOTO, Mishio and TAKAHASI, Ryûtarô, "Measures des mouvements d'un bâtiment dans des conditions tranquilles," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 175-184, June, 1929.
345. JACOBSEN, Lydik S., "Vibration Research at Stanford University," *Bulletin of the Seismological Society of America*, 19, No. 1, 1-27, Stanford, March, 1929.
346. JAGGAR, T. A. and FINCH, R. H., "Tilt Records for Thirteen Years at the Hawaiian Volcano Observatory," *Bulletin of the Seismological Society of America*, 19, No. 1, 38-51, Stanford, March, 1929.
- The authors terminate the paper with a summary of the conclusions, listed under nine divisions. It may be noted here that seasonal tilts, of twenty seconds or more in a half-year, vary with air temperature; that there is practically no correlation between tilt and rainfall; and that there is perfect correlation between Kilauea lava movement and Mauna Loa lava movement, whenever Kilauea lava pit is not sealed. The correlation between the tilting and the lava movements is traced in the concluding summary.
347. JÉLÉNKO, M., "Tremblements de terre de Bulgarie en 1928: Situation géologique des régions dévastées et dislocations diverses," *Comptes rendus de l'Académie des Sciences*, 186, No. 25, 1741-1743, Paris, 1928.
348. JOERG, Wolfgang L. G., "On the Proper Map for Determining the Location of Earthquakes," *Annals of the Association of American Geographers*, 2, 2 pages, 1 figure, 1 plate, 1913.
- The author advocates the use of a map of the world on the stereographic projection, with the station as the pole of projection.
349. KELLY, Sherwin F., "Principles of Geophysical Prospecting," *Engineering and Mining Journal*, 17, 449-452, New York, September, 1928.
- An abstract appears in *Geologisches Zentralblatt*, 38, No. 2, 63, Leipzig, October 15, 1928. J.B.M.
- KEYS, D. A. and EVE, A. S., "Geophysical Methods of Prospecting: Demonstration and Discussion on Geophysical Methods of Prospecting." See No. 328 of this list.
- KEYS, D. A. and EVE, A. S., "Applied Geophysics in the Search for Minerals." See No. 329 of this list.
- KISHINOUE, Fuyuhiko, KODAIRA, Takeo, and IMAMURA, Akitune, "The Effect of Superficial Sedimentary Layers upon the Transmission of Seismic Waves." See No. 340 of this list.
350. KITHIL, Karl L., "Prospecting with Artificial Earthquakes," *Scientific American*, 508-511, illustrations, New York, June, 1929.
351. KNOTT, C. G., "Earthquakes and Earthquake Sounds," *Transactions of the Seismological Society of Japan*, 12, 115-136, Yokohama, 1888.
352. KNOTT, C. G., "Seismic Radiations" (Parts I and II), *Royal Society of Edinburgh*, Session 1907-08, 217-230: Session 1908-09, 23-37.
- KODAIRA, Takeo, IMAMURA, Akitune, and KISHINOUE, Fuyuhiko, "The Effect of Superficial Sedimentary Layers upon the Transmission of Seismic Waves." See No. 340 of this list.

353. LACOSTE, J., "Le mouvement microsismique à Strasbourg," *Revue générale des Sciences*, 590, Paris, 1924.
354. LAMBERT, WALTER D., "The Importance from a Geophysical Point of View of a Knowledge of the Tides in the Open Sea," Reprinted from *Bulletin No. 11, de la Section d'Océanographie du Conseil international de Recherches*, 11 pages, Venezia, 1928.
- The author's introduction concludes as follows: "The purpose of this note, however, is not to insist on a knowledge of tides in midocean from the purely oceanographic point of view, but rather to emphasize the desirability of this knowledge for two geophysical purposes that are not primarily oceanographic at all, namely: (1) the problem of the earth tides and (2) the problem of tidal friction and the apparent secular acceleration of the moon. Furthermore one way is suggested in which some knowledge of tides at sea could be gained."
355. LAND SURVEY DEPARTMENT, IMPERIAL JAPANESE ARMY, "Revision of the Primary Trigonometrical Survey in Tango Earthquake Districts," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 187-191, June, 1929.
356. LEE, Frederick W., "Geophysical Abstracts," United States Bureau of Mines, Washington. No. 1 (Circular 6120), May, 1929; No. II (Circular 6133), May, 1929; No. III (Circular 6154), July, 1929.
- The publication appears as an "Information Circular" in mimeographed form. The reference to each item is, as a rule, unusually comprehensive and informing. The preface to the first issue is written by Scott Turner, Director of the Bureau of Mines. It reads as follows: "This paper is the first of a contemplated series which will contain abstracts of current articles and publications dealing with applied geophysics. The abstracts will be prepared, for the most part, by officials and engineers of mining and exploration companies, in cooperation with the United States Bureau of Mines. It is believed that useful and timely information dealing with the science of applied geophysics can thus be adequately presented. The bureau plans, if possible, to procure the original papers from which these abstracts are prepared and to assist those who may be interested in obtaining translations or photostat copies." I.B.C.
357. LINKE, F., "Die Brandungsbewegungen de Erdbodens und ein Versuch ihrer Verwendung in der praktischen Meteorologie. Ergebnisse der Arbeiten des Samoa-Observatoriums III," *Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen, Mathematisch-physikalische Klasse*, Neue Folge, 7, No. 3, 1909.
358. MAHER, Thomas J., "The United States Coast and Geodetic Survey—Its Work in Collecting Earthquake Reports in the State of California," *Bulletin of the Seismological Society of America*, 19, No. 2, 77-79, Stanford, June, 1929.
359. MASCART, J., "La lune et les tremblements de terre," *Revue générale des Sciences*, 386, Paris, 1924.
360. MATUYAMA, Motonori, "On the Direction of Magnetisation of Basalt in Japan, Tyôsen and Manchuria," *Proceedings of the Imperial Academy*, 5, No. 5, 203-205, Tokyo, May, 1929.
361. MAURAIN, Ch., "Les frémissements de la terre," *Science et Vie*, No. 112, 269, Paris, October, 1926.

362. MEISSER, O., "Beiträge zu einer experimentellen Seismik," *Veröffentlichungen der Reichsanstalt für Erdbebenforschung in Jena*, Heft 9, 77 pages, 68 text-figures, Jena, 1929.

The paper is, as indicated, one of the series of geophysical papers issued from Jena, under the general editorship of Prof. Hecker. The author first presents the theory underlying the propagation of earth waves for conditions such as would obtain in geophysical prospecting. He then deals with the instruments to be employed in seismic surveying, together with the evaluation of their records, and outlines methods to be followed. The many illustrations are beautifully clear. The presentation is orderly, detailed, and comprehensive.

363. MENGEL, Octave, "Étude de la séismotectonique des Pyrénées et des Alpes occidentales," *Union géodésique et géophysique internationale, Section de Séismologie, Publications du Bureau central séismologique international*, Série B, Monographies, Fascicule No. 3, 3-74, Strasbourg, 1929.

364. MIHAILOVIĆ, J., "Annuaire séismique," *Publications de l'Institut séismologique de l'Université de Beograd*, Série A (Observations), Fascicule 3, 71 pages, Belgrade, 1928.

— MILNER, H. B. and RAEBURN, C., "Alluvial Prospecting." See No. 374 of this list.

365. MIYABE, Naomi, "On the Fluctuation of the Zone of Macroseismic Activity in the Pacific Ocean," *Proceedings of the Imperial Academy*, 5, No. 6, 243-245, Tokyo, June, 1929.

— MIYABE, Naomi and TERADA, Torahiko, "Experimental Investigations of the Deformation of Sand Mass, Part III." See No. 388 of this list.

366. MYRBACH, O., "Die bebenauslösende Wirkung der Sonnenflecken, gezeigt an der sogenannten elfjährigen Periode," *Zeitschrift für Geophysik*, 4, Heft 7-8, 413-416, Göttingen, 1928.

367. NASU, Nobuji, "Further Study of the Aftershocks of the Tango Earthquake," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 133-152, June, 1929.

The paper is in Japanese with a one-page résumé in English. The legends of the eight illustrations are in both languages.

368. NEUMANN, Frank, "The Velocity of Seismic Surface Waves over Pacific Paths," *Bulletin of the Seismological Society of America*, 19, No. 2, 63-76, Stanford, June, 1929.

— NISHIMURA, Genrokuro and SEZAWA, Katsutada, "Generation of Rayleigh-waves from an Internal Source of Multiplet Type." See No. 382 of this list.

369. OMURA, Hitoshi, "Horizontal Displacements of the Primary and Secondary Triangulation Points, Observed after the Earthquake of March 7, 1927, in Tango Districts. The Second Report," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 185-186, with map, June, 1929.

370. ORLOFF, A., "Sur la rigidité de la terre d'après les observations faites à Paris avec des pendules horizontaux," *Odessa, Chambre des Poids et Mesures de l'Ukraine, Recueil des Travaux gravimétriques*, 2, 1-3, 1928.

371. PÉNTCHEFF, N. P., "Les gaz rares des sources thermales et les grands tremblements de terre des 14 et 18 avril 1928 en Bulgarie," *Comptes rendus de l'Académie des Sciences*, 187, No. 4, 243-244, Paris, 1928.
372. PLANIOL, R., "Sur un pendule très peu amorti," *Comptes rendus de l'Académie des Sciences*, 187, No. 21, 933-935, Paris, 1928.
373. PROVIERO, A., "Sul funzionamento ed uso di alcuni strumenti sismiche," *Bollettino della Società sismologica italiana*, 25, Fascicolo 1-2, Rome, 1924-25.
374. RAEBURN, C. and MILNER, H. B., "Alluvial Prospecting" (Foreword by J. D. Falconer), D. Van Nostrand and Co., 478 pages, 32 plates, 139 figures. Price \$14. London and New York, 1927.
- A brief review, signed W. A. W., appears on pages 95-96, *Journal of Geology*, 37, No. 1, Chicago, January-February, 1929.
375. RENIER, A., "Les tremblements de terre envisagés comme les manifestations les plus récentes de phénomènes de plissement du sol belge," *Comptes rendus des Congrès de l'Association française pour l'Avancement des Sciences, Liège*, 382, 1924.
- RIEBER, Frank, "Adaptation of Elastic-wave Exploration to Unconsolidated Structures." See No. 304 of this list.
376. ROTHÉ, E., "Les tremblements de terre récents et l'état actuel de la séismologie," *Scientia*, 37, No. 151, 87, Milan, 1925.
377. SCIENTIFIC AMERICAN, "Amateur Seismology," *Scientific American*, 141, No. 5, 411-413, New York, November, 1929.

The article serves to open a campaign to enlist the interest of the amateur scientist in the study of earth-tremors. It presents an outline of the field in which their co-operation would be particularly useful and describes a simple seismometer which has been designed by Dr. Jaggar of the Hawaiian Volcano Observatory, and which may be constructed for about twenty-five dollars.

378. SEIDL, Erich, "Ableitung der Knick- bzw. Biege-Form in Technik und Geologie aus ihren Elementen; Anwendung auf den Alpen-Bogen," *Gerlands Beiträge zur Geophysik*, 22, Heft 1-2, 175-202, Leipzig, 1929.

The author's abstract reads: "In some much-disputed areas of disturbance of the earth's crust the tectonic processes may be reduced to a simple form by comparing them with analogous forms of disturbance known to mechanics.

"In order to derive the flexure or bending forms in mechanics and geology from their elements, first of all the definitions of the forms of the disturbance resulting from the strain of thrust, tension, pressure, bending and flexing are given; the deformation being constant. The geological forms of disturbance—displacements, overthrust-faults, ditch-fractures, 'horste' and folds—are reduced to the above-mentioned mechanical forms of disturbance.

"The Alps are chosen as an example to show the importance of this geometrical method serving to explain mountain formation.

"The Alp-curve originates from flexure strain (seen in horizontal projection); in consequence of pressure west-east and vice-versa. On the concave (southern) side forms of excessive pressure predominate; on the convex (northern) side forms of disruption.

"The flexure of the Alps northward means thrust.

"The upheaval of the Alps, combined with the curve-formation, results from a strain caused by bending (seen in cross-section).

"The eruption of magma in the core zone of the Alps may be regarded from the point of view of a flow process."

379. SEZAWA, Katsutada, "Propagation of Rayleigh-waves in Two Dimensions," *Proceedings of the Imperial Academy of Japan*, 2, No. 7, 314-317, Tokyo, July, 1926
J.B.M.
380. SEZAWA, Katsutada, "The Tilting of the Surface of a Semi-infinite Solid due to Internal Nuclei of Strain," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 1-14, June, 1929.
381. SEZAWA, Katsutada, "Formation of Shallow-water Waves Due to Subaqueous Shocks," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 15-40, June, 1929.
The paper deals with the subject under four divisions as follows:—
Part I. Waves due to Bottom Pressure.
Part II. Waves due to Bottom Pressure in a Shallow-sea of Moderate Depth.
Part III. The Effect of the Inertia of the Subaqueous Medium.
Part IV. Waves due to Subaqueous Pressure at an Intermediate Depth.
382. SEZAWA, Katsutada and NISHIMURA, Genrokuro, "Generation of Rayleigh-waves from an Internal Source of Multiplet-type," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 41-64, June, 1929.
383. STINY, Josef, "Das Erdbeben von Schwadorf, N. Ö.," *Matériaux pour l'Étude des Calamités*, No. 18, 130-132, Geneva, July-September, 1928.
384. STÖLTING, W., "Kontinentalverschiebung und Gebirgsbildung," *Gerlands Beiträge zur Geophysik*, 22, Heft 1-2, 203-204, Leipzig, 1929.
385. TABER, Stephen, "Frost Heaving," *Journal of Geology*, 37, No. 5, 428-461, Chicago, July-August, 1929.
386. TAKAHASI, Ryûtarô, "Tilting Motion of the Earth Crust Caused by Secondary Undulations of Tides in a Bay," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 95-102, June, 1929.
- TAKAHASI, Ryûtarô and ISHIMOTO, Mishio, "Mesures des mouvements d'un bâtiment dans des conditions tranquilles." See No. 344 of this list.
387. TAMS, E., "Zur Auffindung des tungusischen Riesenmeteors vom 30. Juni 1908," *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, No. 3-4 (Kleine Mitteilungen), 143-145, 1929.
388. TERADA, Torahiko and MIYABE, Naomi, "Experimental Investigations of the Deformation of Sand Mass, Part III," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 65-93, June, 1929.
389. TSUBOI, Chûji, "Block Movements as Revealed by Means of Precise Levellings in Some Earthquake Districts of Japan," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 103-114, 4 coloured plates, June, 1929.
390. TURNER, H. H., "On a Method of Solving Spherical Triangles and Performing Other Astronomical Computations by Use of a Simple Table of Squares," *Monthly Notices of the Royal Astronomical Society*, 75, No. 7, 530-541, London, May, 1915.

The author says, "The following method has been found to facilitate the calculation of distances of seismological observing stations from a given epicentre, and seems to be capable of a wider extension." From time to time Prof. Turner has published lists of constants for various seismological stations to enable them to use the method outlined in this paper.

391. TURNER, H. H., "Note on the 240-Year Period in Chinese Earthquakes in the Light of Dr. Fotheringham's Paper," *Monthly Notices, Royal Astronomical Society*, **80**, No. 6, 617-619, London, April, 1920.
392. ULLER, Karl, "Indirekte Induktion elastischer Planwellen an der Grenze zweier fester, isotroper, schwereloser, und ruhender Mittel," *Gerlands Beiträge zur Geophysik*, **21**, Heft 2-3, 313-343, Leipzig, 1929.
393. WALKER, G. W., "Graphical Construction for the Epicentre of an Earthquake," *Meteorological Office Observatories, Geophysical Memoirs*, No. 3, 53-54, 1 plate, London, 1912.
394. WEICKMANN, L., "Der Umbau des Leipziger Seismographen und die in dem Jahren 1925, 1926 und 1927 aufgezeichneten Erdbeben," *Sächsischen Akademie der Wissenschaften zu Leipzig, Mathematisch-physikalische Klasse*, **80**, 385-496, 4 text-figures, 11 pages of reproduction of seismograms, 1929.

The bulk of the book is taken up with the tabular report on the seismograms registered at the Geophysical Institute at Leipzig, for the period indicated.

395. WENNER, Frank, "A New Seismometer Equipped for Electro-magnetic Damping and Electromagnetic and Optical Magnification (Theory, General Design, and Preliminary Results)," *Bureau of Standards Journal of Research*, **2**, Research Paper No. 66, 963-999, Washington, 1929.

The paper is also issued as a reprint in separate cover, and may be obtained from the Superintendent of Documents, Washington, at the nominal price of fifteen cents. The author describes the horizontal seismograph which he has designed and developed. The instrument is in many respects different from the Galitzin. The mass is about 500 grams, the magnification and its variation with the period of earth displacements, in the range from 2.5 to 60 seconds, is substantially the same as is given by a seismometer of the ordinary type (direct magnification) having a magnification for short-period displacements of 1,250, a period of 12.5 seconds and critical damping.

The treatment of the theory is mathematical, and the application of the theory to the instrument is given in some detail. Examples of the beautiful records obtained are given in the illustrations.

396. WIECHERT, E., "Theorie der automatischen Seismographen," *Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen, Mathematisch-physikalische Klasse*, Neue Folge, **2**, No. 1, 128 pages, Berlin, 1903.

This book presents a classic outline of the theory of seismographs.

397. WILLIS, Bailey, "Earthquake Conditions in Chile," *Carnegie Institution of Washington (Studies in Comparative Seismology)*, No. 382, 178 pages, numerous illustrations, tables, etc. Price \$5.50. Washington, 1929.

The book has, as appendixes, articles by J. B. Macelwane, S.J., Perry Byerly, L. S. Vera, Johannes Felsch, and Henry S. Washington, dealing with various phases of the subject. The whole is a most comprehensive analysis of the seismicity of Chile, chiefly from the standpoint of the geologist, and includes a detailed investigation of the Atacama quake of November, 1922, as regards the field data.

398. YABE, Hisakatsu, "The Latest Land Connection of the Japanese Islands to the Asiatic Continent," *Proceedings of the Imperial Academy*, **5**, No. 4, 167-169, Tokyo, April, 1929.

399. YAMAGUTI, Seiti, "On the Effect of Cyclones upon Sea Level," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 1, 115-132, June, 1929.
400. ZEITSCHRIFT FÜR GEOPHYSIK, "Seismische Meldungen im Anschluss an amerikanische Wettertelegramme," *Zeitschrift für Geophysik*, 5, Heft 1, 47-48, Göttingen, 1929.

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The appended initials are those used to indicate in each case the items contributed by the respective collaborator.

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SUBJECT INDEX FOR THE YEAR 1929

The following index has been prepared, listing under one or more of fifty subject headings each of the items reported for the year 1929 (Publications of the Dominion Observatory, Volume X, Numbers 1, 2, 3, 4). It is proposed to issue a similar index with the last number of each ensuing year of the Bibliography.

The subject headings have been developed as the result of several years' experience and are considered to be fairly comprehensive. Following their arrangement in alphabetical order, they have, accordingly, been arbitrarily assigned order designations, consisting of a letter and a figure, or a letter and a figure followed by a period and subordinating figures.

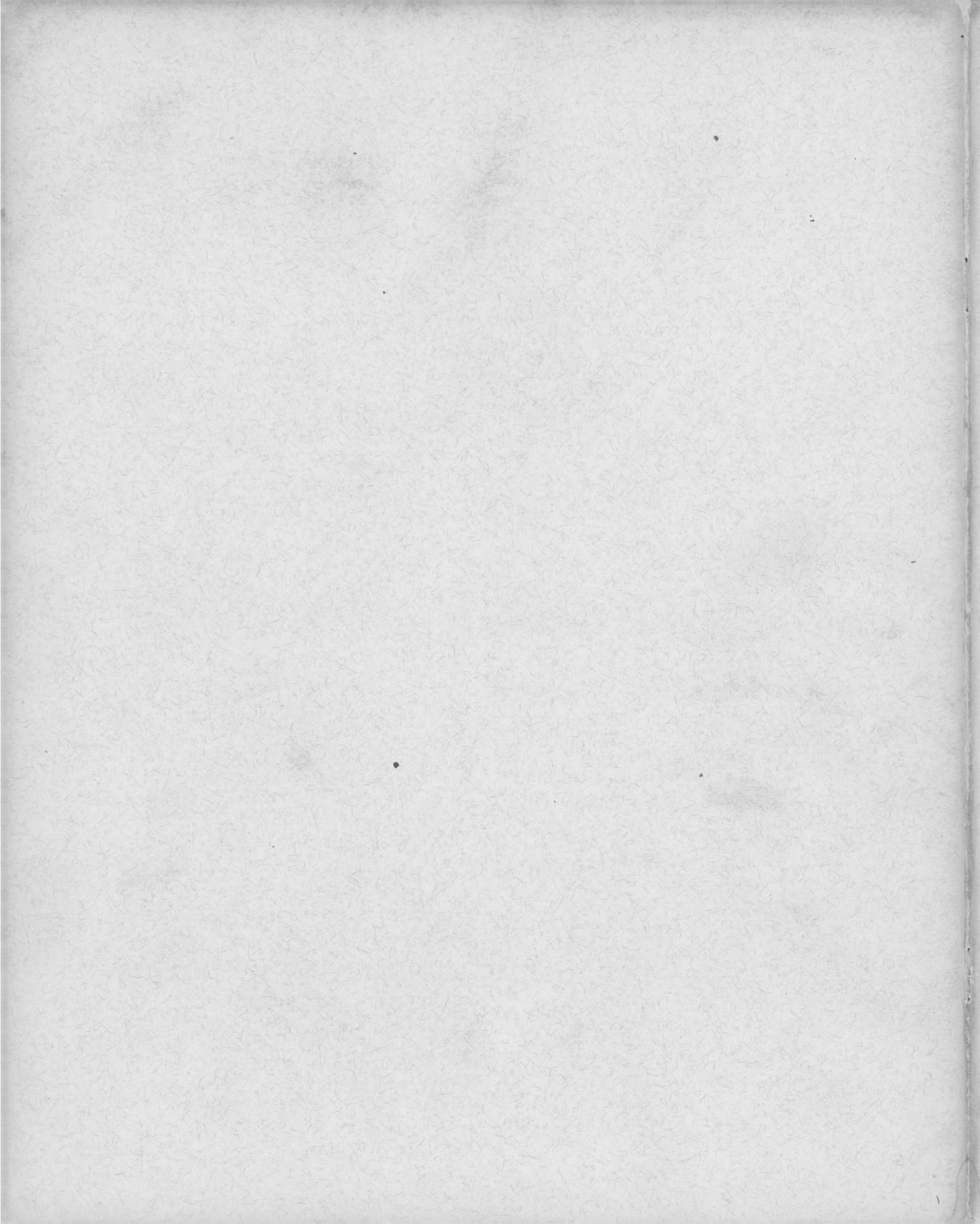
These designations will be maintained in future issues. Additions will find their place, first alphabetically. Then, if they should appear to be subdivisions of an existing classification, the addition of a subordinating figure will serve to place them. If they are not subdivisions of an existing classification, they will be assigned the next free figure to precede the period.

Thus the previous arrangement may be maintained; future classifications will find their consecutive places. Furthermore, any numbers previously assigned to items in the earlier issues may be conveniently re-numbered in the case of further subdivision by the simple addition of a figure or figures. As each subject designation begins with a letter it cannot be confused with serial numbers of bibliographical entries. The letter also serves as an aid to memory in assigning the designations and in the use of the bibliography. To avoid confusion the digit 0 is never used in the subject designations.

- A1. Aids to Seismological Study: Nos. 37, 163, 179, 185, 275, 282(2), 390, 393.
See also M1 (Maps).
- B1. Building Construction: Nos. 39, 68, 151, 165, 168, 169, 183, 194, 319, 326, 327.
- C1. Catalogues of Earthquakes, Lists of Aftershocks, etc.: Nos. 29, 31, 44, 56, 73, 122, 153, 197, 220, 264(4), 281, 292, 310, 367.
See also R2 (Reports).
- C2. Causes of Earthquakes: Nos. 11, 12, 30(3), 57, 86, 99(1), 100, 113, 132, 136, 149(2), 157, 159(2), 301, 338, 339, 359, 371, 389.
See also R3 (Rotation Variation).
- C3. Cosmogony; Theoretical Discussions of Similar Nature; Continental Drift, etc.: Nos. 18, 34, 40, 41, 42, 43, 91, 138, 213, 307, 313, 384.
- C4. Cycles, Earthquake: Nos. 30(2), 30(3), 31, 54, 106, 108, 109, 149(1), 149(2), 186, 189, 231, 366, 391.
See also P5 (Prediction).
- D1. Dams and Earthquakes: Nos. 21, 201(1).
See also E2 (Engineering).
- D2. Deformations, Gradual, of the Earth's Crust: Nos. 4, 5, 25, 47, 52, 55, 82, 90, 93, 184, 203, 223, 238, 241, 255, 262, 296, 338, 339, 375, 384.
- D3. Descriptions, General, of Earthquakes in Canada or the United States: Nos. 60, 63, 155, 239, 308, 325.
- D4. Descriptions, General, of Earthquakes other than Those in Canada or the United States: Nos. 1, 35, 46, 48, 100, 105, 114, 128, 135, 137(3), 137(5), 154, 159(1), 159(3), 177, 180, 201(4), 201(5), 207, 237, 270, 271, 285, 291, 298, 322, 335, 383.
- E1. Effects of Earthquakes, on Buildings, Ground, etc.—Observed During or After the Disturbance: Nos. 35, 68, 82, 114, 115, 132, 134, 154, 183, 190, 242, 351, 371.
- E1. 1 Earthquake Sounds: Nos. 217(2), 351.
- E2. Engineering; Particular Applications to Seismology or of Seismology: Nos. 39, 68, 194.
See also B1 (Building Construction) and D1 (Dams).
- E3. Explosions, Studies of Wave Propagation from: Nos. 125, 222, 236.
See also S3 (Seismic Prospecting).
- F1. Foci, Depth of Earthquake: Nos. 20, 62, 74, 105, 116, 195, 209, 227, 266, 282(1), 341.
- G1. Geodesy and Surveying Applied to Seismology: Nos. 170, 190, 251, 311, 355, 369, 389.
- G2. Geography of Seismological Interest: No. 33.

- G3. Geology of Interest to Seismologists: Nos. 2, 4, 5, 6, 7, 8, 10, 26, 35, 41, 47, 51, 52, 61, 63, 80, 81, 84, 90, 117, 126, 150, 154, 203, 208, 211, 216, 250, 263, 288, 294, 296, 297, 298, 307, 315, 320, 343, 347, 374, 378, 398.
See also M1 (Maps).
- G3.1 Geology, Experimental; Geodynamics: Nos. 55, 188, 214, 388.
- H1. Historical Studies of Seismological Interest: No. 22.
- I1. Instruments; Seismographs and Accessories: Nos. 32, 45, 83, 99(2), 102, 111, 125, 131, 148, 156(2), 166, 167, 178, 181, 192, 193, 199, 204, 219, 235, 276, 337, 372, 373, 377, 395, 396.
- I2. Insurance and Earthquakes: Nos. 317, 327.
See also B1 (Building Construction) and E2 (Engineering).
- I3. Isostasy and Gravity; Papers of Interest to Seismologists: Nos. 12, 38, 51, 59, 261, 312.
- L1. Landslides, Mudflows, etc.: Nos. 8, 101.
- M1. Maps; Geological and Seismological: Nos. 216, 316, 348.
- M2. Materials of the Earth's Crust, Laboratory Tests of: Nos. 13, 14, 15, 248, 259(1), 324.
- M3. Mathematical Physics, as Applied to Seismological Problems: Nos. 50, 53, 96, 97, 98, 152, 172, 173, 174, 175, 176, 244, 259(1), 260, 277, 278, 289, 290, 293, 305, 306, 318, 332, 334, 340, 352, 379, 380, 381, 382, 392, 395, 396.
- M4. Microseisms: Nos. 28, 49, 73, 118, 119, 120, 121, 124, 140, 145, 146, 210, 249, 332, 353, 357, 361.
- O1. Obituaries: No. 201(6).
- O2. Oceanography; Charting, etc.: Nos. 82, 114, 123, 134, 288, 336.
- O3. Organizations for Seismological Investigations: Nos. 24, 30, 56, 67, 73, 76, 99, 123(2), 129, 142, 148, 156(1), 212, 218, 358, 376.
- O4. Origins of Earthquakes; Methods of Locating Epicentres and Results of That Work: Nos. 24, 37, 94, 95, 139, 141, 185, 191, 224(1), 245, 275, 342, 365, 393, 400.
- P1. Pacific, Problems of: Nos. 123, 129, 143, 160, 164, 206, 251, 255, 295(1), 365, 368.
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- P2. Physics, Experimental, As Applied to Seismological Problems: Nos. 9, 32, 182, 194, 286.
- P3. Physics of the Earth, Density, Viscosity, Rigidity, Elasticity, Temperature, etc.: Nos. 26, 27, 30(1), 40, 41, 88, 92, 105, 176, 184, 200, 201(2), 229, 230, 232, 233, 246, 248, 293, 299, 300, 305, 306, 314, 324, 331, 334, 370.
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- P4. Popular Presentations of Various Phases of Seismology: Nos. 11, 12, 30, 33, 60, 67, 92, 99, 137, 201, 219, 221, 256, 271, 309, 310, 312, 361, 377.
- P5. Prediction of Earthquakes: Nos. 11, 30(2), 30(3), 107, 131, 133(1), 133(2), 217(1), 243(2).
See also C4 (Cycles).
- R1. Records, Evaluation of Earthquake: Nos. 3, 77, 158, 179, 199, 224, 228, 264(3), 268, 282(2), 332, 342.
See also T4 (Time-Distance Curves) and W1 (Wave Study).
- R2. Reports, Seismological; Regular Series: Nos. 66, 78, 79, 94, 95, 103, 130, 191, 196, 228, 309, 364, 394.
See also C1 (Catalogues).
- R3. Rotation Period of the Earth, Variations Therein; Wandering of the Pole; Variation of Latitude: Nos. 16, 71, 85, 86, 89, 133, 136, 147.
- S1. Scales, Earthquake: Nos. 75, 76, 225.

- S2. Seismicity of Particular Regions: Nos. 19, 29, 76, 87, 93, 122, 127, 137(4), 149(3), 149(4), 163, 171, 187, 202, 211, 212, 218, 221, 239, 252, 258, 267, 288, 292, 295(2), 321, 347, 363, 397.
See also C1 (Catalogues); D3 and D4 (Descriptions of Particular Earthquakes); M1 (Maps); O4 (Origins); and R2 (Reports).
- S3. Seismic Prospecting: Nos. 2, 23, 32, 45, 58, 64, 69, 102, 104, 105, 110, 125, 204, 205, 222, 235, 236, 302, 303, 304, 323, 328, 329, 330, 333, 337, 349, 350, 356, 362, 374.
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- T1. Text-books; General Treatises on Seismology or its Applications: Nos. 104, 125, 304, 329, 332, 362, 374, 396.
- T2. Tidal Loading; Its Effects; Sea-level Pressure Changes, etc.: Nos. 159(2), 184, 259(1), 284, 301, 386, 399.
- T3. Tides, Earth: Nos. 107, 136, 176, 265, 354, 359.
- T4. Time-Distance Curves, Tables, etc.: Nos. 62, 105, 116, 123(3), 144, 185, 246, 266, 292.
- V1. Vibrations of the Ground, Buildings, etc., Caused by Non-seismic Disturbances Other Than Explosions—As Traffic, Machinery, Falling Weights, Meteors, Frost: Nos. 247, 257, 344, 345, 385, 387.
- V2. Volcanoes in Relation to Earthquakes: Nos. 19, 33, 201(3), 242, 243, 279, 280, 346, 360.
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- W1. Waves, Studies of Earthquake; Based on Observational Data, Velocity, Paths, Nature, etc.: Nos. 36, 62, 70, 98, 105, 123(3), 143, 144, 160, 161, 162, 185, 198, 206, 215, 226, 229, 230, 233, 234, 236, 240, 253, 254, 259(2), 268, 269, 272, 273, 274, 283, 287, 299, 300, 332, 335, 340, 342, 368.
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Bibliography of Seismology

January, February, March, 1930

With this issue, the Bibliography of Seismology enters the second year of publication under its present auspices. The valued co-operation of the Eastern Section—Seismological Society of America, of the United States Coast and Geodetic Survey, of the Jesuit Seismological Association, and of numerous individual collaborators is gratefully acknowledged. A list of collaborators is appended to this number.

It is hoped that this co-operation may be continued and extended. Forms have been prepared with a view of making it convenient to report bibliographical data. A supply of these will be mailed on request.

It is desirable that bibliographical items be reported as completely as possible. Abbreviations should be carefully avoided. A short abstract or review is particularly useful. The place of publication should be given. Collaborators will greatly assist the editor by filling out the forms in full, and by indicating clearly the accents required. Reviews should be comprehensive, but should rarely exceed 150 words.

— ADAMS, C. E., "The South Island Earthquake of June 17, 1929." See No. 423 of this list.

401. ADAMS, Oscar S., "The Bowie Method of Triangulation Adjustment," U.S. Department of Commerce, Coast and Geodetic Survey, Special Publication No. 159, 32 pages, diagrams, tables, and maps, Washington, 1930.

The above pamphlet may be obtained from the Superintendent of Documents, Washington, D.C., at the nominal price of ten cents. It deals with the application of the method to the first-order net in the western part of the United States.

402. AGAMENNONE, Giovanni, "Il periodi sismici Parmensi del 1834, 1835 e 1927-28," *Bollettino della Società Sismologica Italiana*, 28, Fascicoli 3-4, 101-105, Rome, 1928-29. J.B.M.

403. AMBRONN, Richard, "Einige allgemeine Bemerkungen zur systematischen Anwendung geophysikalischer Aufschlussarbeiten in der Praxis," *Allgemeine Österreichische Chemische und Technische Zeitung*, 34, No. 15, 109-111, 1926.

A review appears in *Physikalische Berichte*, 9, No. 13, 1269-1270, July, 1928.

J.B.M.

— ATUMI, Keiryō and MUTO, Katuhiko, "An Investigation into the Results of the New and Old Measurements of the Levelling Net in the Kwanto District." See No. 465 of this list.

404. AULT, J. P. and SOULE, F. M., "New Data on the Bottom Contour of the South Pacific Ocean from Soundings Taken on Board the *Carnegie*, October, 1928, to March, 1929," *Gerlands Beiträge zur Geophysik*, 23, Heft 1, 1-7, 6 figures, Leipzig, 1929.

On pages 8-9 of the same issue, Captain Ault presents a second short paper entitled, "Form of the Slope of Wake Island."

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An abstract of this paper by Donald C. Barton appears in *Geophysical Abstracts*, No. 7, Washington, November, 1929, as follows: "This is a brief note calling attention to the fact that the 'new' seismograph method described by R. Ambronn in 'Modern Instruments for Seismic Prospecting,' *Engineering and Mining Journal*, Vol. 128, No. 3, July 30, 1929, pp. 93-99, is not new but parallels current American practice, and that Dr. Ambronn's paper totally ignores American practice of the past four years." F.W.L.
406. BARTON, Donald C., "Geophysical Methods of Prospecting, Principles and Recent Successes" (A review), *Bulletin of the American Association of Petroleum Geologists*, **13**, No. 10, 1402-1404, Tulsa, Okla., October, 1929.
A detailed criticism of the book by Dr. C. A. Heiland (previously reported as No. 125 of these lists).
407. BATEMAN, H., "The Solution of the Integral Equation Connecting the Velocity of Propagation of an Earthquake-wave in the Interior of the Earth With the Times Which the Disturbance Takes to Travel to the Different Stations on the Earth's Surface," *Philosophical Magazine*, Series 6, **19**, 576-587, January-June, 1910.
The results of this important paper are summarized by Jeffreys in his book, "The Earth." (See No. 440 of this list.) L.D.L.
408. (1) BELLUIGI, A., "Sullo smorzamento dei pendoli sismografici," *Bollettino della Società Sismologica Italiana*, **26**, Fascicoli 3-4, 69-81, Rome, 1926. J.B.M.
408. (2) BELLUIGI, A., "Sul problema delle coordinate spaziotemporali ipocentrali," *Bollettino della Società Sismologica Italiana*, **26**, Fascicoli 5-6, 111-124, Rome, 1926. J.B.M.
409. BERLOTY, R. P., S. J., "Le tremblement de terre de Palestine, 11 juillet 1927," *Annales de l'Observatoire de Ksara*, 62-94, 1927.
410. BOBILLIER, Carlos, "Boletin del Servicio Sismológico de la Universidad de Chile (Terremoto del 14 de Abril), año de 1927," No. 19, Santiago, 1929.
With regard to the earthquake of April 14, there is given a list of damages which resulted; a value of 1.0 to 1.2 m/sec² as maximum acceleration at Santiago is indicated for the horizontal acceleration, and 0.16 m/sec² for the vertical acceleration. The determination of the epicentre and the interpretation of the data obtained is not made, the conclusions of F. Lünkenheimer at La Plata, and of P. A. Loos, at Mendoza being accepted. The annual list of quakes observed in Chile is given in the same form as in previous years, the only difference being that Greenwich Mean Civil Time is now used instead of Santiago Mean Time. F.L.
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An abstract by W. Ayvazoglou appears on pages 29-30 of *Geophysical Abstracts*, No. 8 (Circular 6224, U.S. Bureau of Mines), December, 1929. The section which refers to the seismic method reads, "Examination of elastic anomalies; study of the velocity of propagation of shocks; measurement by sound; measurement by ultrasound." A lengthy bibliography is appended. F.W.L.
412. BOWIE, William, "Tilting of Mean Sea Level," *Gerlands Beiträge zur Geophysik*, **23**, Heft 2, 97-98, Leipzig, 1929.
413. BROCKAMP, B. and WÖLCKEN, K., "Bemerkungen zu den Beobachtungen bei Steinbruchsprengungen," *Zeitschrift für Geophysik*, **5**, Heft 3-4, 163-171, Göttingen, 1929. F.W.L.
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414. CAVASINO, A., "Il terremoto nelle prealpi Carmiche orientali del 27 marzo 1928," *Bollettino della Società Sismologica Italiana*, 28, Fascicoli 3-4, 77-100, Rome, 1928-29. J.B.M.
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Chapters I and II (pages 1-18) summarize briefly and clearly the features of Fermat's Principle, and a concept of group velocity with which students of seismology should be familiar. L.D.L.
416. CONRAD, V., "Erdbebenhäufigkeit und Sonnenaktivität," *Spitaler Festschrift, Erzgebirge-Zeitung*, 50, Heft 1-2, 19-22, Teplitz-Schönau, 1929.
The frequency of earthquakes and the activity of the sun: The monthly frequency of near earthquakes ($\Delta < 1000$ km.) registered instrumentally at Batavia (1910-1925 = 192 months) is correlated with the mean monthly sunspot-numbers given by Wolfer for the above-mentioned time. It is found that $r = -0.045 \pm 0.049$ P.E. The earthquakes in the regentships of Batavia, Bantam, and Preanger, alone, give $r = -0.190 \pm 0.047$ P.E. Therefore there is no correlation between earthquakes and sunspots in the Malayan Archipelago.
Some authors state that the earthquakes are especially frequent if the relative numbers of sunspots are growing, or if the sunspots pass the meridian of the sun opposite to the earth's region in question. This case was also examined by methods of the theory of probability and it was found that: The number of earthquakes which happen in times of growing relative sunspot-numbers is quite equal to the number mathematically expected for the case where the earthquakes are distributed over the time at random. V.C.
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The paper deals with the forced vibrations of a vertical bar, direction-fixed at the base and carrying either concentrated or uniformly distributed loads, when subjected to any given arbitrary vibratory motion. R.R.M.
418. DARLINGTON, Tom, "Geological Exploration with Dynamite," *Explosives Engineer*, 6, No. 9, 329-332, September, 1928. J.B.M.
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This paper is a useful reference to the origin and meaning of seismological terms.
420. DAVISON, Charles, "On the 42-Minute Period in the Frequency of the Aftershocks of Earthquakes," *Philosophical Magazine*, 8, No. 53, 801-812, London, December, 1929.
The author introduces the paper as follows, "The time taken by an earthquake-wave to travel from a focus near the surface to its antipodes is almost exactly 21 minutes. As the crust within and near the focus is for some days in a highly sensitive condition, it is possible that the return-pulsation may affect the frequency of the after-shocks, and my object in this paper is to show that a 42-minute periodicity does govern their occurrence."
421. DECARVALHO, Anselmo Ferraz, "Estudo actual dos tremores de terra," *O Instituto Coimbra*, 72, No. 1, 1-50, 1925.
An abstract appears in *Physikalische Berichte*, 9, No. 13, 1254, Braunschweig, July, 1928. The paper is a brief summary of the subject with particular reference to Portugal. J.B.M.
422. (1) FESSENDEN, Reginald A., "Patent 1,167,366 Dynamo Electric Machinery," United States Patent Office, Washington, 1916.
The above patent covers the vibrator used by the inventor for sonic depth measurements.

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This method makes use of vibrators, installed in bore holes filled with water, as the source of oscillations of the frequency of sound.
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The Committee was accompanied in its investigations by Dr. C. E. Adams, Government Seismologist. A.S.M.
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The paper is in Japanese with an abstract in English. The concluding paragraph reads: "From these (investigations) it seems like that the mere form of land and sea can, to some extent, indicate the stress, acting on or the displacement of the crust. So the authors point out more examples of the vortical form of coast lines and in one of them is obtained a good concordance of the sense of stress inferred from their point of view with that from geological point of view by Dr. Ehara on the southwestern part of Sikoku."
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Paper presented before the Seismological Society of America, at Berkeley, California, on June 20, 1929.
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An abstract appears in *Geologisches Zentralblatt*, 40, No. 1, 17, September, 1929. J.B.M.
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This text-book has been prepared by the author named with the collaboration of Prof. A. Born (Berlin), Prof. E. A. Ansel (Freiburg i.B.), Prof. A. Sieberg (Jena), Prof. J. Bartels (Eberswalde), Prof. J. Weickmann (Leipzig), Prof. F. Linke (Frankfurt a.M.), Prof. A. Wegener (Graz), and Prof. H. Benndorf (Graz).
It treats of the subject of geophysics under the following general headings (1) The Growth of the Earth and its Structure, (2) Gravity and Isostasy, (3) The Mechanism of Movement of the Earth's Crust, (4) Water, Ice, Wind, as Greater Geological Factors, (5) Volcanism, (6) Earthquakes-Geology, (7) The Physics of Earthquake Study, (8) Water-waves and Tides, (9) Movements of the Earth's Axis, (10) Terrestrial Magnetism and Electricity, and the Polar Light, (11) The physical Properties of the Earth's Structure, (12) Geophysical Prospecting Methods, (13) The Structure of the Atmosphere, (14) Optics of the Atmosphere, (15) The Electrical Properties of the Atmosphere, (16) Mechanics and Thermodynamics of the Atmosphere, (17) Geophysics and Life. A tabulation of "Geophysical Constants," is appended.
The book appeared as a series of five "Lieferungen," which were sold at reduced subscription prices. These subscription prices are now cancelled. The book is sold only as a single volume at the prices quoted. G.B.

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The author's abstract reads: The focus of the Rheinland earthquake of 1928, December 28, is situated, according to the registrations, about one to two kilometers southeast of Rödigen, the most shaken place. The longitudinal waves were propagated in the three upper layers with the velocities 5.6 km./sec. (with respect to Göttingen perhaps 6.0?), 6.7, and 8.2 km./sec., respectively. The P_N -waves arrived at the stations two to three seconds before they were to be expected in the light of the other European earthquakes studied. It may perhaps be supposed that the corresponding discontinuity is situated a little less deep in West-Germany. Values of greater precision could not be established, because stations near to the epicentre are wanting, so that the calculation of the depth was not possible. The registrations of Heerlen, near the epicentre, yield a value for the depth of focus of thirty kilometers.

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A translation into French, by M. Marcel Thiers, of l'École Polytechnique, Paris, appears in the same issue on pages 139-148 (of the supplement section), with the title, "Les tremblements de terre d'après l'histoire physique de la terre." B.G.

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436. IMAMURA, Akitune, "On the Earth-vibrations Induced in Some Localities at the Arrival of Seismic Waves," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **7**, Part 3, 489-494, December, 1929.

The paper is in Japanese with an abstract in English. The experiments which are here reported indicate that small earth-vibrations of a period ranging from 0.2 to 0.4 sec. are induced in a relatively thin surface layer by the arrival of the seismic waves.

437. IMPERIAL JAPANESE ARMY, LAND SURVEY DEPARTMENT, "Revision of the Secondary Trigonometrical Survey in the Tango District," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **7**, Part 2, 381-389, 1 plate, September, 1929.

The article, written in Japanese, carries the following abstract in English: "The result of revision of the primary trigonometrical survey in Tango and the other districts was already published in Vol. VII, part 1 of this Bulletin. The results of the survey which was carried out later with respect to the secondary trigonometrical points are now given in the tables and the annexed plate.

The assumption regarding the two fixed stations is the same as in the previous case." The abstract gives also the probable errors of the results of calculations.

438. ISHIMOTO, Mishio and TAKAHASI, Rutarō, "Construction d'un accéléromètre-enregistreur dans le but de mesurer les mouvements des automobiles, des trains, etc.," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 3, 571-585, December, 1929.

The paper is in Japanese with the following summary in French: "Un accéléromètre comportant deux bourrelets de caoutchouc est construit dans les conditions suivantes:—

- | | |
|--|-----------------------|
| (1) masse du poids..... | 15.2 kg. |
| (2) période propre..... | 0.03 sec. |
| (3) amplification du déplacement de la masse de l'appareil | 50 |
| (4) amortissement..... | amortisseur à air. |
| (5) sensibilité..... | 1 cm. correspond à g. |

Les étalonnages de l'appareil sont exécutés dans des conditions statiques et dynamiques: et les résultats obtenus coïncident bien avec les valeurs théoriques. Dans des enregistrements obtenus sur une automobile, on distingue d'une part les vibrations caractéristiques de la voiture, d'autre part les conditions superficielles de la route."

439. ISHII, Eikitu, "Comparison of the Results of the Third and Fourth Precise Levellings in the Region Disturbed by the Tango Earthquake," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 3, 587-588, December, 1929.

The paper is but a brief summary, in English and in Japanese, of the information given by a map and a graphical representation of a comparison of the results given by the third and the fourth re-levellings.

440. JEFFREYS, Harold, "The Earth: Its Origin, History, and Physical Constitution," Cambridge University Press, 346 pages, 3 plates, 16 figures, index. Price, \$5.50. Cambridge, 1928.

The above issue is the second edition of this valuable work. The chapters on seismology (VI and VII) have been considerably revised.

441. JONES, William R., "Early Geophysical Prospecting," *The Mining Magazine*, 40, No. 5, 269-272, London, May, 1929; and 40, No. 6, 348-351, London, June, 1929.

An abstract of this paper by Donald C. Barton appears in *Geophysical Abstracts*, No. 4 and No. 7, Washington, 1929, from which the following extracts are taken: "This paper gives a historical résumé of the British pioneers in early geophysical prospecting. . . . Mallet was the father of the seismic method of geophysical prospecting with his observations on difference of velocity of different formations and the use of explosions to produce elastic earth waves before 1851. Nöggerath in 1846 and J. F. Schmidt in 1858 proved the correctness of Mallet's theories (He made) laboratory determinations of the compressibility and modulus of elasticity of different rocks. His study included that of anisotropism. Milne, at the end of the century, modified some of Mallet's deductions and as far back as 1885 experimented with elastic earth waves produced by falling bodies. . . . "

F.W.L.

442. LAMBERT, Walter D., "Earth Tides," *Travaux de la Section de Géodésie de l'Union géodésique et géophysique internationale, Rapports généraux, établis à l'Occasion de la troisième Assemblée générale, Prague, 29 août—10 septembre 1927 (Rapport sur les marées de l'écorce terrestre)*, 16 pages.

The paper, undertaken by the author as the "Rapporteur" on this subject, appointed by the above organization, first outlines the investigations carried out by those attacking the subject from various angles. He then deals with the nature of the quantities h , k , and l , used by geophysicists in the study of this problem, and the best means of determining their values. The question of the effect of local geologic conditions on observed tides is then considered. Finally, the conflicting conclusions of Stoneley and of Jeffreys, as to the nature of the earth's core, receive attention. The paper concludes with a number of recommendations.

443. LEE, Frederick W., "Geophysical Abstracts," Department of Commerce, Bureau of Mines, Washington. No. 4 (Circular 6164), August, 1929; No. 5 (Circular 6175), September, 1929; No. 6 (Circular 6203), November, 1929; No. 7 (Circular 6209), November, 1929; No. 8 (Circular 6224), December, 1929; No. 9 (Circular 6233), January, 1930.

These publications appear as Information Circulars, giving abstracts of current articles and publications dealing with applied geophysics. F.W.L.

444. LEE, Frederick W., In "Geophysical Abstracts," No. 6 (Circular 6203, U.S. Bureau of Mines), Washington, November, 1929 (see No. 443 of this list, next above); a long list is compiled of United States patents granted in respect of various geophysical instruments or methods. Those dealing with the seismic method (no less than 26) are found on pages 3-10.

The number of the patent, the date of its being granted, the descriptive title, the name of the patentee, a brief outline of the scope of the patent, and the number of claims allowed is given in each case.

The compilation is a most useful one as outlining the history and present trend of the art.

445. LEUCHS, K., "Erdkruste und Erdinneres," *Berichte der Senckenbergischen Naturforschenden Gesellschaft*, No. 56, 44, 1926.

An abstract appears in *Geologisches Zentralblatt*, 40, No. 1, 17, September, 1929.

J.B.M.

446. LIECHTI, P., "Eine neue Hochfrequenzmethode zur Registrierung von Bodenerschütterungen," *Gerlands Beiträge zur Geophysik*, 23, Heft 2, 213-228, 11 figures, Leipzig, 1929.

The author's English abstract reads: "The construction and working of a new electric ground-vibrationmeter are described. It consists of a high-frequency tube transmitter inductively coupled to an absorbing circuit, the capacity of which is performed as a mercury condenser. The mercury's surface then acts as a free vibrative membrane. The enclosed diagrams show the superposition of the ground vibrations to those of the free membrane. The new apparatus is very simple as in regard to its construction as to its use and may easily be transported. Its high sensitivity can still be increased by stages of low-frequency amplification." A bibliography of seventeen items is appended.

447. LITERARY DIGEST, "What New Zealand Learned from Its Worst Quake," *Literary Digest*, pages 28 and 30, New York, October 19, 1929.

A useful index to the outstanding features of the earthquake of June 17, 1929, as gleaned from the press of New Zealand.

448. LOGAN, Jack, "Geophysics Reveal Vast Petroleum Deposits in Coast Region," *The Oil Weekly*, 51, No. 9, 40-50, Houston, Texas, November 16, 1928.

An abstract of this paper, by W. Ayvazoglou, appears in *Geophysical Abstracts*, No. 7, Washington, November, 1929. F.W.L.

449. LÚNKENHEIMER, Federico, "Elementos nuevos para la determinación de los epicentros," *Observatorio Astronómico, La Plata, Contribuciones Geofísicas*, 2, No. 5, 147-250, 1928.

The seismological stations being situated in both hemispheres and with great epicentral distances sometimes involved, the values of d and r (as used in the stereographic projection method of determining epicentres) become so great, at times, that it is practically impossible to apply the method. In order to overcome these difficulties, the author puts the centre of projection on the equator, using, instead of the geographical co-ordinates ϕ and λ , the values h (altitude) and a (azimuth). The relations between the two kinds of co-ordinates are, in this case, very simple. Numerous tables are given in order to make the application of the method an easy one. F.L.

450. LÚNKENHEIMER, Federico, "Resultados sismometricos del año 1926," *Observatorio Astrónomico, La Plata, Contribuciones Geofísicas*, 3, No. 1, 1-84, 1929.

Some improvements having been made in the instruments, the number of annual observations has increased to 154. For all cases, where it was possible, epicentres have been calculated as in former years.

Of special interest is the Argentine quake of February 9, to which the author had previously (two years ago) made reference, in "Resultados Sismometricos, 1906-1922," page 165, supposing an extremely great depth of focus. It is worth mentioning that Mr. Turner, in "The International Seismological Summary for 1926," although calculating an epicentre rather east from that given by the author, also finds this exceptionally great depth.

F.L.

451. MACELWANE, J. B., S.J., "New Evidence for a Sharply Bounded and Very Rigid Core in the Earth," *Bulletin of the American Physical Society*, 1, 4, Minneapolis, February 21, 1925. Reprinted in *Proceedings of the American Physical Society*, 25, 721, Minneapolis, May, 1925.

J.B.M.

452. MACELWANE, J. B., S.J., "Some Seismographic Problems and Our Present Knowledge," *Bulletin of the Seismological Society of America*, 19, No. 3, 135-142, Stanford, September, 1929.

The paper reports the Presidential address delivered before the joint meeting of The Seismological Society of America and of its Eastern Section, which was held at Fordham University, New York City, April 30-May 1, 1929. A bibliography of thirty-six items is appended.

453. MAINKA, C., "Über das Amplitudenverhältnis bei Rayleighschen Oberflächenwellen," *Physikalische Zeitschrift*, 16, 117-121, Leipzig, 1915.

L.D.L.

454. MALAMPHY, Mark C., "The Seismograph in the Gulf Coast," *The Oil Weekly*, 52, No. 5, 31-34, January 18, 1929.

An abstract of this paper by Kenneth Hartley appears in *Geophysical Abstracts* (Published by United States Bureau of Mines), No. 1, Washington, May, 1929, and a shorter reference in the same publication, No. 2, Washington, May, 1929, has also been prepared by Donald C. Barton.

F.W.L.

455. MALAMPHY, Mark C., "Factors in Design of Portable Field Seismograph," *The Oil Weekly*, 53, No. 1, 28-30, 84-94, March 22, 1929.

An abstract of this paper by Donald C. Barton appears in *Geophysical Abstracts*, No. 4, Washington, August, 1929, as follows: "Field seismographs are of two types, 'mechanical' seismographs in which there is mechanical magnification of the movement of the heavy mass, and 'electric' seismographs in which the movement of the heavy mass is transformed into an electrical impulse which is then amplified. The following factors in the design of the seismograph equipment are discussed: Weight of equipment including carrying cases, over-all dimensions, transportation equipment, sensitivity (amplification) of seismograph, frequency (selectivity) characteristics, damping of recording apparatus, timing system, simplicity of adjustments and operation, sensitivity of seismograph of blastophone to sound and receive air waves, accessibility of all instruments for adjustment repair or replacement of parts, provision for development of records in the field, method of transmitting the exact instant of the shot, radio equipment, and power supply for electrical equipment. This is an interesting and reliable account of many details of the art of seismic prospecting."

456. MALAMPHY, Mark C., "A Seismic Method of Determining the Deviation of Drill Holes," *The Oil Weekly*, 53, No. 6, 31-32, 70-80, Houston, Texas, April 26, 1929.

An abstract of this paper by Donald C. Barton appears in *Geophysical Abstracts*, No. 4, Washington, August, 1929, as follows: "The position of the bottom of a well may be determined by dropping the detector of an electric-type seismograph to the bottom of the well and exploding small charges of dynamite at a certain pattern of locations. Formulas for the computation of the position of the bottom of the hole from the results are given. The charges of dynamite required are small and the time necessary to make the survey is

less than a day. The cost of the determination is low. The greatest difficulty will be in applying the method in an area where the beds dip steeply. The use of several detectors suspended at different depths will allow simultaneous determination of position of well hole at as many points. No mention is made of the actual application by the Geophysical Research Corporation." F.W.L.

457. MALKOVSKY, J. A. and WANTLAND, Dart, "Geophysical News and Review of Geophysical Literature," Department of Geophysics, Colorado School of Mines, 2, No. 1, 1-50, Golden, Colorado, November 15, 1929.

The publication is a review in abstract form of the more important papers dealing with geophysics. J.A.M.

458. MARTEL, R. R., "The Effects of Earthquakes on Buildings with a Flexible First Story," *Bulletin of the Seismological Society of America*, 19, No. 3, 167-178, Stanford, September, 1929.

Paper presented before the Seismological Society of America, at Berkeley, California, on June 20, 1929.

459. MATUZAWA, Takeo, YAMADA, Kunitika, and SUZUKI, Takeo, "On the Forerunners of Earthquake Motions" (Second Paper), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 2, 241-260, 11 figures, September, 1929.

460. McCOMB, H. E., "A New Method of Marking Time on Magnetograms," *Terrestrial Magnetism and Atmospheric Electricity*, 33, No. 3, 159-161, Baltimore, September, 1928.

This method might be equally successful for the registration of time on seismograms. H.E.McC.

461. MITCHELL, A. S., "Building Construction Lessons of the Earthquake," *The Journal of the New Zealand Institute of Architects*, 8, No. 4, 83-87, Wellington, N.Z., October, 1929.

The paper describes the damage caused by the New Zealand earthquake of June 17, 1929. The results, as observed, are classified according as they affected (1) Timber Structures, (2) "Deconcrete," (3) Stone Structures, (4) Brick-walled Structures, (5) Plain Concrete, (6) Reinforced Concrete, (7) Structural Steel and Reinforced Concrete Buildings, (8) Reinforced Concrete with Floors, etc. Integral, etc. A.S.M.

- MITCHELL, A. S., FORD, C. R., and BUTCHER, H., "The South Island Earthquake of June 17, 1929." See No. 423 of this list.

462. MIYABE, Naomi, "Die Schankungen der makroseismischen Tätigkeitszonen um den Pazifischen Ozean," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 2, 261-268, September, 1929.

A short summary of the foregoing was given in *Proceedings of the Imperial Academy*, 5, page 243, 1929.

- MIYABE, Naomi and TERADA, Torahiko, "Deformation of the Earth Crust in Kwansai Districts and its Relation to the Orographic Feature." See No. 491 of this list.

463. MORRIS, S. B. and PEARCE, C. E., "Design of Gravity Dam in San Gabriel Canyon to Resist Earthquakes," *Bulletin of the Seismological Society of America*, 19, No. 3, 143-155 Stanford, September, 1929.

Paper presented before the Seismological Society of America at Berkeley, California, June 20, 1929.

464. MOTHES, H., "Neue Ergebnisse der Eisseismik," *Zeitschrift für Geophysik*, 5, Heft 3-4, 120-145, Gottingen, 1929.

The following abstract is condensed from that given in *Geophysical Abstracts*, No. 9, Washington, January, 1930: In July and August, 1928, artificial seismic waves were produced in Hintereisferner by explosions, were measured optically by means of a vertical

- seismograph at distances of 180 to 600 metres, and the value for the velocity of wave propagation in ice determined. In 25 cases reflections of longitudinal waves at the lower boundary surface of the ice, which served for the determination of the thickness of the ice, could be registered. F.W.L.
465. MUTO, Katuhiko and ATUMI, Keiryō, "An Investigation into the Results of the New and Old Measurements of the Levelling Net in the Kwanto District," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 7, Part 3, 495-522, December, 1929.
- The paper is in Japanese, with an abstract in English. The conclusions are:—
- "(1) When the land upheaved or depressed, the crustal surface splits into a mosaic of blocks; it appears that the surface crust is not perfectly elastic.
- (2) The distance between each tectonic line is generally equal.
- (3) The block which suffered a large vertical displacement generally made a large tilting.
- (4) In Tokyo-Okitu-Kohu levelling circuit, the same blocks were active through both periods before and after the earthquake, but the sense of tilting before the earthquake was opposite to that after it.
- (5) On the approach of the earthquake, the tilting movement of certain blocks in Tokyo was accelerated considerably."
466. NAKANO, H., "Love Waves in Cylindrical Co-ordinates," *Geophysical Magazine*, 2, No. 1, 37-52, Tokyo, March, 1929. J.B.M.
467. NAVARRO NEUMANN, M. Ma. S., S.J., "Sur quelques contributions de la géologie à la sismologie et de la sismologie à géologie," *Comptes rendus, XIV Congrès géologique international*, 1926.
- A 6-page reprint, issued by Graficas Reunidas, S.A., Madrid, 1929, presents the above paper as a separate. N.N.
468. NAVARRO NEUMANN, M. Ma. S., S.J., "El XI Congreso de La Asociación Española y Portuguesa para el Progreso de las Ciencias," *Ibérica*, No. 684, 7 pages (in the reprint), Barcelona, June 25, 1927. N.N.
469. NAVARRO NEUMANN, M. Ma. S., S.J., "Estado actual de la determinación de los epicentros," *Ibérica*, No. 784, Barcelona, June 29, 1929. N.N.
470. NEUMANN, Frank, "Seismological Report, January, February, March, 1927," United States Department of Commerce, Coast and Geodetic Survey, Serial No. 463, 81 pages, Washington, 1929. F.N.
471. NIKIFOROV, P. M., "Seismic Experiments with Explosions; Preliminary Note," *Comptes rendus de l'Académie des Sciences de l'U.S.S.R.*, Series A, 189-190, Leningrad, October, 1926.
- The following abstract is by E. U. Von Buelow, and appears in *Geophysical Abstracts* (Published by the United States Bureau of Mines), No. 2, (Circular 6133), page 20: "The author briefly reports experiments employing (1) a vertical seismograph of B. B. Galitzin, slightly changed for this special work; (2) the horizontal seismograph by Wiechert-Mintrop; (3) a small horizontal seismograph of their own design. Problems studied are defined, results obtained will be given in a separate paper at an early date." F.W.L.
- NISHIMURA, Genrokuro and SEZAWA, Katsutada, "The Displacement Independent of the Dilatation and the Rotation in a Solid Body." See No. 482 of this list.
472. NISHKIAN, L. H., "Design of Tall Buildings for Resistance to Earthquake Stresses," *The Architect and Engineer*, 88, 73, March, San Francisco, 1927. R.R.M.
473. (1) ODDONE, Emilio "L'organizzazione sismica ed i recenti studi sismologici nelle nazioni a noi confinanti: Jugoslavia, Svizzera, Francia, e Austria," *Bollettino della Società Sismologica Italiana*, 26, Fascicoli 5-6, 139-151, Rome, 1926. J.B.M.

473. (2) ODDONE, Emilio, "Paragone e studio dei moti sismici gravitazionali e proiettivi di eguale velocita," *Bollettino della Società Sismologica Italiana*, 27, Fascicolo 2 41-85, Rome, 1927. J.B.M.
473. (3) ODDONE, Emilio, "I lavori della sezione sismologica alla terza assemblea generale dell'Unione Geodetico-Geofisica Internazionale in Praga dal 3 al 10 Settembre 1927," *Bollettino della Società Sismologica Italiana*, 27, Fascicoli 5-6, 141-158, Rome, 1927. J.B.M.
- PEARCE, C. E. and MORRIS, S. B., "Design of Gravity Dam in San Gabriel Canyon to Resist Earthquakes." See No. 463 of this list.
474. PROVIERO, A., "Per impedire o moderare qualche incendio nei terremoti disastrosi," *Bollettino della Società Sismologica Italiana*, 26, Fascicoli 1-2, 47-48, Rome, 1926. J.B.M.
475. RAIKO, N. V. The following twenty reviews have been furnished by Dr. N. V. Raiko, of the Physico-Mathematical Institute, Academy of Sciences, Leningrad, U.S.S.R. In view of the fact that each reference indicates an article which appeared in the Russian language, it has seemed best to group them, the items appearing in the group in the alphabetical order of the authors' names. E.A.H.
- (1) ABDALIAN, S., "The Great Earthquake in Armenia," *Messenger of Knowledge (Vestnik Znania)*, No. 19, 1177-1182, with 2 charts, 1927.
The author gives a descriptive account of the earthquake of October 22, 1926, by which the town of Leninakan (formerly Alexandropol) was destroyed. A chart of isoseists is appended to the paper.
- (2) CHEKANINSKI, I., "On Seismic Phenomena in the Government of Semipalatinsk from 1760 to 1927" (Historical Reference), *Bulletin of the Semipalatinsk Section of the Russian Geographical Society*, 16, 14-72, 1927.
The above is a catalogue compiled from data obtained from non-instrumental observations.
- (3) DOBROVOLSKI, "Lessons of Leninakan: Methods of Investigating the Rigidity of Buildings Exposed to Earthquakes," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 3, 171-174, 13 figures, March, 1927.
- (4) ISHEVSKI, M., "The Problem of Earthquake-proof Construction: Estimates for and Structure of Buildings in Localities Exposed to Earthquakes," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 9, 623-626, 8 drawings, September, 1927.
- (5) ISHEVSKI, M., "Estimates and Structure of Buildings in Localities Subject to Earthquakes," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 10, 676-681, October, 1927.
The author discusses in general terms the measures to be taken in erecting dwelling houses, warehouses, or small household and industrial buildings in localities subject to earthquakes. In conclusion he insists on the necessity for more accurately registering earthquakes in other regions of U.S.S.R. where they are likely to prove a menace.
- (6) JAROSLAVZEW, T. N., "The Determination of the Time and of the Epicentre of the Kuban Earthquake of April 19, 1926," *Transactions of the Kuban Agricultural Institute*, 4, 97-99, 1926.

According to the method of isoseists the author gives $\varphi = 45^{\circ} 30'$ N. and $\lambda = 39^{\circ} 01'$ E., whilst, according to data of the seismic stations of Pulkovo, Sverdlovsk, and Tifis, these values have been computed as follows:— $\varphi = 45^{\circ} 30'$ N., and $\lambda = 39^{\circ} 07'$ E. For "O" he finds the value $7^{\text{h}} 49^{\text{m}} 51^{\text{s}}$.

- (7) KELDYSCH, W., "The Necessity of Providing for Rigidity in Beamless Bracings," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 3, 209-211, March, 1927.

The author makes some objections to the paper by Prof. A. Loleyt (No. 14, below).

- (8) KRYNIN, D., "Lessons of Leninakan: On the Rôle of Foundation Soil of Buildings During Earthquakes," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 4, 255-256, April, 1927.

The author makes an attempt to clear up the question as to the influence of soil condition on the rigidity of buildings in seismic regions. In particular, he points out that during the earthquake in Leninakan (1926), the buildings which stood on sandy ground were less injured than those on clay or volcanic tuff. The author attributes the comparative damage as being due to the nature of the foundation soil.

(These findings are quite contrary to the general experience elsewhere. It would be interesting to learn the reconciling factor. E.A.H.)

- (9) LAZAREFF, P. P., "Researches in Practical Seismometry: I. On some Problems of Applying the Seismic Method to Investigations of the Depth of Rocks," *The Journal of Applied Physics*, 3, No. 2, 231-236, 1926.

A general theory of phenomena observed in applying the seismometric method for determining the depth of strata mineral deposits, trending either parallel to the earth's surface, or at a small angle.

- (10) LAZAREFF, P. P., "Researches in Practical Seismometry: II. On the Application of the Seismograph for Determining the Depth of Mineral Deposits Bordered by Planes," *The Journal of Applied Physics*, 3, No. 2, 237-238, 1926.

The author discusses theoretical data regarding the self-registering seismometer, as being an apparatus recording vibrations which reach it, either in a direct way from the seat of explosion, or after having been reflected by an ore-body.

- (11) LAZAREFF, P. P., "Researches in Practical Seismometry: III. On the Application of Helmholtz's Method to the Investigation of Stratified Geological Structures," *The Journal of Applied Physics*, 3, No. 3-4, 289-298, 1926.

In the present article the author endeavours to develop and generalize the method of Mintrop regarding the investigation of mineral deposits by means of artificial explosions.

- (12) LAZAREFF, P. P., "Researches in Practical Seismometry: IV. A General Theory of a Combined Gravimetric and Seismic Method of Investigating Venal Deposit Representing an Infinite Cylinder Disposed Parallel to the Plane of the Earth's Surface," *The Journal of Applied Physics*, 3, No. 3-4, 299-302, 1926.

In this article the author discusses in principle the question of the investigation of venal deposits, which, in the general case, consist of cylindrical bodies of an infinite or commensurate dimension.

- (13) LEBEDEV, P. I., "The Earthquake of Leninakan (Alexandropol) in Connection with the Question of the Seismicity of Armenia," *Nature (Priroda)*, 16, No. 3, 171-188, 5 drawings, 1927.

A description of the earthquake of October 22, 1926, with reference to geology.

- (14) LOLEYT, A. T., "Necessity for Providing for Rigidity in Beamless Bracing (from Experience of the Earthquake at Leninakan)," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 4 No. 11, 825-828, November, 1926.

The author compares the formulæ proposed by himself for computing beamless bracings with the formulæ of American and German norms, and arrives at the conclusion that his formulæ provide adequately for the rigidity of such bracings. He offers as supporting evidence the fact that a factory, so constructed, survived the earthquake of October 22, 1926, in Leninakan, with practically no damage.

- (15) LOLEYT, A. T., "About the Paper by Prof. W. Keldysch" (No. 8 above), *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 3, 211-212, March, 1927.

Polemics of the author with Prof. W. Keldysch, regarding the paper listed just above as No. 14.

- (16) LOLEYT, A. T., "How to Put the Problem," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 10, 673-676, 3 drawings, October, 1927.

The author outlines the problem of earthquake-proof construction.

- (17) NEKRASOW, W., "Competition of Designs for the Reconstruction of Leninakan," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 10, 681-682, October, 1927.

The author gives an account of the results of the competition of designs for one-storied and two-storied dwelling houses (earthquake-proof constructions), to be erected in Leninakan (formerly Alexandropol, Caucasus) after the earthquake of October, 1926.

- (18) RAÏKO, N. V. "Supplementary Materials Relating to the Earthquakes Which Occurred in the Region of the Caucasian Mineral Sources," *Les travaux de l'Institut Balnéologique aux eaux minérales du Caucase (Pjatigorsk)*, 4, 160-162, 1927.

Supplementary notes to the paper by the same author, entitled, "Materials for the Compilation of a Catalogue of Earthquakes Which Have Occurred in the Region of the Caucasian Mineral Sources," in the same journal, 3, p. 233.

- (19) TATARINOW, E., "Future Structural Methods in the Crimea in Connection with Landslips and Earthquakes," *The Constructive Industry (Stroitel'naya Promyshlennost)*, 5, No. 10, 669-673, 2 drawings, October, 1927.

The author insists upon the necessity of considering the houses in the Crimea from the point of view of dangers due to landslips and earthquakes, and proposes an approximate scheme of constructive methods to form a basis for future earthquake-proof construction in this region.

- (20) ZABOROVSKI, A. I., "A Contribution to the Theory of Curves Showing the Time of Wave Propagation," *The Journal of Applied Physics*, 3, No. 3-4, 303-309, 1926.

476. RANKINE, A. O., "Seismic Methods in Geophysics," *The Mining Magazine*, 40, No. 5, 311-314, London, May, 1929.

A mathematical explanation of the seismic method of prospecting.

F.W.L.

477. SCHMIDT, Wilhelm, "Nomographische Tafel zur Auswertung von Bebenogrammen," *Gerlands Beiträge zur Geophysik*, 12, Heft 2 (Kleine Mitteilungen), 114-117 1 plate, Leipzig, 1913.

478. SCRASE, F. J., "The Thermal and Elastic Properties of Elinvar: a Study of an Elinvar Spring in the Galitzin Vertical Seismograph at Kew Observatory," *Journal of Scientific Instruments*, 6, No. 12, 385-392, December, 1929.

The author's abstract reads: "A serious defect of the Galitzin vertical seismograph is the drift of the pendulum which is caused by the effect of temperature changes on the elasticity coefficient of the steel spiral spring. In order to overcome this disadvantage an elinvar spring was recently fitted to the vertical seismograph at Kew Observatory. After loading the spring, the 'creep' remained appreciable for several months. Moreover, the rate of 'creep' was dependent on the temperature. After making due allowance for these effects it was found that the temperature coefficient of the elastic constant of the elinvar spring was about one-tenth of that of the steel spring."

F.J.W.W.

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The author's summary is as follows:—

"(1) In spite of the application of a single disturbance at the origin of a semi-infinite body of a certain dispersive nature, the generated surface waves are of a harmonic type.

(2) The leading part of the train of these waves is propagated with the velocity of a special Rayleigh-type wave.

(3) The periods of the successive oscillations of the harmonic displacements are of a gradually increasing nature.

(4) The amplitudes of the successive oscillations are, in the case of two dimensions, of a gradually decreasing character, while in the three dimensional problem they are more quickly decreasing.

(5) The order of the length of the periods depends on the dispersive nature of the body, i.e. the elasticities, the effective thickness of the layer and some dispersive constants.

(6) In certain dispersive waves there are abnormal regions of the earthquake movements at certain periodic distances from the epicentre."

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"(1) Long Love-waves having azimuthal distribution on a spherical surface have the large colatitudinal component of displacement, besides the ordinary azimuthal component, and this colatitudinal component cannot disappear even at the equatorial circle.

(2) The vertical component is not existent from the start.

(3) The velocity of the propagation of Love-waves on a spherical surface is approximately equal to that on a plane surface, even though the waves are relatively long.

(4) The dispersion of Love-waves is possible also on a spherical surface.

(5) The growth of Love-waves towards the antipode is also possible.

(6) The azimuthal variation of displacement of Love-waves is maintained towards the antipode.

(7) In considering the neighbourhood of the origin, the waves become quiescent as the waves are propagated towards infinity. When the waves are generated from an internal source, the displacement at the free surface conspires with the modes of the oscillations at the origin.

(8) In this case the azimuthal variation of the azimuthal displacement at the surface conforms for all radial distances with the type of the oscillations of the internal source."

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An abstract by W. Ayvazoglou appears in *Geophysical Abstracts*, No. 8 (Circular 6224, U.S. Bureau of Mines), 32-33, December, 1929. F.W.L.

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- SOULE, F. M. and AULT, J. P., "New Data on the Bottom Contour of the South Pacific Ocean from Soundings Taken on Board the *Carnegie*, October, 1928, to March, 1929." See No. 404 of this list.
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The paper is in Japanese with an abstract in English.
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(B) Some volcano in the middle of a large area of depression, on the one hand, and some lake situated at the centre of an extensive area of elevation, on the other hand, seem to be genetically correlated to each other in opposite senses."
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495. WADATI, K., "Shallow and Deep Earthquakes (Second Paper)," *Geophysical Magazine*, 2, No. 1, 1-37, Tokyo, March, 1929. J.B.M.
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- WANTLAND, Dart and MALKOVSKY, J. A., "Geophysical News and Review of Geophysical Literature." See No. 457 of this list. J.A.M.
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This deals with seismic observations in connection with blasting in quarries with the idea of studying the uppermost layer of the earth's crust. F.W.L.
- WÖLCKEN, K. and BROCKAMP, B., 'Bemerkungen zu den Beobachtungen bei Steinbruchsprengungen.' See No. 413 of this list.
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- For many years Mr. Woods has been collecting evidence for the purpose of testing a theory that great fault-breaks occur in the earth, cutting "the earth's crust into a series of blocks, which, from time to time warp and tilt, with resultant edge grinding, after the manner of ice cakes in a mill-pond broken up by rising water."
- The information on the map has been compiled largely from the viewpoint of this theory. T.S.W.
- YAMADA, Kunitika, SUZUKI, Takeo, and MATUZAWA Takeo, "On the Forerunners of Earthquake Motions" (Second Paper). See No. 459 of this list.

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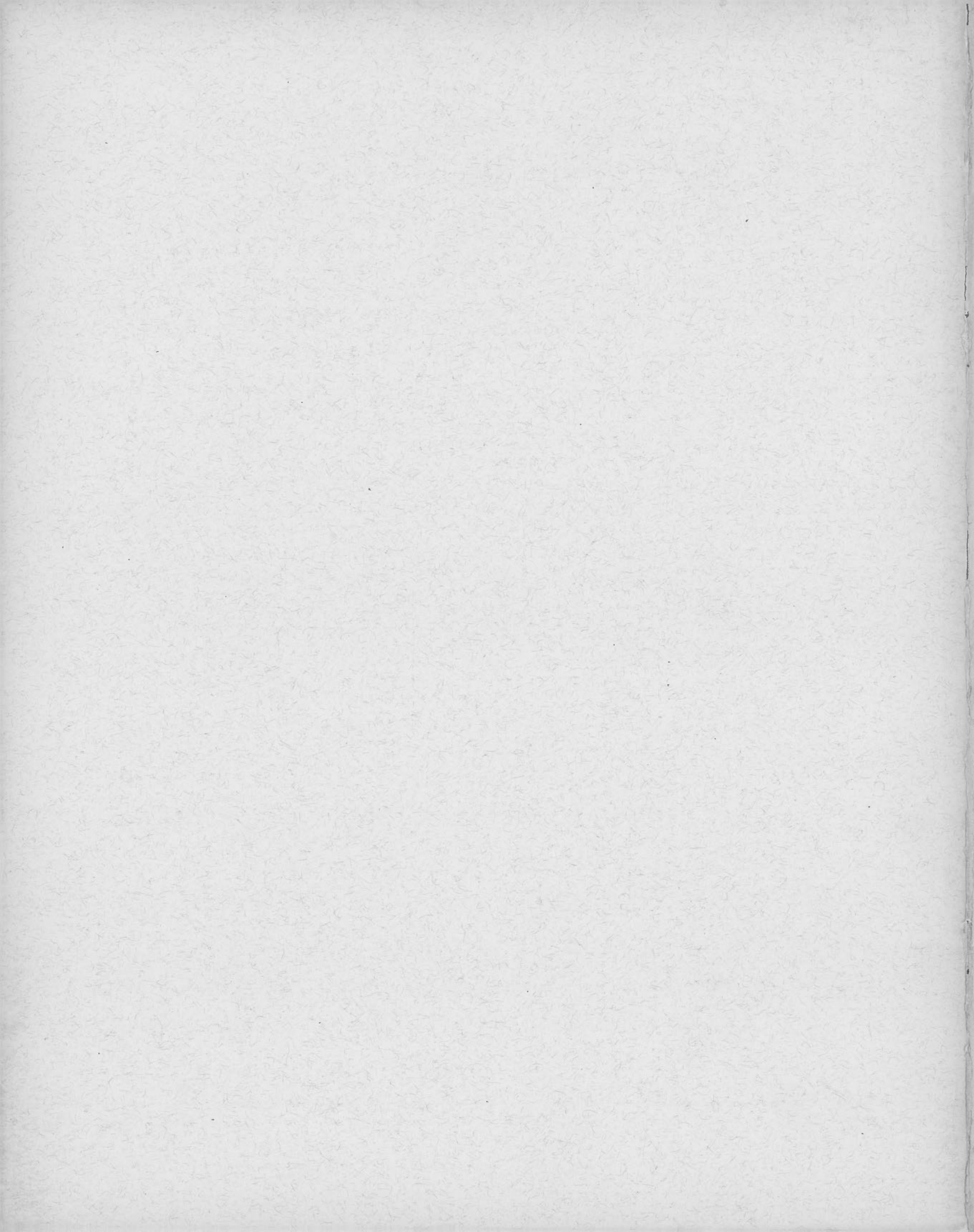
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BY

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The author's abstract reads: "Geophysical prospecting for petroleum strictly is an indirect method of mapping geologic structure. In it, three successive steps can be recognized in all of the methods: (1) mapping of the areal variation of some physical effect at the surface; (2) the determination of the subsurface distribution of some physical property producing the surface effect; (3) the interpretation of the geologic situation corresponding with the distribution of that physical property. The methods have their limitations through the incomplete concordance between structure and the distribution of these physical properties, lack of knowledge of the geophysical constants of formations, inexperience, and erroneous geologic information. There is a bare possibility of the direct determination of the presence of petroleum by the electric method. Although the positive value of geophysical methods has been demonstrated, they are no panacea for all the difficulties in prospecting for oil." L.D.L.
- BASKAKOV, V. K., SABININA, A. D., and BONCHKOVSKI, V. E., "Bulletin géophysique, etc." See No. 507 of this list.
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The author's English abstract reads as follows: "It is possible to find a distance for the epicentre of the New Zealand quake of June 16th by a quite simple calculation method of approximation which shows the best concordance between the observed impetus-times and the times calculated by means of all the time-distance-curves given by Gutenberg in the "Frankfurter Laufzeitkurven." The possibility of finding such an optimum distance confirms the assumptions as to the constitution of the interior of the earth which are taken as the basis of the calculation of the time-distance-curves and fix thus the paths and velocities of the waves".

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515. DEGREYERZ, P., "Le fonds suisse de secours en cas de dommages non assurables," *Matériaux pour l'Etude des Calamités*, No. 19, 3, 197-212, Geneva, 1929.
516. EWING, Maurice and LEET, L. Don, "Seismic Propagation Paths," *American Institute of Mining and Metallurgical Engineers*, Technical Publication No. 267, Class L, Geophysical Prospecting, No. 16, 18 pages, New York, 1930.

The paper discusses the path of the seismic ray assuming that wave velocities increase as a continuous linear function of the depth. Formulas are derived for computing, from two time-distance observations, the amount of velocity increase, depth of penetration, and a graphical determination of the path of the vibrations. The ground, reflected and refracted waves are discussed. The application of the formulas is illustrated numerically.

L.D.L.

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The paper is illustrated by means of four photographs and a map, the latter showing geological faults and the epicentres of recorded severe earthquakes.

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The following brief abstract by W. Ayvazoglou is taken from *Geophysical Abstracts* No. 10 (see No. 549 of this list). "The addition of geophysical methods of prospecting to the prospection work in Poland has been decided upon, and first investigations have been started in the region between the Stryj and Swica, to the north and south of the Daszawa. The seismic method has been adopted. The results obtained from the work carried on during the summer and the fall will be published in the near future."

F.W.L.

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The publication is in mimeographed form with a printed cover sheet. It reports the Minutes of the General Assembly of the Union and of the Sessions of its Sections, April 25, 26, 1929.

520. FYFE, H. E., "Movement on White Creek Fault, New Zealand, During the Murchison Earthquake of 17th June, 1929," *New Zealand Journal of Science and Technology* 11, No. 3, 192-197, Wellington, 1929. A.S.M.

The paper is illustrated by a geological map of the Murchison District, by three photographs, and by a line drawing. One of the photographs shows a road which crossed the fault and which was dislocated in a vertical direction, the difference in height between the dislocated road-surfaces being fourteen feet nine inches.

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This paper is included in the Bibliography because of the method rather than for its particular application.

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523. GREGORY, J. W., "The Earthquake South of Newfoundland and Submarine Canyons," *Nature*, No. 3138, 124, 945-946, London, December 21, 1929.

The note is accompanied by a map showing the positions of cable breaks caused by the earthquake of November 18, 1929. The author advances data in support of the theory that submarine canyons are the result of subsidence of strips of land along faults rather than excavation by stream action. The evidence of the above earthquake is strongly in favour of such a deduction. Incidentally the statement that the Saguenay fiord is "the site of the powerful earthquake of February, 1925," is in error. It was in the bed of the Saint Lawrence river about half-way between Quebec and Tadoussac. E.A.H.

524. GUTENBERG, B., "Nochmals: Zur Frage der Laufzeitkurven," *Zeitschrift für Geophysik*, 6, Heft 1, 57-59, Göttingen, 1930. B.G.

525. GUTENBERG, B., "Bemerkungen zu der vorstehenden Erwiderung," *Zeitschrift für Geophysik*, 6, Heft 1, 63-64, Göttingen, 1929. B.G.

526. GUTENBERG, B., "Registrierungen mit zwei Galitzinpendeln verschiedener Periode," *Gerlands Beiträge zur Geophysik*, 25, Heft 1, 74-80, Leipzig, 1930.

At Taunus Observatory two Galitzin pendulums with self periods of three and twenty seconds, respectively, were set up on the same pier. The differences in the graphs (which were registered on the same sheet) are discussed. The paper is illustrated by five text-figures. B.G.

527. GUTENBERG, B., "Hypothesen über die Entwicklung der Erde," *Forschungen und Fortschritte*, 6, No. 5, 66-67, Berlin, February, 1930.

The above paper reports an address given by the author before a combined meeting of the Geological Society and the Philosophical Society, in Washington, on October 23, 1929. B.G.

528. HEILAND, C. A., "Development in Science of Geophysics," *The Oil and Gas Journal*, 28, No. 21, 186-190; 274, Tulsa, October 10, 1929.

A review by W. Ayvazoglou appears in *Geophysical Abstracts* (see No. 549 of this list).

529. HENDERSON, J., "The Faults and Geological Structure of New Zealand," *New Zealand Journal of Science and Technology*, 11, No. 2, 93-97, Wellington, 1929.

A.S.M.

This paper, by the Director of the New Zealand Geological Survey, is illustrated by a small map. A footnote announces that Fault Maps of the North and South Islands (scale 1 inch = 16 miles) may be obtained by subscribers (presumably to the *Journal*) on application to the Director, *New Zealand Geological Survey*, Wellington, or to the Editor, *New Zealand Journal of Science and Technology*.

530. HIGUCHI, Seiichi, "Note on the Oscillatory Motion of a Viscous Liquid in an Open Channel of Infinite Length," *Proceedings of the Physico-Mathematical Society of Japan*, 3rd Series, 11, No. 10, 139-142, Tokyo, November, 1929.

531. HODGSON, Ernest A., "The Earth Beneath: In the Light of Modern Seismology," *Journal of the Royal Astronomical Society of Canada*, 24, No. 2, 65-81, Toronto, February, 1930.

The above paper was presented before the Montreal Centre of the Society on Thursday, October 31, 1929. It deals, in semi-popular fashion, with the contribution of seismology toward an understanding of the structure and the physical condition of the interior of the earth. A bibliography of about twenty items is appended.

532. IMAMURA, Akitune, "On the Multiple Source of Origin of the Great Kwanto Earthquake of 1923 and its Relation to the Fault System Connected with the Earthquake," *Proceedings of the Imperial Academy*, 5, No. 8, 330-333, 6 figures, Tokyo, October, 1929.

533. IMAMURA, Akitune, "On the Active Faults in the Kyoto-Osaka District," *Proceedings of the Imperial Academy*, 5, No. 10, 463-464, 2 figures, Tokyo, December, 1929.

534. IMAMURA, Akitune, "Topographical Changes Accompanying Earthquakes or Volcanic Eruptions," *Publications of the Earthquake Investigation Committee in Foreign Languages*, No. 25, 1-143, 69 text-figures, Tokyo, 1929.

The table of contents is as follows:—

Chapter I. General View of a Cycle of Earth-tiltings.

Chapter II. Topographical Changes in the Past That Were Accompanied by Earthquakes.

Chapter III. Recent Topographical Changes That Were Accompanied by Earthquakes and Which Were Investigated by Means of Precise Levellings.

Chapter IV. Topographical Changes That Have Accompanied Volcanic Eruptions.

Chapter V. Concluding Remarks.

535. IMAMURA, Akitune and KODAIRA, Takao, "On the Pre-seismic Earth-tilting and Mechanism of Occurrence of the Kii Earthquake of July 4, 1929," *Proceedings of the Imperial Academy*, 5, No. 10, 460-462, 1 map, Tokyo, December, 1929.

536. INGLADA, Vicente, "Contribución al estudio del sismo pirenaico (Canal de Berdùn) de 10 de julio de 1923," *Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales, de Madrid*, 24, Series 2a, No. 9, 54 pages in reprint, 1929. V.I.

537. INOUE, Win and SUGIYAMA, Tomonori, "On Pre-seismic Earth-tiltings Observed at Mount Tukuba," *Proceedings of the Imperial Academy*, 5, No. 10, 457-459, 3 figures, Tokyo, December, 1929.

The authors conclude: "Our opinion on the whole is that, by diligent watching, it is possible to detect certain characteristic earth-tiltings, either before earthquake takes place or during the period when earthquakes are more or less frequent, which we might interpret as signs of instability of the earth's crust prior to an earthquake outbreak as a result of the operation of the seismogenic forces in the particular region."

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The chapters, in order, are entitled:

- (1) The Future of the Sun.
- (2) The Cooling of the Earth.
- (3) The Future of the Moon.

539. JONES, E. Lester, et al., "The United States Coast and Geodetic Survey: Its Work, Methods and Organization," Department of Commerce, Special Publication No. 23 (1928 Revised Edition), 1-130, Washington, 1928.

On pages 114-116, the seismological work of the Survey is outlined briefly.

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The author's English abstract reads, "An attempt is here made to find an explanation of the formation of the earth's surface and the distribution of the masses, based upon the whole of the endogene and exogene geological forces and phenomena. The distribution of the masses depends upon a certain independence of the outer crust of the earth, the 'facial zone,' upon the tendency of land and water to balance each other, upon the inner structure, the quantity of water, the density relationship of land and sea, the rotation of the earth and upon other causes which will be discussed. It is decisive that there exists a regional compensation between land and sea. The ideal arrangement would be given by the inverse relation of quantity and density. This fundamental law of the distribution of the masses is also to be recognized in the actual arrangement which is such as would result from a general relativity between land and sea. The whole and its parts stand in the closest connection; the whole range of geological and geophysical phenomena and relationship must be taken into consideration."

- KODAIRA, Takao and IMAMURA, Akitune, "On the Pre-seismic Earth-tilting and Mechanism of Occurrence of the Kii Earthquake of July 4, 1929," See No. 535 of this list.

541. KOENIGSBERGER, J., "Zur Erforschung der ersten 100 km. Erdkruste," *Zeitschrift für Geophysik*, 5, Heft 7, 289-299, Göttingen, 1929.

542. KÖHLER, R., "Beobachtungen an Profilen auf See-Eis," *Zeitschrift für Geophysik*, 5, Heft 7, 314-316, Göttingen, 1929.

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The author concludes: "In summarizing what is stated, the Iwatsuki seismic zone within the unstable plain of Tokyo and the crustal disturbance at the deep bottom of Sagami Bay constitute together the southwardly sheared strip with the Kazusa-Awa peninsula along the meridionally fractured geotectonic line, viz., the regional inland seismic zone of the environs of Tokyo, and the sliced seaboard strip-blocks are moving remarkably counter-clockwise around the abyss of the north Circum-Pacific, the cause of which is not known."

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545. KRUMBACH, Gerhard, "Zur Frage der Laufzeitkurven, II," *Zeitschrift für Geophysik*, 5, Heft 7, 303-314, Göttingen, 1929.
546. LABROUSTE, H., "Recherche des composantes élémentaires d'un séismogramme," *Union géodésique et géophysique internationale, Section de Séismologie, Série A, Travaux scientifiques*, Fascicule 6, 63-70, Strasbourg, 1929.
547. LACOSTE, J., "Sur le rôle des amortisseurs dans les séismographes: Coefficients d'amplification," *Union géodésique et géophysique internationale, Section de Séismologie, Série A, Travaux scientifiques*, Fascicule 6, 28-59, Strasbourg, 1929.
548. LEE, F. W., "Comparative Advantages of Applying Several Geophysical Methods of Prospecting to the Same Territory," *U. S. Bureau of Mines, Information Circular*, No. 6235, 11 pages, 27 figures, Washington, February, 1930.
549. LEE, F. W., "Geophysical Abstracts No. 10," *U.S. Bureau of Mines, Information Circular*, No. 6253, 1-29, Washington, February, 1930.
- LEET, L. Don and EWING, Maurice, "Seismic Propagation Paths." See No. 516 of this List.
550. LEHMANN, I., "Über die Laufzeitkurve der Phase ScPcS," *Zeitschrift für Geophysik*, 5, Heft 5-6, 259, Göttingen, 1929.
551. LOWE, William F., "Geological Prospecting for Oil Still in Research Stage," *National Petroleum News*, 21, No. 47, 59-63, Cleveland, 1929.
- The following abstract by W. Ayvazoglou is taken from Geophysical Abstracts (see No. 549 of this list); "The important part of geophysics in petroleum exploration, although proved to be of great value, can not yet be considered anything other than a geologic guide. The findings of the magnetometer, torsion balance, seismograph, and the various electrical methods of geologic exploration have a very definite value when properly interpreted. A clear understanding of the value is necessary before a conclusion can be reached concerning subsurface conditions. These instruments can but indicate certain irregularities in the local geological section and can not be considered oil finders. The author draws attention to the growing appreciation of the value of micropaleontology. In connection with the geophysics by which the structure may be outlined it remains for the paleontologist to furnish the more accurate geologic data."
F.W.L.
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W.H.
553. MAINKA, C., "Über die Realität von Einsätzen in einem Seismogramm," *Physikalische Zeitschrift*, 16, 241-246, Leipzig, 1915.
L.D.L.
554. MAINKA, C., "Über Universalseismographen," *Zeitschrift für Feinmechanik*, No. 2, 3 pages in reprint, Berlin, 1916.
L.D.L.
555. MAINKA, C., "Über die Registrierung mit Hilfe eines Gasstrahles bei Seismometern," *Zeitschrift für Instrumentenkunde*, 40, 195-199, Berlin, 1920.
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W. H. + L.D.L.

557. MALINOVSKI, N. V., "Peculiarities of Propagation of Seismic Waves in the Caucasus," *Annals of the V. J. Lenin State University of Azerbaijan: Section of Natural History and Medicine*, 8, 131-137, 1 chart, 1929.

The long years of observations of the first class seismic station Baku established that for earthquakes lying in W. and SW. quadrants from the station and for Δ less than 2,000-3,000 km., the determination of the coördinates of the epicentre based upon the observations of one station (Galitzin's method) led to wrong deductions, the obtained azimuth values being incorrect, because the first deflections of the horizontal and vertical pendulums pointed to the direction of epicentres in the NW. quadrant (about NW. 50°) with variations of $\pm 10^\circ$ to 15° , instead of the true one. In the author's opinion, such a phenomenon, i.e., the arrival of the initial oscillations of the first phase not in the direction from the epicentre, is a peculiarity of tectonics of the Caucasus, due to which the longitudinal movements coming directly from the hearth of the quake are either damped on their way, or acquire a lower velocity, the first movements registered thus being those which reached the mountains and were propagated through the latter towards the seismic station." (In Russian.) N.V.R.

558. MATÉRIAUX POUR L'ÉTUDE DES CALAMITÉS, "L'assurance contre les séismes," *Matériaux pour l'Étude des Calamités*, No. 19, 3, 256-276, Geneva, 1929.

A lengthy review of the subject which quotes largely from publications which have appeared in English dealing with earthquake insurance.

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- MIYABE, N., and TERADA, T., "Deformation of the Earth Crust and Topographical Features." See No. 581 of this list.

560. MONTANDON, Frédéric, "Les éboulements du Motto d'Arbino," *Matériaux pour l'Étude des Calamités*, No. 19, 3, 222-232, 2 illustrations, Geneva, 1929.

561. MUSHKETOV, D. and NIKIFOROFF, P., "Gravimetric and Seismic Expedition to Central Asia," *Comptes rendus de l'Académie des Sciences de l'Urss*, No. 22, 499-502, Leningrad, 1929. N.V.R.

The article, which is written in English, reports the above expedition undertaken by the Institute for Applied Geophysics and the Seismological Institute of the Academy of Sciences of the U.S.S.R. The point of investigation was the Ferghana depression (central Asia) and was begun in the autumn of 1928. The expedition was under the general direction of P. Nikiforoff assisted by Girin. The seismic party was headed by N. Raiko; they endeavoured to secure data "to determine the rate of propagation of elastic movements within those layers, in order to establish the law according to which their values change in the lapse of time between two consecutive earthquakes." With regard to the tentative conclusions which are drawn from the work carried out, the report concludes: "Thus, in the area of the Ferghana depression, a lack of compensation is established quite positively, which involves the tendency of that portion of the earth crust to vertical displacement upward, the latter circumstance being the cause of numerous strong earthquakes. As to the origin of the Ferghana depression, we are led to conclude that it was formed in the result of squeezing of the earth crust, the sial-masses being pressed into a denser layer underlying the crust."

562. NAKAMURA, Saemontaro, "The Great Earthquake of SE. Japan on Sept. 1, 1923," *Report of the Imperial Earthquake Investigation Committee*, No. 100 A., Tokyo, 1925.

"A description of the earthquake phenomena is given. A generalized form of Professor Omori's formula for the distribution of the after-shocks is discussed. By means of the new formula the number of earthquakes are given separately according to the difference of intensities." The paper is in Japanese only. The above abstract by the author is taken from the abstracts section of the *Japanese Journal of Astronomy and Geophysics*, 7, No. 2, (15), Tokyo, 1930.

563. NAKAMURA, Saemontaro, "On the Tango Earthquake of the 7th of March, 1927," *Reports of the Saito Gratitude Institute (Gakuzyutu Kenkyû Hôkoku)*, No. 5, Saito, 1928.

The paper is in Japanese only. A short abstract by the author appears in the *Japanese Journal of Astronomy and Geophysics*, 7, No. 2 (Abstracts), (15), item 41, Tokyo, 1930. It reads as follows: "In Part I a general description of the earthquake which occurred in Tango, Japan, is given. The most remarkable result is that the earthquake was preceded by a change of the sea-level along the coast of the epicentral region. In Part II a discussion of the earthquake phenomena is given. The writer found that there is a simple relationship between the horizontal and vertical dislocations along the main fault line in the epicentral region. From this relationship he concluded that the earthquake was caused by the horizontal compression of a layer of the earth's crust some 9 km. thick along the fault line. His final conclusion is that the earthquakes of 1925 and 1927 must have had a common cause."

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The book is divided into three parts, the pagination and chapter divisions running through the whole. There are twenty-one chapters: the first nine deal with the phenomena of earthquakes; the next eight discuss the registration of earthquakes and the studies arising from such records; the last four present a special study of building construction in relation to seismic conditions.

566. NEUMANN, Frank, "Seismological Report, April, May, June, 1927," U.S. Department of Commerce, Coast and Geodetic Survey, Serial No. 468, 45 pages, Washington, 1930.

567. NEVILLE, Ernest H., "The Mintrop Seismic Method," *Oil News*, 26, No. 877,276, 283,284, London, September 20, 1929: and *Journal of the Institution of Petroleum Technologists*, 15, No. 76, 569-573, London, 1929.

A review, signed W. Ayvazoglou, appears in *Geophysical Abstracts* No. 10 (see No. 549 of this list). After noting that the paper described the Mintrop instrument, and method, as well as its successful applications to petroleum geology, the review concludes, "One of the most striking applications was the accurate contouring of the surface of the Paleozoic rocks beneath the later looser strata in Holland." F.W.L.

- NIKIFOROFF, P. and MUSHKETOV, D., "Gravimetric and Seismic Expedition to Central Asia." See No. 561 of this list.

568. ODDONE, E., "Études sur les mouvements séismiques, gravitationnels et projectifs d'égale vitesse," *Union géodésique et géophysique internationale, Section de Séismologie, Série A, Travaux scientifiques*, Fascicule 6, 18-27, Strasbourg, 1929.

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570. PREY, A., "Über die Elastizitätskonstante der Erde," *Gerlands Beiträge zur Geophysik*, 23, Heft 4, 379-429, Leipzig, 1929.

A lengthy summary, in English as well as in French and in German, is given. The paper is an important contribution to the literature of the subject indicated.

571. PUSEY, William Allen, "The New Madrid Earthquake—An Unpublished Contemporaneous Account," *Science*, No. 1837, **71**, 285-286, New York, March 14, 1930.
The paper quotes excerpts from the diary of William Brown, who lived about forty-six miles directly south of Louisville, Ky., at the time of the New Madrid earthquake. References are also given to other sources of information regarding that earthquake.
572. REUTLINGER, G., "Eine experimentelle Überprüfung der Theorie der Schwingungsmesser," *Gerlands Beiträge zur Geophysik*, **24**, Heft 2-3, 168-240, Leipzig, 1929.
An important contribution to the literature of the subject indicated.
573. RISCH, Kurt, "Messungen von Verkehrserschütterungen," *Strassenbau und Strassenunterhaltung (Strassenbau-Beilage der 'Verkehrstechnik')*, Heft 40, 4 pages in reprint, 1929.
The paper describes a number of different types of instruments designed to record artificial tremors. These included a "Vibrograph" by Dr. Geiger, a "Seismograph" by Spindler and Hoyer, an "Amplitudenmesser" by Schenk, and a Piezo-quartz Acceleration-meter after Ambronn.
- SABININA, A. D., BONCHKOVSKI, V. E., and BASKAKOV, V. K., "Bulletin géophysique, etc." See No. 507 of this list.
574. SCRASE, F. J., "Two Notes on the Operation of Galitzin Seismographs," Meteorological Office, London, *Geophysical Memoirs*, **5**, No. 49, H.M. Stationery Office, London, 1930.
The first note describes an isopleth diagram for the rapid evaluation of the free period and the damping constant of a Galitzin seismograph. The second note discusses the variation of period of the Galitzin vertical pendulum with angular deviation and the effect of this variation on the magnification factor. F.J.S.
575. SELLARDS, E. H., "Man-made Earthquakes," *Science*, No. 1833, **71**, 188-189, New York, February 14, 1930.
An account of the effects of blasts used for seismic prospecting at distances of thirty miles and more in Texas. The author concludes that "limestone is apparently an effective medium for the transfer of earth tremors."
576. SOMIGLIANA, Carlo, "The Mechanics of Earthquakes," *Scientific American Supplement*, No. 2269, **87**, 402-403: 407, New York, June 28, 1919.
The above interesting paper was translated for the *Scientific American Supplement* from *Scientia* (Bologna). L.D.L.
577. SOMVILLE, O., "L'enregistrement des séismes des 11 novembre 1922 et 14 avril 1924 à Uccle et à De Bilt," *Union géodésique et géophysique internationale, Section de Séismologie, Série A, Travaux scientifiques*, Fascicule 6, 1-17, Strasbourg, 1929.
578. SPITALER, R., "Über die Auslösung von Erdbeben durch die Achsenschwankungen der Erde," *Gerlands Beiträge zur Geophysik*, **25**, Heft 1, 119-129, Leipzig, 1930.
The author's English abstract reads, "Based on 87 observations of earthquakes, a close connection is shown to exist between the latitude of a terrestrial place and the respective changes of it at the time of the earthquake. The earthquake is generally preceded by a change of direction of the elastic tension or forces caused by the change of latitude with the tendency of forming the rotation ellipsoid conformable to the new position of the rotation axis and temporarily producing earthquakes in certain places disposed for them."
- SUGIYAMA, Tomonori and INOUE, Win, "On Preseismic Earth-tiltings Observed at Mount Tukaba." See No. 537 of this list.

579. SUYEHIRO, Kyoji, "Über die untere Grenze der fühlbaren Schwingungen," *Proceedings of the Imperial Academy*, 5, No. 9, 411-414, Tokyo, November, 1929.
580. TANAKADATE, H., "On the Relations between the Tectonic Earthquakes and Volcanic Activities in Japan," *Union géodésique et géophysique internationale, Section de Séismologie, Série A, Travaux scientifiques, Fascicule 6*, 60-62, Strasbourg, 1929.
581. TERADA, T. and MIYABE, N., "Deformation of the Earth Crust and Topographical Features," *Proceedings of the Imperial Academy*, 5, No. 8, 322-325, 2 diagrams, Tokyo, October, 1929.
582. THORNBURGH, H. R., "Wave-front Diagrams in Seismic Interpretation," *Bulletin of the American Association of Petroleum Geologists*, 14, No. 2, 185-200, Tulsa, February, 1930.
 The author's abstract reads: "Subsurface structure can be derived from seismic data by graphical methods based upon wave-front diagrams. The method of construction of these diagrams is shown, and the nature and origin of the important underlayer wave is explained. Coincident-time curves and secondary shotpoints are defined and some applications are illustrated. The diagrams are used to explain some of the simpler seismic rules, and the original determination of simple underlayer structure is illustrated. The paper is only an introduction to wave-front methods; the principles developed can be applied by experienced seismologists to more complex situations." L.D.L.
583. TSUBOI, Chuji, "On a Relation between the Distributions of Gravitational Anomalies and the Origins of Earthquakes in Japan," *Proceedings of the Imperial Academy*, 5, No. 8, 326-329, 2 maps, Tokyo, October, 1929.
584. TSUBOI, Chuji, "Report on the Activity of the Earthquake Research Institute, Tokyo Imperial University, 1925-1929," *Gerlands Beiträge zur Geophysik*, 23, Heft 4, 430-441, Leipzig, 1929.
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586. ULLER, Karl, "Grundlegung der Kinematik einer physikalischen Welle von elementarer Schwingungsform" (Parts II and III), *Physikalische Zeitschrift*, 17, 610-615, Leipzig, 1916; and 18, 548-550, Leipzig, 1917. L.D.L.
 Part I was previously reported as No. 493 (2) of these lists, having appeared in the same periodical, 17, 168-172, Leipzig, 1916.
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589. ULLER, Karl, "Ton-Erzeugung und empirischer Nachweis gebundener Deformationswellen," *Zeitschrift für Physik*, 6, No. 2, 100-105, Braunschweig, 1921. L.D.L.
590. ULLER, Karl, "Über die Verzerrungswellen-Induktion," *Verhandlungen der Deutschen physikalischen Gesellschaft*, Series 3, 3, No. 1, 8-12, Braunschweig, January, 1922. L.D.L.

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The paper concludes with a bibliography of twenty-three items, a valuable list of papers published by the same author.

592. VILLA, Mario, "Les tremblements de terre d'Asie Mineure et des Balkans," *Vers la Santé*, 468-474, Paris, December, 1928.

A short review, signed R. M., appears in *Matériaux pour l'Étude des Calamités*, No. 20, 4, 392-393, Geneva, 1929.

593. VON BUELOW, E. U., "Essential Points in Use of Geophysics," *The Oil and Gas Journal*, 28, No. 33, 34; 67, 68; 104, Tulsa, January 2, 1930.

An abstract by W. Ayvazoglou appears in *Geophysical Abstracts* (see No. 549 of this list) Included in this is the following statement: ". . . Summarizing all the foregoing investigations, the author is of the opinion that they reveal the fact that for structural studies and studies of the exact shape and position of salt domes, etc., the seismic method of measuring the acceleration of the ground particles is the most reliable and speediest, therefore the most economic of to-day . . ." F.W.L.

594. VOSNESENSKI, A. V., "Earthquakes of 1927 in the Crimea," *Priroda (Nature)*, 16, No. 12, 958-974, 3 photographs and 4 sketches, 1927.

A study by the author of the Crimean earthquakes of 26 June and 12 September, 1927, based upon the evidence from instrumental observations as well as upon seismograms of distant seismic stations According to the author, the intensity of the former quake is VI, of the latter VII, Rossi-Forel. The epicentres as deduced from observations of distant stations are : $\varphi = 44^{\circ} 30' N.$; $\lambda = 35^{\circ} 50' E.$ $\varphi = 44^{\circ} 30' N.$; $\lambda = 35^{\circ} 10' E.$, differing from those calculated upon isoseists. (In Russian.) N.V.R.

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The above paper concludes the report of the seismic work at the Schweizerischen Meteorologischen Zentralanstalt, Zürich. The report as issued is a separate of twenty-five pages, taken from the Annalen for 1927 of the Zentralanstalt. W.H.

596. WHIPPLE, F. J. W., "Researches on the Transmission of Air Waves to Great Distances," *Gerlands Beiträge zur Geophysik*, 24, Heft 1, 72-75, Leipzig, 1929.

597. YABE, Hisakatsu, "Geological Age of the Latest Continental Stage of the Japanese Islands," *Proceedings of the Imperial Academy*, 5, No. 9, 430-433, November, Tokyo, 1929.

598. YABE, Hisakatsu, "Larger Geotectonic of the Island Arc of Japan Proper," *Proceedings of the Imperial Academy*, 5, No. 10, 465-468, Tokyo, December, 1929.

599. YAROSLAVTSEV, T. N., "Seismic Activity at the Kuban from 1794 to 1927," *Annals of the Kuban Institute of Agronomy*, 8, 1-33, 1929.

A catalogue of earthquakes of the Kuban area (North Caucasus) comprising quakes recorded by instruments as well as those studied in a non-instrumental way. (In Russian.) N.V.R.

600. YEHARO, Shingo, "Geologic and Tectonic Study of Shikoku," *Japanese Journal of Geology and Geography*, 7, No. 1, 1, Tokyo, October, 1929.

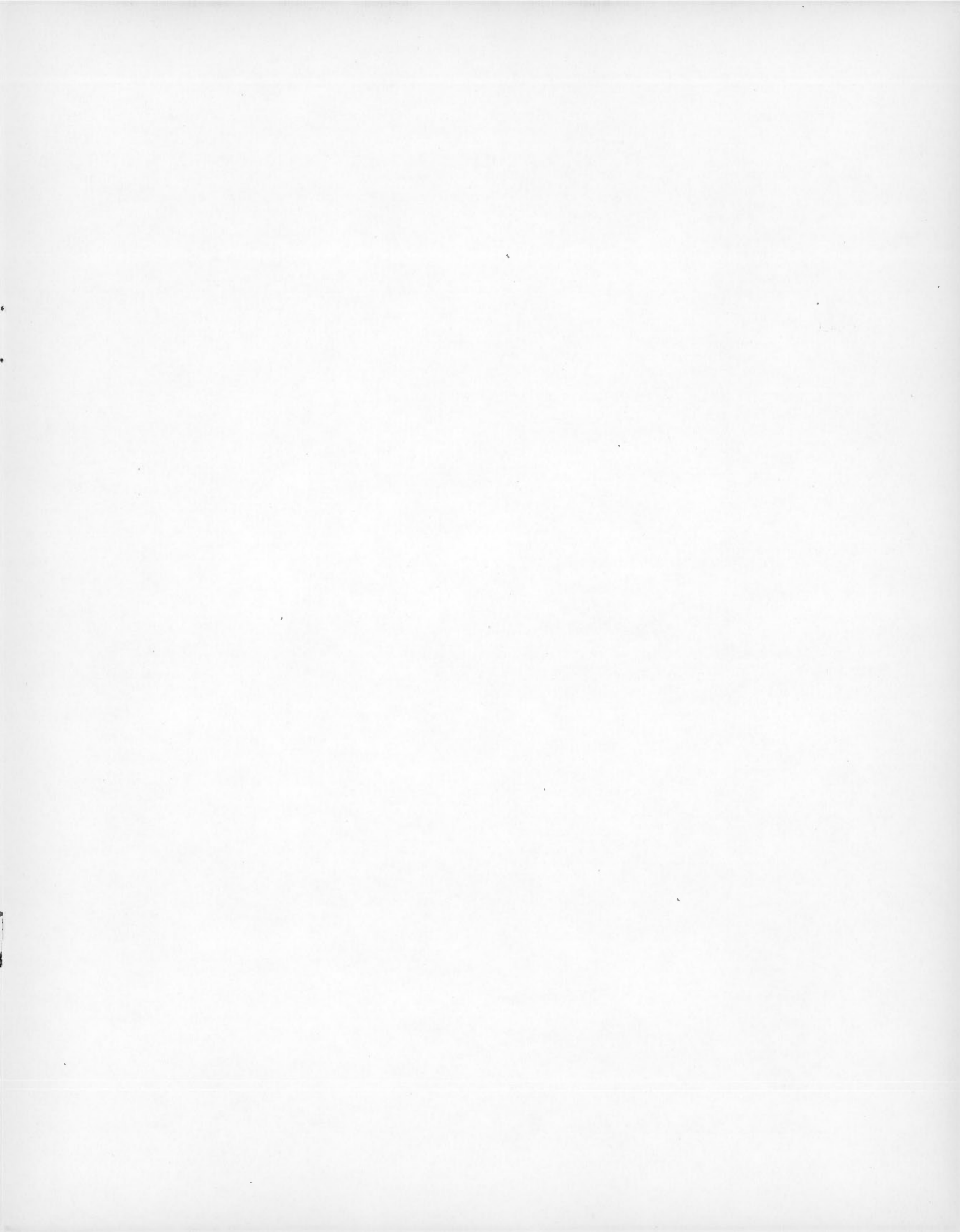
A history of earthquakes in Tosa province appears on page 20.

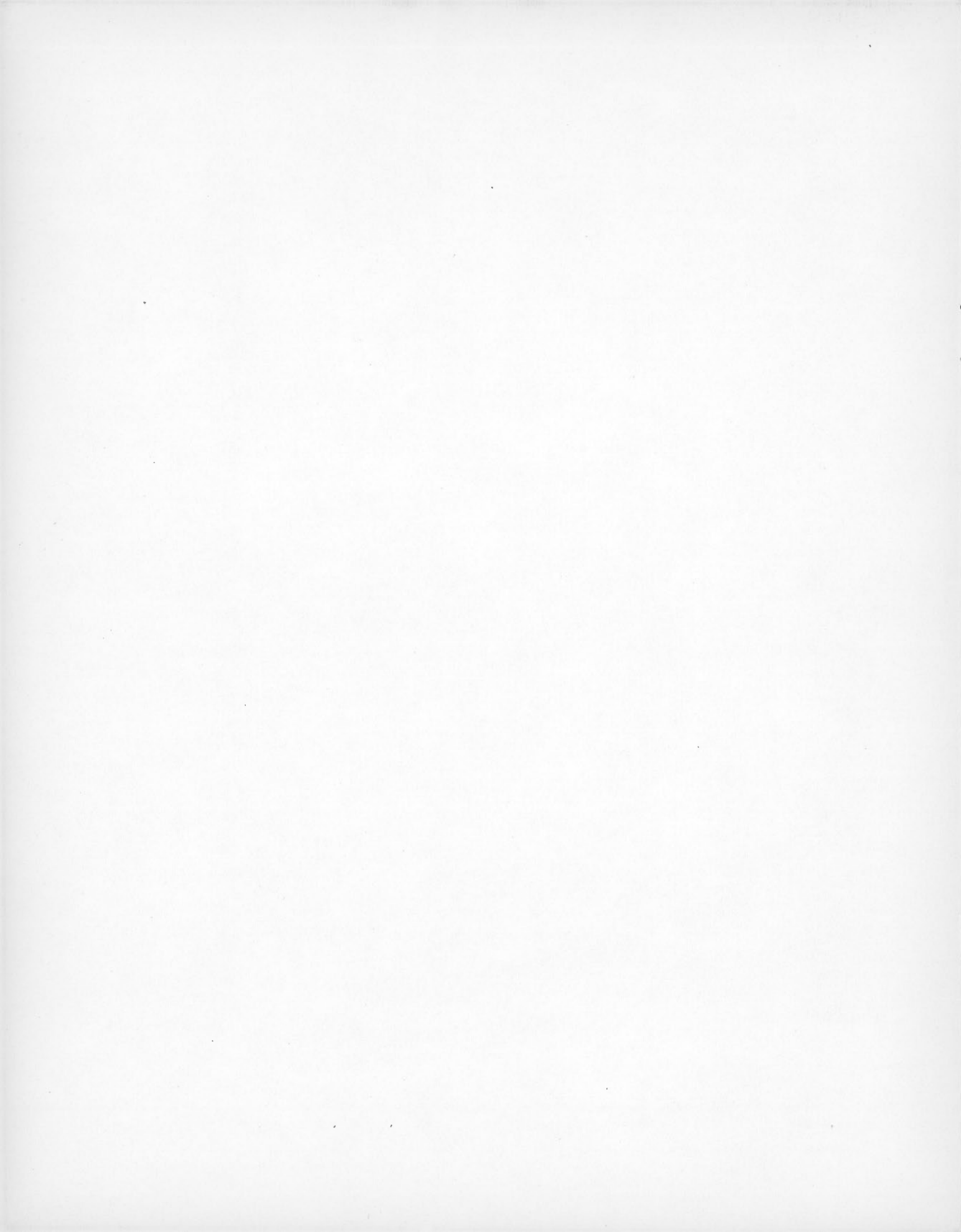
R.R.B.

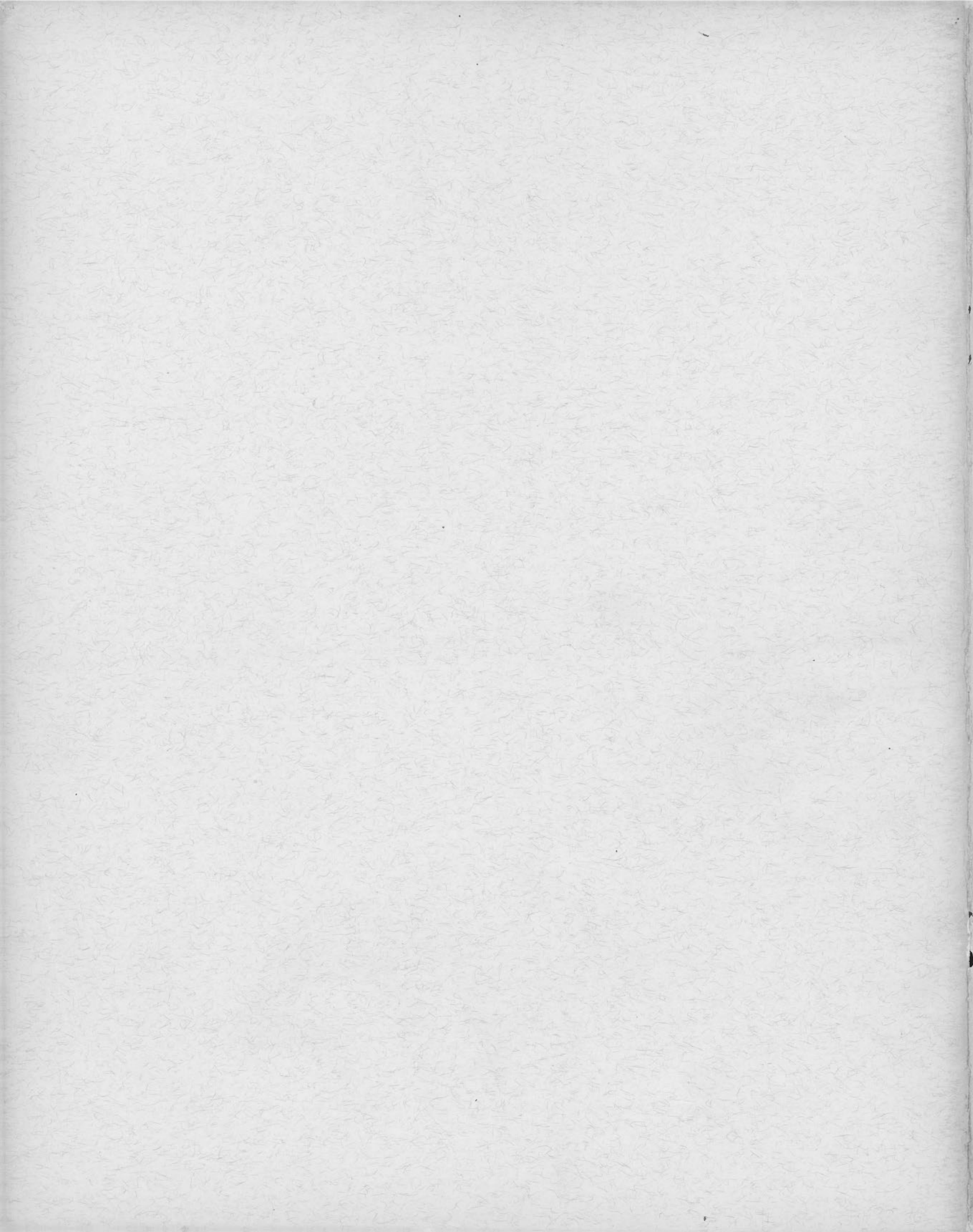
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Vol. X

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Vol. X

Bibliography of Seismology

No. 7

JULY, AUGUST, SEPTEMBER, 1930

BY

ERNEST A. HODGSON

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Bibliography of Seismology

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Bibliography of Seismology

July, August, September, 1930

601. ADAMS, L. H. and GIBSON, R. E., "The Elastic Properties of Certain Basic Rocks and Their Constituent Elements," *Proceedings of the National Academy of Sciences of the United States*, 15, No. 9, 713-724, Washington, 1929.

The author's abstract reads: "We have measured directly, at pressures between 2,000 and 12,000 megabaryes, the cubic compressibility of the minerals labradorite, jadeite, grossularite and almandite, and of diabase rocks from Sudbury, Canada; Frederick, Maryland; and the Whin Sill in the North of England. By combining these mineral results with those already known, we are able to give a table of the compressibilities, at various pressures, of all the important constituents of basic rocks, to compare the compressibilities of the rocks with those of their constituent minerals, and to conclude that the compressibility calculated from the mineral content gives a limit to which that of the rocks approaches at high pressure. Our results demonstrate, furthermore, that at 15,000 megabaryes and 30°C. the *maximum* velocity of longitudinal waves through rocks of basaltic composition and mode is 7.4 kilometers per second. On the other hand, the compressibilities of garnet and jadeite, being found to be surprisingly low, lead to the conclusion that magmas of this composition, crystallized primarily as or subsequently metamorphosed to eclogites, may transmit longitudinal waves with velocities exceeding 8 kilometers per second. Bearing in mind that the pressures existing at 20, 40, and 60 kilometers below the surface of the earth are somewhat greater than 5, 10, and 15,000 megabaryes, respectively, we may readily see the connection between these observations and deductions concerning the composition of the interior of the earth. Indeed, the existing data, in our opinion, place the possible components of the earth, below 60 kilometers and above the core, in the following ascending order of probability: holocrystalline basalt, eclogite, peridotite."

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603. AGAMENNONE, G., "Saremmo sulla via della previsione dei terremoti?" *Il Messaggero*, Rome, June 28, 1930. G.A.
604. ANTEVS, ERNST, "Maps of the Pleistocene Glaciations," *Bulletin of the Geological Society of America*, 40, No. 4, 631-720, Washington, December, 1929.
- AYABE, Naoshi and NAGAOKA, Hantaro, "On a Silica-glass Pendulum." See No. 640 of this list.
605. BERLAGE, H. P., jun., "Näherungsformeln zur Berechnung der Amplituden der elastischen Wellen, die beim Durchgang einer gegebenen Welle durch eine Unstetigkeitsfläche entstehen," *Gerlands Beiträge zur Geophysik*, 26, Heft 2, 131-140, Leipzig, 1930.

The author's English abstract reads: "K. Zoeppritz has worked out the extremely complicated relations between the amplitudes of the longitudinal and transversal reflected and refracted waves, generated at the passage of longitudinal and transversal seismic waves through a layer of discontinuity, in the abridged form of matrices.

"The formulae given below are easier to operate with, but claim to be exact only in cases of:

- (1) reflection by a free surface (density of the second medium = 0)
- (2) identity of the two media

- (3) reflection by a solid boundary (density of the second medium being infinite)
 (4) any given density of the media, if the angles of incidence of the primary wave are 0° or 90° .

"In every other case the formulae yield approximate values for the amplitudes of the secondary waves, with an error of probably no more than 0.1 of the amplitude of the incident wave.

"The ratio of the velocities of propagation of condensational and distortional waves has been supposed to amount to the square root of three. Thus liquid media have been ruled out.

"The formulae should be used only in cases when the denser medium possesses the greater velocities of propagation. They moreover do not extend to cases of total reflection.

"The solution of two practical problems closes the paper."

606. (1) BOIS, Ch., "Chronique sismologique — tremblements de terre destructeurs du 1^{er} septembre 1928 au 1^{er} janvier 1929," *Matériaux pour l'Étude des Calamités*, No. 19, 3, 243-246, Geneva, 1929.
606. (2) BOIS, Ch., "Chronique sismologique—tremblements de terre destructeurs du 1^{er} janvier 1929 au 1^{er} avril 1929," *Matériaux pour l'Étude des Calamités*, No. 20, 4, 345-347, Geneva, 1929.
607. BOWIE, William, "The Scientific and Practical Value of Triangulation," *Journal of the Washington Academy of Sciences*, 20, No. 4, 53-59, February 19, 1930.
608. BREYER, Hans, "Über die Elastizität von Gesteinen," *Zeitschrift für Geophysik*, 6, Heft 2, 98-111, Göttingen, 1930.
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610. BYERLY, Perry, "The Dispersion of Seismic Waves of the Love Type and the Thickness of the Surface Layer of the Earth under the Pacific," *Gerlands Beiträge zur Geophysik*, 26, Heft 1, 27-33, Leipzig, 1930.
- The author's abstract reads: "Observations made at the Berkeley seismographic station for eleven years have been studied and data for the dispersion of the first wave of the Love type under the Pacific obtained. If these observations be correlated with wave velocity, they point to a thickness of some 40 km. of the surface layer of the earth under the Pacific. If they be correlated with group velocity, they point to a thickness of some 20 km. I think that the former correlation is the better."
611. BYERLY, Perry, "Love Waves and the Nature of the Motion at the Origin of the Chilean Earthquake of November 11, 1922," *American Journal of Science*, Fifth Series, No. 112, 19, 274-282, New Haven, April, 1930. R.R.B.
- DAY, Arthur L., "Progress in American Seismology." See pages 161-166 of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.
612. DOBBIE, J. C., "The Ranges and Phase-displacements of the Earth and Ocean Tides. A New Investigation Based on an Experiment by A. A. Michelson and H. G. Gale," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 5, 233-259, London, February, 1930.

613. DODWELL, D. F., "South Australian Earthquakes," *Proceedings of the Australasian Association for the Advancement of Science*, 416-423, Brisbane, 1910.

The paper describes the instrumental equipment available for a study of the seismicity of Southern Australia and lists the earthquakes registered 1904-1908. It is illustrated by means of five maps, five line cuts, and five half-tone reproductions from photographs.

614. FLEMING, J. A., et al., "Transactions of the American Geophysical Union, Tenth Annual Meeting, April 25 and 26, 1929: Eleventh Annual Meeting, May 1 and 2, 1930, Washington, D.C.," Special publication by National Research Council of the National Academy of Sciences, 314 pages, 105 illustrations, 24 tables, Washington, June, 1930.

615. FLEMING, Robins, "Wind Stresses in Buildings (with a Chapter on Earthquakes and Earthquake-resistance)," John Wiley and Sons, 193 pages, 6 by 9 inches. Price (cloth) \$3.50. New York, 1930.

The publisher's abstract reads, in part, as follows: "The first three chapters are concerned with a general study of atmospheric circulation and the complicated reactions of wind, a classification of the winds, and a discussion of the causes and results of the more violent types of wind, hurricanes and tornadoes. The author presents a practical treatment of wind bracing in steel mill buildings, such as manufacturing plants, power houses, foundries, train sheds and car barns, and armories, with a special discussion of hangars. An important section of the book is devoted to the determination of wind stresses in buildings of many stories. Because of the universality of earthquakes and the damage and injury caused by them, a chapter on earthquakes and earthquake-resistance has been included."

The author is a structural engineer of the American Bridge Company, New York City.
R.R.B. + J.A.P.

- GIBSON, R. E. and ADAMS, L. H., "The Elastic Properties of Certain Basic Rocks and Their Constituent Minerals." See No. 601 of this list.

616. GOLDSTEIN, S., "Tidal Motion in Rotating Elliptic Basins of Constant Depth," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 4, 213-231, London, October, 1929,

617. GREGORY, J. W., "The Relative Influence of Denudation and Earth-Movements in Moulding the Surface of the Earth," *Scientia*, 40, No. 174, 217-230, Milan, 1926.

618. GUTENBERG, B., "Hypotheses on the Development of the Earth," *Journal of the Washington Academy of Sciences*, 20, No. 2, 17-25, January, 1930.

The text of an address given by the author before a combined meeting of the Geological Society and the Philosophical Society, in Washington, on October 23, 1929. See also No. 527 of this Bibliography.

619. GUTENBERG, B., "Die dynamische Vergrößerung von Schallregistrierinstrumenten für andauernde Sinuswellen," *Gerlands Beiträge zur Geophysik*, 26, Heft 1, 34-36, Leipzig, 1930.

620. GUTENBERG, B., "Schwere und Druck in Erdinnern," *Gerlands Beiträge zur Geophysik*, 26, Heft 1, 37-41, Leipzig, 1930.

621. GUTENBERG, B., "Der Aufbau des Untergrundes im Pazifischen Ozean," *Gerlands Beiträge zur Geophysik*, 26, Heft 2, 156-157, Leipzig, 1930. B.G.

622. GUTENBERG, B., "Die Verteilung der Massen an der Erdoberfläche," *Gerlands Beiträge zur Geophysik*, 26, Heft 2, 158-160, Leipzig, 1930.

The above short paper is addressed to Prof. L. Kober, with relation to his paper "Die Verteilung der Massen an der Erdoberfläche," which appeared in the same journal (25, Heft 2, 163-174, 1930) and which was reported as No. 540, in an earlier issue of this Bibliography, the author's English abstract being quoted at length. B.G.

623. GUTENBERG, B., "The Process of Formation of Seismic Surface Waves," *Bulletin of the Seismological Society of America*, 20, No. 1, 11-14, Stanford, March, 1930.

The above is the English translation, prepared by Ernest A. Hodgson, of a manuscript with the title, "Die Ausbildung der seismischen Oberflächenwellen," which was prepared for presentation before the joint meeting of the Seismological Society of America, and of its Eastern Section, at Fordham University, New York, May, 1929. It was read at that meeting by Dr. J. B. Macelwane, S.J., then President of the Society.

The author sketches the observed characteristics of seismic surface waves. He states and exemplifies the law of the growth of periods for such waves as stated by Uller. An explanation of the great amplitudes in the case of certain periods is explained on the basis of group velocity effects. In closing, mention is made of those phases of the subject which now await combined investigation. The writer concludes with the statement that: "For this purpose the collaboration of investigators in all parts of the world is necessary. Moreover, the results gained hitherto may only be established on the basis of records from all parts of the world."

624. GUTENBERG, B., "Zur Frage der Erdbebenursachen," *Forschungen und Fortschritte*, 6, 2 pages in reprint, with map of world showing location of larger earthquakes, Berlin, April, 1930. B.G.

625. GUTENBERG, B. and LANDSBERG, H., "Das Taunusbeben vom 22. Januar 1930," *Natur und Museum*, 60, Heft 4, 6 pages in reprint, 1 map, Frankfurt a.M., April, 1930. Also, with the same title, and by the same authors, but at somewhat greater length, in *Gerlands Beiträge zur Geophysik*, 26, Heft 2, 141-155, 4 maps, Leipzig, 1930.

The authors' English abstract in the last-named publication reads as follows: "On January 22nd, 1930, an earthquake took place in the western parts of the Taunus mountains. As to the macroseisms, it was found that the intensity V of the Mercalli-Sieberg scale was the highest one. The most-shocked district was a small area from the south of the Langenschwalbach nearly to the Lahn. The boundaries of the district in which the earthquake was felt are, to the south and west, the Rhine; in the north, the river Lahn was passed by about 20 kilometers—to Diez; from this town, the Lahn itself formed the boundary; in the east, the Idstein-ground was not reached. At the boundaries the diminishment of the intensity was extraordinary. Sounds were heard nearly in the same district in which the shock was felt. From some points, light phenomena were reported. The records showed that the focus was situated in the southeast of the shocked district, at a very slight depth." B.G.

626. HALL, Maxwell, "Earthquakes in Jamaica from 1688 to 1919," Jamaica Weather Service publication, 58 pages, map, Kingston, 1922.

627. HASEGAWA, M., "Die Wirkung der obersten Erdschicht auf die Anfangsbewegung einer Erdbebenwelle," *Zeitschrift für Geophysik*, 6, Heft 2, 78-98, Göttingen, 1930.

— HECK, N. H., "The Earthquake, a Joint Problem of the Seismologist and Engineer." See pages 153-157 of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.

— HEILAND, C. A., WANTLAND, Dart, and MALKOVSKY, J. A., "Geophysical News." See No. 637 of this list.

- HODGSON, Ernest A., "The Seismicity of the Arctic." See pages 47-49 of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.
628. IMAMURA, Akitune, "On the Chronic Block-Movements in the Kyoto-Osaka District," *Japanese Journal of Astronomy and Geophysics*, 7, No. 3 (Transactions and Abstracts), 93-101, Tokyo, 1930. R.R.B.
629. IMAMURA, Akitune, "On Changes of Topography, both Chronic and Acute, in the Southern Part of Sikoku," *Proceedings of the Imperial Academy*, 6, No. 3, 101-104, Tokyo, 1930.
630. IMAMURA, Akitune, NASU, Nobuji, KISHINOUE, Fuyuhiko, and YASUDA, Chuji, "On the Recent Ito Earthquakes," *Proceedings of the Imperial Academy*, 6, No. 5, 190-193, Tokyo, May, 1930. A.I.
- KISHINOUE, Fuyuhiko, YASUDA, Chuji, IMAMURA, Akitune, and NASU, Nobuji, "On the Recent Ito Earthquakes." See No. 630 of this list.
631. KÖHLER, R., "Harmonische Schwingungen des Untergrundes," *Zeitschrift für Geophysik*, 6, Heft 2, 123-126, Göttingen, 1930.
632. KOLDERUP, Carl Fred., "Jordskjelv i Norge, 1926-1929," *Bergens Museums Arbok, Naturvidenskapelig rekke*, Nr. 6, 40 pages, 6 figures, 4 plates, Bergen, 1930.
- LANDSBERG, H. and GUTENBERG, B., "Das Taunusbeben vom 22. Januar 1930." See No. 625 of this list.
633. LEE, Frederick W., "Geophysical Abstracts," Department of Commerce, Bureau of Mines, Washington, D.C., No. 11 (Information Circular 6273), 27 pages, March, 1930: No. 12 (Information Circular 6287), 33 pages, April, 1930: No. 13 (Information Circular 6309), 25 pages, May, 1930: No. 14 (Information Circular 6324), 24 pages, June, 1930.
- These monthly publications give abstracts of current articles and publications dealing with applied geophysics. F.W.L.
- LEET, L. Don, "Earth Vibrations from Dynamite Blasts." See pages 49-62 of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.
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635. LINK, Theodore A., "Experiments Relating to Salt-Dome Structures," *Bulletin of the American Association of Petroleum Geologists*, 14, No. 4, 483-508, 20 figures, 3 tables, Tulsa, April, 1930. T.A.L.
636. LIVLÄNDER, R., "Die kontinentalen Verschiebungen von Amerika und Madagaskar," *Zeitschrift für Geophysik*, 6, Heft 3, 134-140, Leipzig, 1930.
- MACELWANE, James B., S. J., "Earthquake Surface-waves." See pages 41-43 of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.

637. MALKOVSKY, J. A., HEILAND, C. A., and WANTLAND, Dart, "Geophysical News and Review of Geophysical Literature," 2, No. 2, 132 pages (mimeographed), Golden, Col., May 15, 1930.
Published by the Colorado School of Mines (Department of Geophysics), Golden Colorado. J.A.M.
- McADIE, Alexander, "A Serviceable Scale for Earthquake-intensity." See pages 157-158 of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.
- McCOMB, H. E., "A Tilt-compensation Seismometer." See pages 159-161 (four illustrations), of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.
638. MIHAILOVIC, J., "Annuaire séismique, Année VI, 1926: Phénomènes ressentis (macroséismes) sur le territoire du royaume des Serbes, Croates, et Slovènes," *Comité national du royaume des Serbes, Croates, et Slovènes (Union Géodésique et Géophysique internationale), Section de Séismologie, Serie A., Observations, Fascicule 4*, 93 pages, 1 map, Belgrade, 1928.
639. MIYABE, Naomi, "Deformation of Earthcrust in California," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 1, 45-59, 10 figures, March, 1930.
The author discusses the data through the re-triangulation of the western part of California subsequent to the earthquake of 1906, these data being obtained from the publication by Dr. Bowie, previously reported as No. 311 of this Bibliography.
- MIYABE, N. and TERADA, T., "Crustal Disturbance in the Kwanto Districts." See No. 671 of this list.
640. NAGAOKA, Hantaro and AYABE, Naoshi, "On a Silica-glass Pendulum," *Proceedings of the Imperial Academy*, 6, No. 4, 158-160, 1 figure, Tokyo, April, 1930.
641. NAKAMURA, Saemontaro, "On the Diffraction in Artificial Shocks Caused by a Small Building," *Science Reports, Tohoku Imperial University, Series 1*, 18, No. 3, 401-407, Sendai, October, 1929.
The author's abstract reads: "The geophysical laboratory of the Tohoku Imperial University was disturbed by artificial shocks which were caused by hammering in a nearby factory. The shocks were observed at several points in the building and also on the ground near it. As the periods of the shocks were about 0.07 seconds, their wavelength may probably have been several metres, which is nearly comparable in length to the dimensions of the building. The results of the observation show a slight diffraction of the shocks. A diffraction of the seismic waves with longer periods may be likewise expected about some isolated geological units such as isolated mountains, volcanoes, laccoliths, volcanic necks, etc., and also about isolated water masses." S.N.
- NASU, Nobuji, KISHINOUE, Fuyuhiko, YASUDA, Chuji, and IMAMURA, Akitune, "On the Recent Ito Earthquakes." See No. 630 of this list.
642. NAVARRO NEUMANN, M. Ma. S., S.J., "Les preuves de la théorie wegenérienne du déplacement des continents sont-elles évidentes?" *Ciel et Terre*, 45, Nos. 6-7, 195-202, Brussels, June-July, 1929. N.N.
643. (1) NAVARRO NEUMANN, M. Ma. S., S.J., "La Exposición Ibero-Americana de Sevilla," *Ibérica*, 33, No. 806, 353-368, Barcelona, December, 1929.

643. (2) NAVARRO NEUMANN, M. Ma. S., S. J., "L'astronomie et la physique du globe à l'exposition Ibero-Americaine de Seville," *Ciel et Terre*, **46**, Nos. 1-2, 11-16, Brussels, January-February, 1930.

These two papers sketch the work in astronomy in the United States, and in meteorology and seismology at the Cartuja Observatory. An account is given of the royal visit to the Seismological Station at Cartuja. N.N.

644. (1) NAVARRO NEUMANN, M. Ma. S., S. J., "P. Francisco A. Tondorf, S.J.," *Iberica*, **34**, No. 812, 82-83, Barcelona, January, 1930.

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645. NEUMANN, Frank, "An Analysis of the S-wave," *Bulletin of the Seismological Society of America*, **20**, No. 1, 15-32, 12 text figures, Stanford, March, 1930.

This paper was prepared for presentation before the New York meeting of the Seismological Society of America, held jointly with that of its Eastern Section, at Fordham University, April 30-May 1, 1929.

- NEUMANN, Frank, "The Velocity of Surface-waves." See page 47 of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.

646. NEUNTEUFL, Josef, "Zur Bestimmung des Epizentrums eines Nahbebens," *Gerlands Beiträge zur Geophysik*, **26**, Heft 2, 189-198, Leipzig, 1930.

The author's English summary reads: "The method by A. Mohorovičić to find the epicentre of an earthquake by the construction of hyperbels gives only a criterium of the accuracy of the result if at least the diagrams of four stations are applied."

647. NICHOLSON, G. F., "Variations in Levels, 1919 to 1927, in Los Angeles Harbor," *Bulletin of the Seismological Society of America*, **19**, No. 4, 200-205, with map, Stanford, December, 1929.

An introductory note by H. O. Wood outlines the past and present, instrumental, facilities for determining whether a fault crossing the harbor is active.

- NISHIMURA, Genrokuro and SEZAWA, Katsutada, "On the Possibility of the Block Movements of the Earth Crust." See No. 661 of this list.

648. OLDHAM, R. D., "Earth Movements in the Delta of the Rhone," *Nature*, No. 3155, **125**, 601-604, London, April 19, 1930.

The paper deals with the movements of elevation and depression in the delta of the Rhone, within historic times. R.R.B.

649. ONO, A., "The Effect of Elasticity of the Clamped End of a Bar on the Frequency of the Lateral Vibration," *Proceedings of the Imperial Academy*, **6**, No. 3, 97-100, Tokyo, March, 1930.

650. PAIGE, Sidney, "The Earthquake at Cumana, Venezuela, January 17, 1929," *Bulletin of the Seismological Society of America*, **20**, No. 1, 1-10, Stanford, March, 1930.

The paper discusses the subject in the following order: The geological and geographical setting: The earthquake phenomena: The damage to strong structures and to weak ones: The distribution of damage: The cause of the earthquake: Reconstruction. A map of the region is presented, together with 18 half-tone reproductions from photographs.

651. PROUDMAN, J., "The Forced Tides in an Ocean Bounded by a Complete Meridian on a Non-rotating Earth," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, **2**, No. 4, 209-213, London, October, 1929.

652. RANKINE, A. O., "New Seismograph for Geophysical Survey," *The Mining Magazine*, 42, No. 3, 147-150, London, 1930.

A short abstract by Ayvazoglou appears in No. 14 of *Geophysical Abstracts*. (See No. 633 of this list.) F.W.L.

- REID, Harry Fielding, "The Forces and Movements at the Earthquake-focus." See pages 43-46 of the *Transactions of the American Geophysical Union*, listed as No. 614 in this Bibliography.

653. ROSENHEAD, L., "The Annual Variation of Latitude," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 3, 140-170, London, May, 1929.

654. ROSENHEAD, L., "Tides on a Two-layer Earth," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 4, 171-196, London, October, 1929.

655. ROTHÉ, E., "Rapport de la Section de Séismologie," *Compte rendu, Comité National Français de Géodésie et Géophysique*, Assemblée générale du 2 juillet 1928, Paris, 1930.

The complete publication consists of 58 pages. The report by Prof. Rothé occupies pages 8-16.

656. ROY, LOUIS, "La propagation des ondes sur les surfaces élastiques à trois paramètres," *Comptes rendus*, 190, No. 23, 1332-1334, Paris, June 11, 1930.

657. RUEDEMANN, Rudolf, "Alternating Oscillatory Movement in the Chazy and Levis Troughs of the Appalachian Geosyncline," *Bulletin of the Geological Society of America*, 46, No. 2, 409-416, Washington, June 30, 1929.

658. SCHÜNEMANN, H., "Die seismische Bodenunruhe in Hamburg und ihr Zusammenhang mit der Brandung," *Zeitschrift für Geophysik*, 6, Heft 1, 32-41, 4 figures, Göttingen, 1930.

This paper discusses the data of the Dissertation by H. Mendel (reported as No. 146 in an earlier number of this Bibliography).

659. SCIENTIFIC AMERICAN, "Submarine Cables and Area of Recent Earthquake," *Scientific American*, 184, New York, March, 1930.

The short note, accompanying a so-called "map" of the floor of the Atlantic, states that the breaks in the cables range, roughly, in two lines 115 miles apart, and that the sea floor between them has "dropped as much as 1,710 feet, creating a submarine trough." The statement is grossly in error. Soundings of the sea floor by various agents, government and commercial, agree that no changes in depth have occurred which are of sufficient magnitude to be detected with certainty. The statement is credited to J. W. Gregory's article in *Nature* (reported as No. 523 of this Bibliography) but is a mistaken interpretation of his statement that Cabot Strait is a trough "up to 285 fathoms deep." He does not imply that the earthquake created this depth. E.A.H.

660. SEZAWA, Katsutada, "Possibility of the Free-oscillations of the Surface-layer Excited by the Seismic-waves," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 1, 1-11, 8 figures, March, 1930.

The author states: "In the present paper I have attempted to examine a simple case in which a dilational pulse of a purely plane type propagated vertically upwards in an elastic solid medium is partly transmitted through the bottom boundary of the superficial layer and partly reflected at this bottom as well as the surface boundaries of the same layer."

661. SEZAWA, Katsutada and NISHIMURA, Genrokuro, "On the Possibility of the Block Movements of the Earth Crust," *Bulletin of the Earthquake Research Institute Tokyo Imperial University*, 8, Part 1, 13-43, 19 figures, March, 1930.

The résumé of the authors is, in part, as follows:

- "1. The bodily movements of very rigid blocks of the earth crust are impossible. The idea of a mosaic work is not applicable to the actual earth crust where the elasticities or plasticities are very like to or less than that of the actual rocks and the solid friction at the surface of the separation of the blocks (if pre-existing) is very large in gravitating masses.
- "2. The deformation of the surface of the earth crust must be curved, in general. . . .
- "3. At the action of any extraordinary pressure unbalanced isostatically at the bottom of the so-called blocks, the sliding of the surface of the contact of these blocks can hardly take place and the surface displacement is very small and curved. The curvature of this surface movement partially conforms with the mode of the distribution of the unbalanced pressure at the bottom.
- "4. As the ratio of the depth to the breadth of a block is increased the surface displacement diminishes abnormally and the impossibility of the sliding of the surface of the contact increases very rapidly.
- "5. When the block is subjected to the unbalanced force acting horizontally at the surface of the contact, the sliding of the fault in the very vicinity of the surface becomes possible. The deep portion of the ground is not yet capable of sliding. Thus the evidence of the faults which are observed at the earthquake motion or in the slow deformation of the crust are of a superficial nature at the ground. . . .
- "6."

662. SHAW, H., "A Field Test with a New Seismograph," *The Mining Magazine*, 42, No. 4, 201-212, London, April, 1930.

An abstract by the author is reported in *Geophysical Abstracts*, No. 14. (See No. 633 of this list.) The abstract reads: "Tests with a new electrical seismograph devised by the Cambridge Instrument Co. were conducted over an area which is well known, as regards sub-surface structure, from a previous gravity survey and from bore-hole information.

The object of the investigation was to test the applicability of the seismic method to the location of simple structures and to ascertain the suitability of the Cambridge instrument for this purpose. The area is known to be traversed by a well-marked fault, the position, strike, and throw of which have already been determined fairly accurately, and in order to investigate this fault, three profiles were shot across it in a direction perpendicular to the strike. From an examination of the resulting time-distance curves, the position and throw of the fault are found to coincide very closely with the characteristics assumed from other data.

In addition to this, a profile was shot parallel to and on the upthrow side of the fault along a line passing through a bore-hole, in order to determine the depth below the surface of the limestone-drift interface. This determination of the depth differed from the bore-hole value by only 5 per cent." F.W.L.

663. SOKURYOBU, Rikuti, "Re-Survey of the Kwanto District after the Great Earthquake of 1923," *Bulletin of the Imperial Earthquake Investigation Committee*, 11, No. 4, 1-80, 7 plates, Tokyo, 1930.

The text of the report occupies only pages 1-6. The tabular data is given in detail. The illustrations (charts, maps, etc.) are beautifully finished.

664. SORGE, Ernst, "Die Ersten Dickenmessungen des grönländischen Inlandeises," *Zeitschrift für Geophysik*, 6, Heft 1, 22-31, Göttingen, 1930.

The paper gives the account of a German expedition to Greenland in August, 1929, for the purpose of measuring the thickness of the inland ice. A Wiechert seismograph was employed. Reflected waves were used in the investigation. A table shows depths varying from 330 metres to 1,200 metres.

665. SPITALER, R., "Der Einfluss der Achsenschwankungen der Erde auf die Temperaturanomalien," *Gerlands Beiträge zur Geophysik*, **25**, Heft 3-4, 429-441, Leipzig, 1930.
666. SPITALER, R., "Die Achsenschwankungen der Erde und ihre Folgen," *Gerlands Beiträge zur Geophysik*, **26**, Heft 1, 94-97, Leipzig, 1930.
667. TABER, Stephen. The kind collaboration of Dr. Taber has made possible the following complete list of his publications in seismology to date. Numbers in brackets indicate the location of a previous entry in this Bibliography, or, when the letters OS. are added, a previous entry in the earlier series which preceded it.
- (1) "Some Local Effects of the San Francisco Earthquake," *Journal of Geology*, **14**, 303-315, 9 figures, Chicago, May, 1906.
 - (2) "The Mechanics of the California Earthquake of April 18th, 1906," Abstract: *Proceedings of the Philosophical Society, University of Virginia Publications*, **1**, page 33, Charlottesville, 1911.
 - (3) "The Importance of Displaced Objects in Studying the Character of Earthquake Motion in Megaseismic Areas," *Bulletin of the Seismological Society of America*, **1**, No. 4, 149-158, 1 figure, Stanford, December, 1911.
 - (4) "The South Carolina Earthquake of January 1, 1913," *Bulletin of the Seismological Society of America*, **3**, No. 1, 6-13, 1 figure, Stanford, March, 1913.
 - (5) "Earthquakes in Buckingham County, Virginia," *Bulletin of the Seismological Society of America*, **3**, No. 3, 124-133, 1 plate, 1 figure, Stanford, September, 1913.
 - (6) "Seismic Activity in the Atlantic Coastal Plain near Charleston, S.C.," *Bulletin of the Seismological Society of America*, **4**, No. 3, 108-160, 3 plates, 31 figures, Stanford, September, 1914.
 - (7) "Earthquakes in South Carolina during 1914," *Bulletin of the Seismological Society of America*, **5**, No. 2, 96-99, Stanford, June, 1915.
 - (8) "Discussion of Intensity of Earthquakes," *Bulletin of the Seismological Society of America*, **5**, No. 4, 181-186, Stanford, December, 1915.
 - (9) "The Earthquake in the Southern Appalachians, February 21, 1916," *Bulletin of the Seismological Society of America*, **6**, No. 4, 218-226, 1 map, Stanford, December, 1916.
 - (10) "Preliminary Report of the Seismological Commission to His Excellency, Arthur Yager, Governor of Porto Rico," *El Imparcial*, San Juan, P.R., December 9, 1918, and in other local papers. (Joint author with Harry Fielding Reid.)
 - (11) "Recent Earthquakes in Porto Rico," Abstract: *Bulletin of the Geological Society of America*, **30**, No. 1, 83-84, Washington, March, 1919. (Joint author with Harry Fielding Reid.)
 - (12) "The Porto Rico Earthquakes of October-November, 1918," *Bulletin of the Seismological Society of America*, **9**, No. 4, 95-127, 10 figures, 3 plates, Stanford, December, 1919. (No. 288-3A, *Bibliography of Seismology*) (Joint author with Harry Fielding Reid.)
 - (13) "The Porto Rico Earthquake of 1918: with Descriptions of Earlier Earthquakes," *Report of the Earthquake Investigation Commission*, Document No. 264, U.S. House of Representatives, 66th Congress, First Session, 74 pages, 8 figures, Washington, 1919. (No. 288-3B, *Bibliography of Seismology*) (Joint author with Harry Fielding Reid.)
 - (14) "The Virgin Islands Earthquakes of 1867-1868," *Bulletin of the Seismological Society of America*, **10**, No. 1, 9-30, 1 figure, 2 plates, Stanford, March, 1920. (No. 288-3C, *Bibliography of Seismology*) (Joint author with Harry Fielding Reid.)
 - (15) "Jamaica Earthquakes and the Bartlett Trough," *Bulletin of the Seismological Society of America*, **10**, No. 2, 55-89, 1 plate, Stanford, June, 1920. (No. 288-1, *Bibliography of Seismology*.)

- (16) "The Inglewood Earthquake in Southern California, June 21, 1920," *Bulletin of the Seismological Society of America*, **10**, No. 3, 129-145, 8 plates, Stanford, September, 1920.
- (17) "The Earthquake Problem in Southern California" (Address delivered at a meeting of the Southern California Section of the American Institute of Mining and Metallurgical Engineers, in Los Angeles, on September 3, 1920.) *Bulletin of the Seismological Society of America*, **10**, No. 4, 276-289, Stanford, December, 1920.
- (18) "The Los Angeles Earthquakes of July, 1920," *Bulletin of the Seismological Society of America*, **11**, No. 1, 63-79, 1 plate, Stanford, March, 1921.
- (19) "The Great Fault Troughs of the Antilles," Abstract: *Bulletin of the Geological Society of America*, **32**, No. 1, 47, Washington, March, 1921.
- (20) "The Great Fault Troughs of the Antilles," *Journal of Geology*, **30**, No. 2, 89-114, 1 plate, 1 figure, Chicago, 1922. (No. 288-2, *Bibliography of Seismology*.)
- (21) "The Active Fault Zones of the Greater Antilles," *Congrès Géologique International, Compte rendu, XIII^e Session, Belgique, 1922*, 731-736, 1 figure, (1923). (No. 288-3, *Bibliography of Seismology*.)
- (22) "The Seismic Belt in the Greater Antilles," *Bulletin of the Seismological Society of America*, **12**, No. 4, 199-219, 1 plate, Stanford, December, 1922. (No. 888, *Bibliography of Seismology OS*.)
- (23) "Review: A Manual of Seismology" (by Charles Davison), *Bulletin of the Seismological Society of America*, **12**, No. 4, 241-244, Stanford, December, 1922.
- (24) "Some Criteria Used in Recognizing Active Faults," *Bulletin of the Geological Society of America*, **34**, 661-668, 1 figure, Washington, December 30, 1923.
- (25) "The Inglewood Fault Zone," *Bulletin of the Seismological Society of America*, **14**, No. 3, 197-199, Stanford, September, 1924.
- (26) "Evidence on Basin Range Structure," *Science*, No. 1611, **62**, 436-437, New York, 1925.
- (27) "Fault Troughs," *Journal of Geology*, **35**, No. 7, 577-606, 7 figures, Chicago, 1927. (No. 791, *Bibliography of Seismology OS*.)
- (28) "Earthquake Hazard in the South Atlantic States," Abstract: *The Bibliographical Bulletin of the Eastern Section of the Seismological Society of America*, **3**, No. 2, 42-43, Ottawa, June 1, 1928. Re-published in the *Bulletin of the Seismological Society of America*, **18**, No. 2, 147-148, Stanford, June, 1928. (Presented at the Third Annual Meeting of the Eastern Section of the Seismological Society of America, at Charlottesville, May 1, 1928.)
- (29) "Effect of Earthquakes on Artesian Waters," *Economic Geology*, **23**, No. 6, 696-697, New Haven, 1928. S.T.
668. TAMS, E., "Die Konstitution der Erdrinde," *Petermanns Mitteilungen, Ergänzungsheft Nr. 209*, 83-96, Gotha, 1930.
- This paper, on advanced seismology and geophysics, is divided into the following subject divisions:
1. General survey: The Earth's Crust in its Relation to the Earth as a Whole.
 2. The Character of the Constituents of the Earth's Crust.
 3. Temperature Distribution: Radioactivity.
 4. Surfaces of Discontinuity in the Earth's Crust: The Floors of the Oceans: The Roots of Mountains. E.T.
669. TERADA, T., "On the Relation between the Divergence of Horizontal Displacements of Trigonometrical Points and the Vertical Displacements of the Earth Crust," *Proceedings of the Imperial Academy*, **6**, No. 2, 53-55, Tokyo, February, 1930.
670. TERADA, T., "On the Nature of Destructive Earthquakes," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **8**, Part 1, 61-73, 4 figures, March, 1930.

671. TERADA, T. and MIYABE, N., "Crustal Disturbance in the Kwanto Districts," *Proceedings of the Imperial Academy*, 6, No. 2, 49-52, 2 text figures, Tokyo, February, 1930
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 Comments by F. J. W. Whipple immediately follow this account of the hearing of earthquake sounds at a distance of over 100 km. in the case of the New Zealand earthquake of June 17, 1929.
673. TSUBOI, Chuji, "Report on the Activity of the Earthquake Research Institute, Tokyo Imperial University, in the Latter Half of 1929," *Gerlands Beiträge zur Geophysik*, 26, Heft 1, 111-122, Leipzig, 1930.
 The paper deals with the following particular activities of the Institute:
1. Investigations on the Deformation of the Earth's Crust in the Tango District, Connected with the Tango Earthquake of 1927.
 2. Eruption of Mount Komagatake.
 3. Instrumental: In discussing this phase of the work, the author, describes the accelerometer designed by M. Ishimoto and R. Takahasi, and the tiltometer of M. Ishimoto.
 4. Seismometrical studies.
 5. Mathematical studies.
 6. Geological studies.
674. TSUBOI, Chuji, "A Characteristic Mode of Displacements of Triangulation Points in the Tango District after the Tango Earthquake of 1927," *Proceedings of the Imperial Academy*, 6, No. 2, 56-58, 2 text figures, Tokyo, February, 1930.
675. TURNER, H. H., "Seismological Investigation: Thirty-fourth Report of Committee on Seismology," British Association for the Advancement of Science, Report of the South Africa Meeting, 1929, Section A, 7 pages, Oxford, 1929.
676. TURNER, H. H., "International Seismological Summary for 1926," July, August, September, pages 173-308; October, November, December, pages 309-427, Oxford, 1930.
677. TURNER, H. H., "Discontinuities in the Variation of Latitude at Greenwich, 1900-27," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 5, 259-272, London, February, 1930.
678. ULLER, Karl, "Die Entwicklung des Wellen-Begriffes, III.," *Gerlands Beiträge zur Geophysik*, 26, Heft 2, 199-237, Leipzig, 1930.
 A bibliography of 32 publications, on related subjects by the same author, is appended.
679. UMEMOTO, Toyokiti, "Results of the Repeated Levellings in the Vicinity of Oosaka," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 1, 85-89, 3 figures, March, 1930.

The paper is in Japanese with a brief introduction in English. The figures show the results of the work and are lettered in both Japanese and in English. The English introduction reads: "Since 1855, the precise levelling survey was repeated several times along a system of routes situated in the vicinity of Oosaka and extended to Ooto, province of Oomi. A comparison of the results obtained in different epochs reveals some remarkable features of the vertical displacement of the earth crust in this district, as may be seen from the curves given in the annexed figures."

680. UMEMOTO, Toyokiti, "On the Results of Precise Levellings in Osaka and Vicinity," *Japanese Journal of Astronomy and Geophysics*, 7, No. 3 (Transactions and Abstracts), 83-91, Tokyo, 1930.
681. VAN DIJK, G., "De seismische storing van 2 April 1916," *Hemel en Dampkring* (Official Organ of the Nederlandsche Vereeniging voor Weeren Sterrenkunde), 14, No. 10, 11 pages in reprint, DeBilt, February, 1917. G.v.D.
682. VAN DIJK, G., "Zeebevingen," *De Zee*, No. 4, 209-216, DeBilt, 1919. G.v.D.
683. VAN DIJK, G., "Ontploffingen en de voortplanting der beweging," *Hemel en Dampkring*, 17, No. 12, April; and 18, No. 1, May; 12 pages in reprint, DeBilt, 1920. G.v.D.
684. VAN DIJK, G., "Planeten en aardbevingen," *Hemel en Dampkring*, 21, No. 11, 345-350, DeBilt, November, 1923. G.v.D.
685. VAN DIJK, G., "De aardbeving in den nacht van 5 op 6 Januari 1926," *Hemel en Dampkring*, 24, No. 3, 73-80, DeBilt, March, 1926. G.v.D.
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688. VAN DIJK, G., "Seismische Registreringen te Heerlen," *Bulletin No. 4 of the Geological Bureau (Nederlandsche Mijng gebied te Heerlen)*, 6 pages, 1 plate, DeBilt, 1928. G.v.D.
689. VAN DIJK, G., "Seismische Registreringen te Heerlen, 1 April 1928-1 Mei 1929," *Bulletin No. 6 of the Geological Bureau (Nederlandsche Mijng gebied te Heerlen)*, 135-137, 1 plate, DeBilt, 1929. G.v.D.
690. VAN DIJK, G., "Aardbevingen," *De Natur*, 49; No. 3, 69-72; No. 4, 87-95, Utrecht, 1929. G.v.D.
691. VAN DIJK, G., "Seismologie—Erdbebenkunde—Seismology—Séismologie," *Geologisch-Mijnbouwkundig Genootschap voor Nederland en Kolonien. Chapter on Seismology of the publication on "Nomenclature géologique,"* 167-182, DeBilt, 1929.

The publication of a glossary of seismological terms in four parallel columns—Dutch, German, English and French—with explanations of the terms in Dutch, is a service of outstanding value to seismologists. The terms are grouped as follows:

1. Aardbevingen—Erdbeben—Earthquakes—Tremblements de Terre.
2. Aardbevingsgolven—Erdbebenwellen—Seismic Waves—Ondes séismiques.
3. Seismografen—Seismographen—Seismographs—Séismographes.
4. Seismische Registreringen—Seismische Registrierungen—Seismographical Records—Enregistrements séismiques.
5. Bepaling van het Epicentrum—Epizentralbestimmung—Determination of Epicentre—Determination de l'Épicentre. G.v.D.

692. VISSER, S. W., "On the Distribution of Earthquakes in the Netherlands East Indian Archipelago, II, 1920-1926: with a Discussion of Time-tables," *Koninklijk Magnetisch en Meteorologisch Observatorium te Batavia*, Verhandelingen No. 22, 115 pages, 11 figures, 3 plates, 1930.

The Table of Contents is as follows:

Introduction:

Chapter I. Macroseismic records:

The records
The diligence of observers
Changes of seismicity
Distribution of earthquakes
Seismic character

Chapter II. Microseismic records:

Earthquakes of Western Java
Earthquakes in the other parts of the Archipelago
Results of microseismic records

Chapter III. Discussion of Time-tables:

Control of the tables, 1921
P-waves: S-waves: P' waves: PP: $\overline{P_c P_c S}$
 $\overline{S_c P_c S}$: PS: PPS: $\overline{S_c P_c P_c S}$: Long waves
Residual errors

Corrected Time-tables:

693. VON STEIN, Josef W., "Linemen of the Sea: When Transatlantic Cables are Broken, Men Must Be Sent to Splice Them," *Scientific American*, 448-450, New York, June, 1930.

A description of the methods followed in locating and repairing cables. The Grand Banks Earthquake of November 18, 1929, broke all the cables crossing a north-south line over 300 miles long. The repair work in connection with this earthquake was only just being completed at the time this article appeared in print.

- WANTLAND, Dart, MALKOVSKY, J. A., and HEILAND, C. A., "Geophysical News." See No. 637 of this list.

694. WHIPPLE, F. J. W., "The Great Siberian Meteor and the Waves, Seismic and Aerial, Which it Produced," *Quarterly Journal of the Royal Meteorological Society*, 56, No. 236, 287-304, London, July, 1930. F.J.W.W.

695. WILLIS, Bailey, "Thomas Chrowder Chamberlin," *Bulletin of the Geological Society of America*, 40, No. 1, 23-45, Washington, March, 30, 1929.

This biography of the late Prof. Chamberlin concludes with a full list of the papers published by him.

696. WILLIS, Bailey, "Continental Genesis," *Bulletin of the Geological Society of America*, 40, No. 1, 281-336, 3 plates, Washington, March 30, 1929.

The above indicates the text of the Presidential Address read before the Geological Society of America at the Annual Meeting on December 26, 1928.

697. WILLIS, Bailey, "Metamorphic Orogeny," *Bulletin of the Geological Society of America*, 40, No. 3, 557-590, Washington, September 30, 1929.

698. WOOD, Harry O., "Seismological Conference at Pasadena," *Bulletin of the Seismological Society of America*, 19, No. 4, 228-234, Stanford, December, 1929.

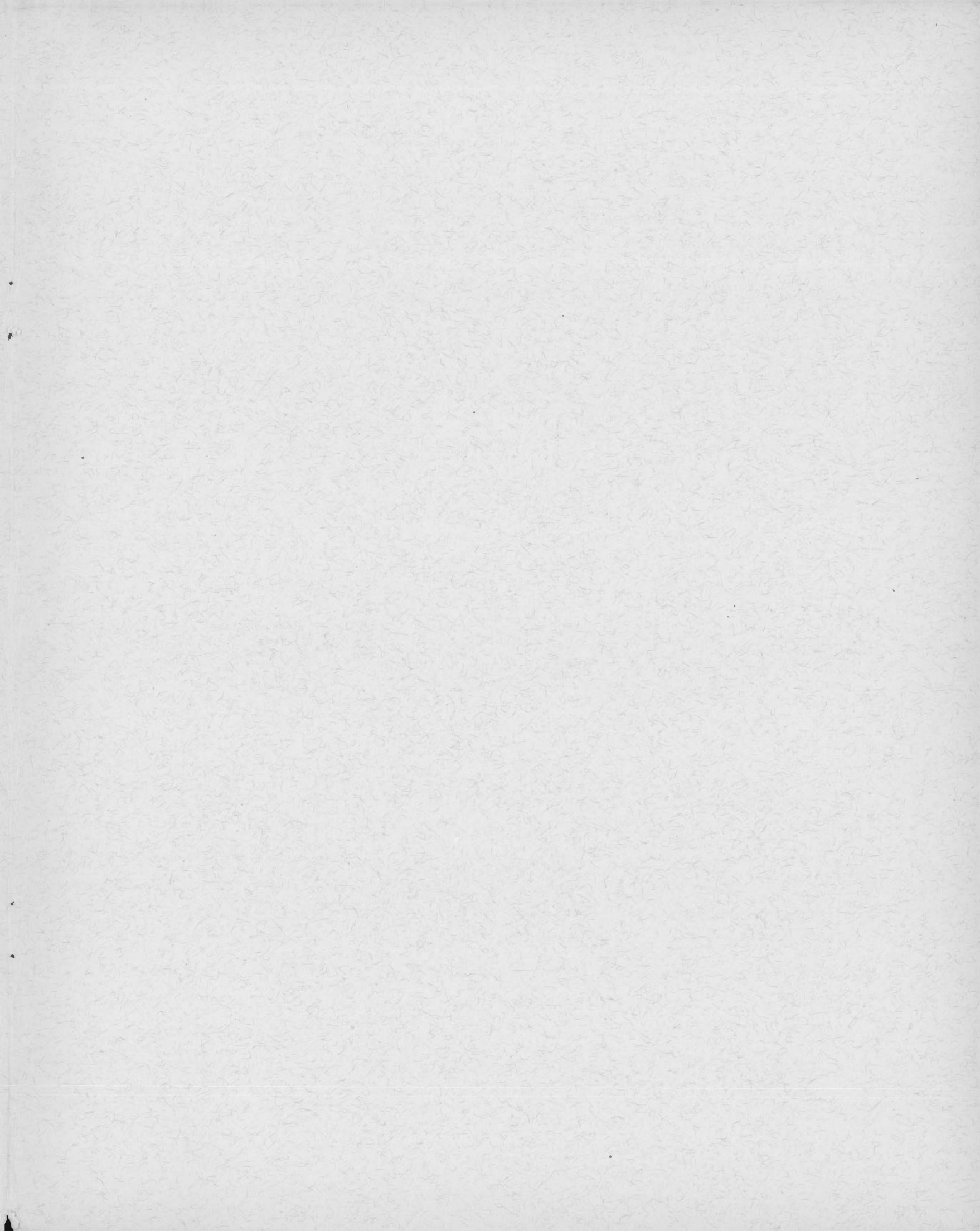
The above article describes the activities of a conference held at Pasadena during the first half of October, 1929. Besides the members of the Advisory Committee in Seismology of the Carnegie Institution of Washington, the following well-known students of seismological and allied problems were invited and were in attendance, namely: Dr. L. H. Adams, Geophysical Laboratory, Washington, D.C.; Professor Perry Byerly, University of California, Berkeley, California; Professor Dr. Beno Gutenberg, University of Frankfurt (Frankfurt-am-Main); Dr. Harold Jeffreys, Saint John's College, Cambridge University, England; Professor James B. Macelwane, S.J., Saint Louis University; and Dr. Fred E. Wright, Geophysical Laboratory, Washington, D.C. The staff of the Seismological Laboratory of the California Institute of Technology at Pasadena were also present.

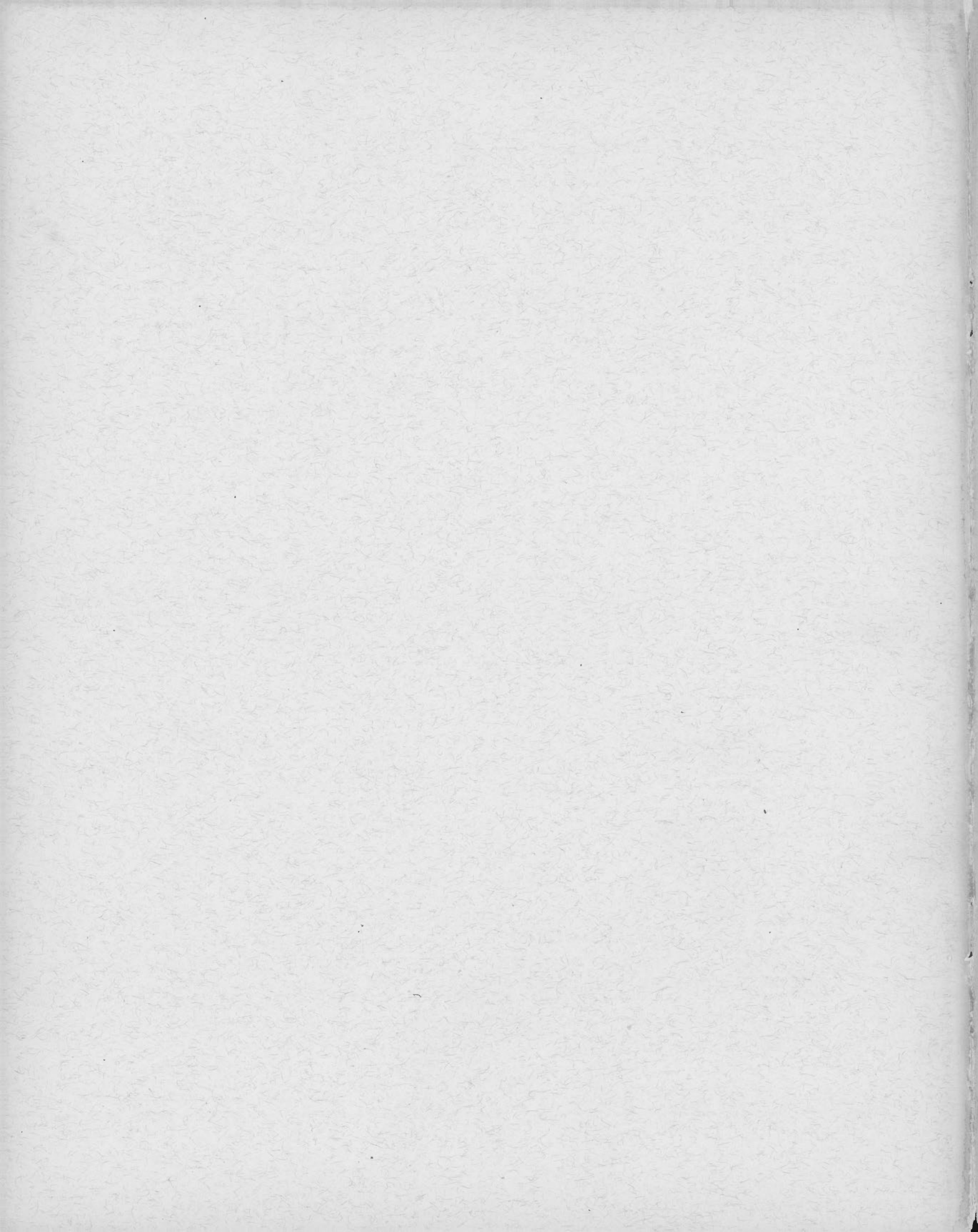
- WOOD, Harry O. (G. F. NICHOLSON), "Variations in Levels, 1919 to 1927, in Los Angeles Harbor." See No. 647 of this list.
699. YABE, Hisakatsu, "The Great Kwanto Earthquake of September 1, 1923, and the Geotectonic of the Meizoseismic Area," *Proceedings of the Imperial Academy*, 6, No. 3, 105-108, Tokyo, March, 1930. R.R.B.
700. YAMAGUTI, Seiti, "On the Effect of Ocean Current, 'Kurosiwo' upon Sea Level. Effect of Waves," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 1, 75-82, 5 figures, March, 1930.
- YASUDA, Chuji, IMAMURA, Akitune, NASU, Nobuji, and KISHINOUE, Fuyuhiko, "On the Recent Ito Earthquakes." See No. 630 of this list.

LIST OF COLLABORATORS

The appended initials are those used to indicate in each case the items contributed by the respective collaborator.

Agamennone, G., Real Osservatorio Geofisico, Rocca di Papa, Rome, Italy.	G.A.
Bodle, Ralph R., United States Coast and Geodetic Survey, Washington, D.C., U.S.A.	R.R.B.
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Imamura, A., Seismological Institute, Tokyo Imperial University, Tokyo, Japan.	A.I.
Lee, Frederick W., United States Bureau of Mines, Washington, D.C., U.S.A.	F.W.L.
Link, T. A., Imperial Oil Company, Calgary, Alberta.	T.A.L.
Malkovsky, J. A., Colorado School of Mines, Golden, Col., U.S.A.	J.A.M.
Nakamura, Saemontaro, Tohoku Imperial University, Sendai, Japan.	S.N.
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van Dijk, G., Koninklijk Nederlandsch Meteorologisch Instituut, DeBilt, Netherlands.	G.v.D.
Whipple, F. J. W., Kew Observatory, Richmond, Surrey, England.	F.J.W.W.





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BIBLIOGRAPHY OF SEISMOLOGY

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The *Handbuch der Physik* edited by H. Geiger and Karl Scheel, is published by Julius Springer, Berlin. Band 6 deals with the subject "Mechanik der elastischen Körper." The price for this Band is R.M. 56 (unbound) or R.M. 58.60 (bound). The complete *Handbuch* comprises 24 Bände.

Chapter 8 of Band 6 deals with the following:

- (1) Theory of seismological instruments.
 - (2) The physical nature of earthquake waves.
 - (3) The geometrical optics (geometrische Ausbreitung) of earthquake waves in the interior of the earth.
 - (4) Observational data.
702. BODLE, R, R, et al., "Proceedings of the 1930 Meeting, Washington, D.C.," Special publication by the Eastern Section of the Seismological Society of America, 86 pages, 34 figures, 3 tables, Washington, 1930.

The publication was made possible by financial support from several sources. It reports the joint meeting of the Eastern Section of the Seismological Society of America and the Section of Seismology of the American Geophysical Union. It was compiled by the editor of the Eastern Section, Mr Ralph R. Bodle, who was assisted in the work by the other officers of the Section resident in Washington, the Secretary, Dr. N. H. Heck, and the Treasurer, Mr. H. E. McComb. Their labours have made available in a most complete and satisfactory form the reports of the officers of the Eastern Section for the year immediately preceding the annual meeting, and the business transacted at that meeting, together with the text of each of the various addresses and papers, and the discussions arising therefrom. Distribution is made through the office of the Secretary, at the U.S. Coast and Geodetic Survey, Washington, D.C.

703. BROWN, Charles W. and MARTEL, Raoul R., "Engineering Seismology in Japan," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 8-25, 24 illustrations, Washington, 1930.

The paper gives detailed information as to the reconstruction of the damaged sections of Japan after the great earthquake of September 1, 1923.

704. BURGESS, G. K., "Address of Welcome," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 7-8, Washington, 1930.

The opening session of the meeting was held at the U.S. Bureau of Standards. The Director of that organization, Dr. G. K. Burgess, in his address of welcome, pointed out the phases of the work under his direction which are in the field of geophysics.

705. BYERLY, Perry, "The California Earthquake of November 4, 1927," *Bulletin of the Seismological Society of America*, 20, No. 2, 53-66, 3 figures, Stanford, June, 1930.

706. CENTRAL METEOROLOGICAL OBSERVATORY, TOKYO, "List of the Seismological Stations in Japan," Special Publication of the Central Meteorological Observatory, 7 pages, Tokyo, 1930.

The list gives, for each station, the latitude and longitude and a list of the seismographs, together with the constants of each. The introduction gives a brief outline of the seismological work as a whole carried out by means of the various stations.

707. CERERO, D. Rafael, "Estudio sobre la resistencia y estabilidad de los edificios sometidos a huracanes y terremotos," Imprenta y Litografia de Deposito de la Guerra, 86 pages, Madrid, 1890. W.C.R.

708. CHAPMAN, S., "A Note on Two Apparent Large Temporary Local Magnetic Disturbances Possibly Connected with Earthquakes," *Terrestrial Magnetism and Atmospheric Electricity*, 35, No. 2, 81-83, Baltimore, June, 1930. R.R.B.

The author, working in the Imperial College of Science and Technology, London, England, discusses two cases of observed temporary magnetic deflections reported as having been due to earthquakes—one in the Gulf of Tokyo on August 3, 1926; the other south of Crete on April 22, 1928—which were brought to his attention by the late Prof. H. H. Turner. He concludes: "Our present ignorance of the cause of the Earth's main field and its secular change makes it difficult to exclude a possible connection between earthquakes and local temporary magnetic disturbances."

709. DALY, Reginald A., "Nature of Certain Discontinuities in the Earth," *Bulletin of the Seismological Society of America*, 20, No. 2, 41-52, 3 tables, Stanford, June, 1930.

The author's abstract reads: "Four different kinds of experimental evidence suggest that the seismically effective compressibility of a rock is of the order of one-fifth less than its compressibility as determined by the high-pressure method. Additional, specially designed experiments to test this idea are urgently needed. As it stands, the tentative conclusion implies that the crystalline Sial of a continental block is essentially granitic down to a depth not far from thirty kilometers. Below that shell a second shell of granodiorite or quartz diorite is indicated. At the depth of about forty-five kilometers is a major discontinuity, which, interpreted on the same basis, represents the interface between the second shell and crystalline basalt, or gabbro. According to Gutenberg's hypothesis, this third shell contacts with a fourth, underlying shell of vitreous basalt, the thickness of which is not now to be readily determined from the wave-velocities in depth. So far as seismological evidence goes, that thickness may possibly approach 1200 kilometers. A shell of either crystalline or vitreous peridotite near the earth's surface is not suggested by the wave-velocities. The master discontinuity at the depth of 2900 kilometers seems capable of at least two different explanations."

710. DAVIS, Watson, "Telling the Public about Earthquakes," *Proceedings of the 1930 Meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 82-83, Washington, 1930.

Mr. Davis, as Managing Editor of Science Service, is closely connected with the work which the title of his paper indicates. Some aspects of that work are brought to the attention of seismologists in this paper.

711. DAY, Arthur L., "Progress in American Seismology," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 65-71, Washington, 1930.

In this paper Dr. Day presents an important historical sketch of the development of seismological research in the United States.

- DEWELL, Henry D., "Some remarks on the Shaking Table Investigations." See No. 724 of this list.
- DOXSEE, W. W. and HODGSON, Ernest A., "The Grand Banks Earthquake, November 18, 1929." See No. 723 of this list.
712. EPSTEIN, Paul S., "Reflection of Waves in an Inhomogeneous Absorbing Medium," *Proceedings of the National Academy of Sciences*, **16**, No. 10, 627-637, Washington, October, 1930.
713. EWING, J. A., "Earthquake Measurements," *Mémoires, University of Tokyo*, No. 9, 92 pages, Tokyo, 1883. W.C.R.
714. FERRAR, H. T., "Murchison Earthquake Investigations," *Bulletin of the Seismological Society of America*, **20**, No. 2, 92-94, 8 half-tone reproductions from photographs, Stanford, June, 1930.
715. FREEMAN, John R., "Engineering Data Needed on Earthquake Motion for Use in the Design of Earthquake-resisting Structures," *Bulletin of the Seismological Society of America*, **20**, No. 2, 67-87, Stanford, June, 1930, and also in the *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 25-40, followed by pages 40-42 devoted to a report of the discussion of the above paper, Washington, 1930.
- Dr. Freeman presents in this paper a vivid outline of the problems and the possibilities of development in seismological research along the lines which will furnish engineers with data required in the design of earthquake-resisting structures in seismic areas. A recent visit to Japan afforded the author an opportunity to study the work of Japanese seismologists along these lines. He urges that steps be taken at once to hasten research development in engineering seismology.
716. GEODETIC INSTITUTE, COPENHAGEN, DENMARK, "The Seismological Stations of Copenhagen and Scoresby-Sund," Special Publication of the Geodetic Institute, 32 pages, 21 figures, 9 plates, Copenhagen, 1930.
717. GUTENBERG, B. and SCHLECHTWEG, H., "Viskosität und innere Reibung fester Körper," *Physikalische Zeitschrift*, **31**, Heft 16, 745-752, Leipzig, 1930.
718. HASEGAWA, M., "Die erste Bewegung bei einem Erdbeben," *Gerlands Beiträge zur Geophysik*, **27**, 102-125, Leipzig, 1930.
719. HECK, N. H., "Progress of Seismological Investigations in the United States, July 1, 1927, to January 1, 1930," U. S. Department of Commerce, Coast and Geodetic Survey, Special Publication No. 167, Washington, 1930.
- The author has succeeded in bringing together within the fourteen pages of this pamphlet a most complete outline of the important progress in seismological work accomplished during the period indicated.
720. HECK, N. H., "Earthquakes, a Challenge to Science," *Scientific Monthly*, **31**, 113-125 12 illustrations, New York, August, 1930. R.R.B.
721. HECK, N. H., "The Earthquake, a Joint Problem of the Seismologist and Engineer," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 42-46, Washington, 1930.

722. HOBBS, W. H., "The Cause of Earthquakes, Especially Those of Eastern United States," *Annals of the Smithsonian Institution for 1926*, 257-277, 5 figures, Washington, 1927.

An abstract appears in *Geologisches Zentralblatt*, 42, No. 6, 317-318, Berlin, September 15, 1930.

723. HODGSON, Ernest A. and DOXSEE, W. W., "The Grand Banks Earthquake, November 18, 1929," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 72-79, 3 figures, 2 tables, Washington, 1930.

The paper is followed, on pages 79-81, by an account of the discussion. Mr. Higgins of the Western Union Telegraph Company, contributed much valuable information with regard to the effect of the earthquake on the cables crossing the disturbed area.

724. HOOVER, Theodore J., et al., "Progress Report on Vibration Research at Stanford University," *Bulletin of the Seismological Society of America*, 20, No. 3, 113-236, Stanford, September, 1930.

The report includes the following papers:

- "Vibration Research—Introduction," Theodore J. Hoover, 113-114.
 "Dynamic Behavior of Models of Timber Walls," Lydik S. Jacobsen, 115-146, 7 tables, 15 figures.
 "Experiments with a Shaking Machine," F. J. Rogers, 147-159, 1 table, 4 figures.
 "Motion of a Soil Subjected to a Simple Harmonic Ground Vibration," Lydik S. Jacobsen, 160-195, 17 figures.
 "An Approximate Solution of the Steady Forced Vibration of a System of One Degree of Freedom under the Influence of Various Types of Damping," Lydik S. Jacobsen, 196-223, 1 table, 11 figures.
 "Discussions of the Paper on Forced Vibrations" (immediately preceding), by various members of the American Society of Mechanical Engineers, at the Detroit meeting of June 9, 1930, at which it was presented by Professor L. H. Donnell of the University of Michigan, 224-230.
 "Some Remarks on the Shaking Table Investigations," Henry D. Dewell, 231-236.

The report covers the research to date in the field of vibrations, carried out in the School of Engineering, Department of Mechanical Engineering, Stanford University, with the aid of funds contributed by an anonymous donor, supplemented by a gift from the National Academy of Sciences. The actual work of the research and analysis of the results have been done by Professor Lydik S. Jacobsen. A consulting committee of six members has given advice from time to time.

725. IMAMURA, Akitune, "On the Chronic and Acute Earth-tiltings in the Southern Part of Sikoku," *Japanese Journal of Astronomy and Geophysics*, 8, No. 1, 29-37, 5 figures, Tokyo, 1930.

726. IMAMURA, Akitune, "The Status of Seismology in Japan," Report presented at the Fourth General Conference of the International Union of Geodesy and Geophysics, at Stockholm, 1930, 13 pages, Tokyo, 1930.

727. IMBÒ, Giuseppe, "Attività sismica durante la fase parossismale del 30 Novembre-1° Dicembre 1923," *Annali del Reale Osservatorio Vesuviano*, Third Series, 2, 11 pages in reprint, Naples, 1925.

728. IMBÒ, Giuseppe, "Osservazioni e ricerche in relazione all' eruzione etnea 2-20 Novembre 1928," *Bulletin Volcanologique (Organe de la Section de Volcanologie de l'Union géodésique et géophysique internationale)*, Nos. 15-18, Naples, 1928.
The publication consists of fifty-nine pages in the reprint, together with fourteen reproductions from photographs and one large folded map. On pages 31-47, the author presents an outline of the seismic activity accompanying the eruptions.
729. INGLADA ORS, Vicente, "Estudio de las erupciones volcanicas por medio de las sacudidas sismicas que producen," *Bulletin Volcanologique*, 1927, Nos. 13 and 14, 244-266, Naples, 1929.
An abstract appears in *Geologisches Zentralblatt*, 42, No. 6, 318-319, Berlin, September 15, 1930.
730. INOUE, W. and SUGIYAMA, T., "On Earth-tiltings observed at Mt. Tukuba" (in Japanese with a long abstract in English), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 3, 346-363, 18 figures, September, 1930.
731. ISHIMOTO, Mishio, "Observations sur les variations de l'inclinaison de la surface terrestre (deuxième rapport). Résultats obtenus dans la région épicertrale du tremblement de terre de Sekihara," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 2, 222-236, 3 figures, June, 1930. R.R.B.
732. ISIKAWA, T., "Über die anormale Erschütterungsgebiete der Erdbeben," *The Geophysical Magazine*, 3, No. 2, 95-100, 10 figures, Tokyo, August, 1930.
- JACOBSEN, Lydik S., "Dynamic Behavior of Models of Timber Walls,"
"Motion of a Soil Subjected to a Simple Harmonic Ground Vibration,"
"Steady Forced Vibration under the Influence of Damping." See No. 724 of this list.
733. JAPANESE MILITARY LAND SURVEY DEPARTMENT, "Precise Levellings in the Province of Idu," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 3, 375-376, 2 figures, September, 1930.
734. JOLIAT, Joseph S., S.J., "A Table of Travel Times for Near Earthquakes," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 56-59, Washington, 1930.
The author briefly reviews the publication of such travel time data to the present and then outlines the work done at the Central Station of the Jesuit Seismological Association in studying the records of the Attica earthquake on the basis of Jeffreys' conception of the structure of the upper crust of the earth.
735. KATO, Y. and NAKAMURA, S., "On the Piezo-electric Accelerometer and Its Application to the Measurement of the Velocity of the Elastic Waves Produced by Artificial Disturbances," *Proceedings of the Imperial Academy*, 6, No. 7, 272-274, 3 figures, Tokyo, July, 1930.
The introductory paragraph reads: "The piezo-electric accelerometer was first introduced into seismometry by Prince B. Galitzin. O. Wood discussed the problem and designed a seismometer. He succeeded in recording the change in potential with an oscillographic galvanometer by adopting the resistance capacity amplification, but he

introduced a transformer in the output circuit to eliminate the large plate current through the galvanometer circuit. What is recorded by this circuit shows, however, the time rate of the change in acceleration instead of the acceleration itself which is desired. The writers improved this point and obtained very large magnification without any increase of difficulties in adjusting the instrument."

736. KEITH, Arthur, "The Grand Banks Earthquake," *Supplement to the Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union, 5 pages, 3 figures, Washington, 1930.

See No. 702 of this list for details of the publication as a whole, of which this is a supplement.

737. KISHINOUE, Fuyuhiko, "Meteorological and Seismological Observations of the Eruption of Komogatake, Hokkaido, in 1929," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 2, 274-289, 5 figures, 2 tables, June, 1930.

The above paper is the third part of an extended publication on the Eruption of Komogatake in 1929. The other sections, all appearing in series in the same journal, are as follows:—

- Part 1: The Volcano Komogatake, Hokkaido, its Geology, Activity, and Petrography.....Hiromichi TSUYA
 Part 2: On the Temperature of the Pumiceous Ejecta of Komogatake, Hokkaido, as inferred from their Modes of oxidation.....Seitaro TSUBOI and Hiromichi TSUYA
 Part 3: Meteorological and Seismological Observations.....Fuyuhiko KISHINOUE
 Part 4: Observations of the Tilt of the Ground accompanying the Eruption.....Ryutarō TAKAHASHI
 Part 5: Precise Levellings around the Volcano.....Chuji TSUBOI
 Part 6: Observation with Gravity Variometer.....Chuji TSUBOI
 Part 7: Electrical Phenomena caused by the Eruption of Komogatake.....Kin'chi NAKATA
 Part 8: Observations on Komogatake.....Naomi MIYABE

738. KOHLSHÜTTER, E., "Jahresberichte des Direktors des Geodätischen Institutes für die Zeit von April 1927 bis März 1928 und von April 1928 bis März 1929," Publication of the Preussischen Geodätischen Institutes, Neue Folge, No. 103, 1-74, Potsdam, 1929.

The work in seismology is discussed on pages 33-36 and 68-71.

739. KRUMBACH, G. and SIEBERG, A., "Die wichtigeren Erdbeben des Jahres 1924 und ihre Bearbeitung," *Veröffentlichungen der Reichsanstalt für Erdbebenforschung in Jena*, Heft 11, 26 pages, Jena, 1930.

The introduction is written by Dr. O. Hecker, the Director of the Reichsanstalt für Erdbebenforschung in Jena.

740. KUMAGAI, N., "On the Shape and Size of Japan Arc," *Japanese Journal of Astronomy and Geophysics*, 8, No. 1, 1-28, Tokyo, 1930.

741. LAGRANGE, E., "Antonio Favoro, sismologue," *Ciel et Terre*, 45, Nos. 6-7, 192-195, Brussels, June-July, 1929.

742. LANE, Alfred C., "Are Batholiths Up-bulges of Sial?" *Science*, No. 1866, 72, 341. New York, October 3, 1930.

The author concludes that the evidence given by the grain exhibited by batholiths is contrary to the hypothesis that they are up-bulges of sial.

743. LEE, Frederick W., "Geophysical Abstracts," United States Bureau of Mines, No. 15 (Circular 6341), 25 pages, July; No. 16 (Circular 6355), 23 pages, August; No. 17 (Circular 6366), 29 pages, September; Washington, 1930.

The above numbers are part of a series, the first of which appeared in May, 1929. They are issued in mimeographed form by the U.S. Bureau of Mines, with the co-operation of thirty-one contributing editors. Many of the abstracts are of considerable length. Appearing monthly, this bibliography covers very efficiently the ever-growing field of geophysical prospecting.

744. LEET, L. Don., "Some Characteristics of Rayleigh-wave Records on Seismograms of Distant Earthquakes," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 60, Washington, 1930.

This paper is given in abstract only. The author presents the results of an investigation carried out by him at the Dominion Observatory, Ottawa, along the lines indicated by the title. The entire paper forms his Doctorate Thesis as presented to Harvard University. A summary, only, was given at the Washington meeting.

745. LEHMANN, I., "P' as read from the Records of the Earthquake of June 16th, 1929," *Gerlands Beiträge zur Geophysik*, 26, 402-412, Leipzig, 1929.

The author's English abstract reads as follows: "P' is read from a great number of records of the New Zealand earthquake of 16 VI 1929 and considered more particularly for distances from 160 to 170 degrees from the epicentre where 23 European records are available. In the said interval the phase is found to separate into two, the first of which is a little earlier but has approximately the same course as P' in the tables of Gutenberg and Macelwane. The times of the second part of the phase increase more with distance, the equation of the time-curve being $P'_2 - T_0 = 20^m46^s + (\Delta - 160) \times 4 \cdot 2^s$."

746. LEHMANN, I., "A Hammer for the Galitzin Vertical Component Pendulum," *Gerlands Beiträge zur Geophysik*, 26, 413-415, Leipzig, 1930.

747. LYNCH, Joseph S. J., "Earthquake Succession," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 72, Washington, 1930.

The following abstract alone appears in the Proceedings. The paper was given in detail at the meeting. Author's abstract: "Do earthquakes succeed one another in any definite direction? Is there any definite order in which they occur? The epicentres for about six years were plotted month by month, according to time of occurrence, on Mercator's projection. In most cases succeeding epicentres progressed from west to east. In some cases the progression was striking; but there were frequent cases of steady progression from east to west. The results as studied so far only warrant the conclusion that there is a slight tendency for succeeding epicentres to progress from west to east rather than vice versa."

748. MACELWANE, James B., S.J., "The Mississippi Valley Earthquake Problem," *Bulletin of the Seismological Society of America*, 20, No. 2, 95-98, Stanford, June, 1930.

The author sketches the seismic history of the region and outlines the organization now under way to permit of an extended study of the seismicity of the southeastern flank of the Ozark uplift—the so-called "New Madrid" region.

749. MARRISON, W. A., "The Crystal Clock," *Proceedings of the National Academy of Sciences*, 16, No. 7, 496-507, 10 figures, Washington, July, 1930.

The paper concludes with a bibliography of eight items on the subject of the development of the crystal clock.

- MARTEL, Raoul R. and BROWN, Charles W., "Engineering Seismology in Japan." See No. 703 of this list.
- MARTIN, H., "Das photographische Koinzidenzverfahren." See No. 752 of this list.
750. McADIE, Alexander, "A Serviceable Scale for Earthquake Intensity," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 54-56, Washington, 1930.
751. McCOMB H. E., "A Tilt-compensation Seismometer," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 60-63, 4 figures, Washington, 1930.
- The author here gives an outline of the modification which he has devised to make an old-type Bosch-Omori seismograph record photographically and to render it free from tilt effects. The modified instrument is in operation in Washington and has given several good records of earthquakes. The modifications are easily and cheaply effected and should make it possible to utilize to good advantage the Bosch-Omori seismographs which have been retired as obsolete. It makes possible the placing of such modified seismographs in outlying stations which would otherwise, for the present at least, be unable to finance the purchase of a modern seismograph and will permit such stations to carry out valuable work in the network of stations.
752. MEISSER, O. and MARTIN, H., "Erhöhung der Beobachtungsgenauigkeit bei relativen Pendelmessungen: I. Registrierung von Pendelschwingungen; II. Das photographische Koinzidenzverfahren," *Zeitschrift für Geophysik*, 5, Heft 3-4, Göttingen, 1929.
- The two sections were written by the respective authors. In connection with this same subject we may note the following paper by the second author: "Zum photographischen Koinzidenzverfahren," in the same journal, 5, Heft 7, 316-319, Göttingen, 1929. In concluding this last paper the author says: "In conclusion then it may be remarked that one may use swinging pendulums as described to measure the length of contacts or the relative time of two clocks with an accuracy of several ten-thousandths of a second."
753. MEISSER, O. and WOLF, F., "Geophysikalische Messungen unter Tage," *Zeitschrift für Geophysik*, 6, Heft 1, 13-21, Göttingen, 1930.
- The article, which was presented at the sessions of the Deutsche Geophysikalische Gesellschaft at Dresden, in 1929, concludes with the statement that, even though the investigations of underground conditions with the torsion balance have undoubted strength yet magnetic and seismic methods should be used to place the work on a sound geophysical basis. It is announced that a more detailed report will appear in the *Veröffentlichungen der Reichsanstalt für Erdbebenforschung in Jena*.
754. MERTIE, J. B., "Mountain Building in Alaska", *American Journal of Science*, Fifth Series, No. 116, 20, 101-124, New Haven, August, 1930.
755. MILDNER, P., "Die im Jahre 1928 in Leipzig aufgezeichneten Erdbeben," *Berichten der mathematisch-physischen Klasse der Sächsischen Akademie der Wissenschaften zu Leipzig*, 81, 239-266, 5 figures, 3 plates. Leipzig, 1929.
756. MILLER, William J., "The Geological History of New York State," New York State Museum, Bulletin No. 255, 148 pages, 52 plates, 38 figures, map, Albany, 1924.
- The above Bulletin may be obtained, at a price of 75 cents, from the Visual Instruction Division, State Education Department, Albany, N.Y.

757. MONTEL, A., "Le case nelle regioni sismiche e la scienza," S. Lattes and C., 116 pages, Turin, 1910. W.C.R.
- NAKAMURA, S and KATO, Y., "On the Piezo-electric Accelerometer and Its Application to the Measurement of the Velocity of Elastic Waves Produced by Artificial Disturbances." See No. 735 of this list.
758. NATIONAL RESEARCH COUNCIL OF JAPAN, "Reports Presented by the National Committee for Geodesy and Geophysics, at the International Union of Geodesy and Geophysics, Fourth General Conference, Stockholm, 1930," Special Publication of the National Research Council of Japan, Tokyo, 1930.
- The following reports are included:
- (1) "Geodetic Survey in Japan during 1927-1929," by Rikuti SOKURYOBU, 2 pages, 6 plates.
 - (2) "Re-survey of the Kwanto District after the Great Earthquake of 1923," by Rikuti SOKURYOBU, 80 pages, 7 plates.
 - (3) "Re-survey of the Tango District after the Earthquake of 1927," by Rikuti SOKURYOBU, 18 pages, 10 plates.
 - (4) "Report upon the Provisional Result of the Work of the International Latitude Service in the North Parallel + 39° 8' during the Period 1927.14-1930.05," by Hisashi KIMURA, 7 pages, 1 figure.
759. NATURE, "Prof. H. H. Turner, F.R.S." (an obituary), *Nature*, No. 3174, 126, 318-319 London, August 30, 1930.
760. NAUMANN, Edmund, "Über Erdbeben und Vulcanausbrüche in Japan," *Mitteilungen der Deutschen Gesellschaft für Natur- und Volkerunde Ostasiens*, Heft 15, 163-215, Yokohama, August, 1878. W.C.R.
761. NAVARRO, NEUMANN, M. Ma., S.J., "Notas sismológicas (1929)," *Ibérica*, Núm. 842, 17, 138-142, Barcelona, September, 1930. N.N.
762. NEGRI, Galdino, "Nueva Tabla Sismica," Special Publication of the Dirección de Meteorología, Ministerio de Agricultura de la Nación, República Argentina, 8 pages, Buenos Aires, 1929.
763. NENNSTIEL, Fritz, "Entstehung und Ausbreitung Deutscher Erdbeben in ihrer Abhängigkeit von den geologischen Verhältnissen," *Veröffentlichungen der Reichsanstalt für Erdbebenforschung in Jena*, Heft 12, 1-43, 8 figures, Jena, 1930.
- The table of contents serves to show the important nature of this contribution to the literature of seismology:
- Part I: Monographs on several earthquakes:
- (1) The Südschwarzwald earthquake, January 22, 1896.
 - (2) The West Germany earthquake, August 26, 1878.
 - (3) The first Herzogenrather earthquake, October 22, 1873.
 - (4) The second Herzogenrather earthquake, June 24, 1877.
 - (5) The earthquake in Hohen Venn, January 14, 1928.
 - (6) The Mittelschlesische earthquake, June 11, 1895.
- Part II: The established earthquake hearths as points of geological movement:
- (1) The hearth of the Bonndorfer graben.
 - (2) The hearth of the Rur-Erft-Schollen.
 - (3) The hearth of the Feldbiss.
 - (4) The hearth in Hohen Venn.
 - (5) Conclusions as to the earthquake hearth at Niederrheim.
 - (6) The seismic "trellis" of Niederrheim.
 - (7) The hearth in Sudetenvorland.

Part III: The relation between the intensity of the earthquakes and the geological conditions:

- (1) The nature of the soil and the apparent intensity of the earthquake
 - (a) water-saturated land
 - (b) dry, firm soil
 - (c) consolidated rock.
- (2) Tectonics and apparent earthquake intensity
 - (a) the influence of faulting
 - (b) the influence of "Bruchstörungen."

A lengthy bibliography completes the publication.

764. NEVILS, W. Coleman, S.J., "Address of Welcome," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 65, Washington, 1930.

The sessions of the second day of the meeting were held in Georgetown University. President Nevils, in his address of welcome, spoke of the work of the late Father Tondorf, whose death occurred since the 1929 meeting of the Eastern Section. (The action of the joint meeting with regard to an expression of their deep sense of loss in the death of Father Tondorf appears in the second Resolution recorded on page 6 of the Proceedings.) The need of close co-operation in seismological work was emphasized and the readiness of Georgetown University to take part in such co-operative work was made apparent.

765. NIKIFOROFF, P., "Plan quinquennal des travaux de recherche scientifique de l'Institut Séismologique de l'Académie des Sciences de l'URSS," Special Publication of Académie des Sciences de l'Union des Républiques Soviétiques Socialistes, 27 pages, 10 plates, 1 map, Leningrad, 1930.

766. NISHIMURA, G., "The Effect of Temperature Distribution on the Deformation of a Semi-infinite Elastic Body," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 2, 91-142, 20 figures, June, 1930. R.R.B.

- NISHIMURA, G. and SEZAWA, K., "Dispersion of a Shock in Echoing- and Dispersive-elastic Bodies." See No. 785 of this list.

767. ODDONE, E., "Influence des hautes températures sur les vitesses de propagation des ondes séismiques," *Bulletin Volcanologique*, Nos. 13 and 14, 306-315, Issue for 1927, Naples, 1929.

An abstract appears in *Geologisches Zentralblatt*, 42, No. 6, 318, Berlin, September 15, 1930.

768. ODDONE, E., "Sur quelques particularités dans l'enregistrement d'un pendule horizontal atteint par les ondes explosives," Special Publication of the National Committee of Geodesy and Geophysics, Section of Seismology, for Italy. Presented at the Fourth General Conference of the International Union of Geodesy and Geophysics at Stockholm in 1930. 7 pages, 4 figures, Rome, 1930.

769. ODDONE, E., "Sur les cartes séismiques mondiales," Special Publication, Comitato Nazionale Geodetico e Geofisico, Sezione di Sismologia (Italy), 1-2, Padova, 1930.

770. ODDONE, E., "Les mesures orthométriques et géodynamiques dans les travaux de sismologie," Special publication, Comitato Nazionale Geodetico e Geofisico, Sezione di Sismologia (Italy), 1-2, Padova, 1930.

771. PALMIERI, Louis, "Sismographes électro-magnétiques," Imprimerie à S. Giovanni magg. Pignatelli, 12 pages, 4 figures, Naples, 1878.

This little booklet, published nearly sixty years ago, describes a seismograph in which the recorder and the seismograph proper were at different positions, connected by wires. The seismograph consisted of three components—two simple pendulums, one inverted, the other direct—and a vertical pendulum of simple type. When the earthquake occurred the movements caused some or all the components to be disturbed. The disturbance caused contacts to be made at mercury cups. The circuits so closed operated the corresponding magnets at the recorder making a series of dots on a moving strip of paper. A fourth magnet provided means of recording time as supplied by a separate clock.

772. PATTON, R. S., "Co-ordination of Seismological Investigation in the United States," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 51-54, Washington, 1930.

As Director of the U.S. Coast and Geodetic Survey, the author is closely in touch with the seismological work in the United States, the activities of the government in that direction being one of the branches of the work of the Survey. The paper is a clear analysis of the present situation and offers suggestions for continued work along closely co-ordinated lines.

773. PITTMAN, C. VAN A., "Buying Earthquakes," *The Dupont Magazine*, 24, No. 7, at page 1, Wilmington, July, 1930; and also in the *Oil and Gas Journal*, 29, No. 10, 129, Tulsa, July 24, 1930.

R.R.B.

An abstract by W. Ayvazoglou appears in *Geophysical Abstracts* No. 17 (see No. 743 of this list), at page 11.

F.W.L.

774. RANKINE, A. O., "Seismic Methods," *Transactions of the Institute of Mining and Metallurgy*, 38, 309-322, London, 1929.

A lengthy abstract by W. Ayvazoglou appears in *Geophysical Abstracts* No. 15 (see No. 743 of this list), at pages 8-10.

F.W.L.

775. REID, Harry Fielding, et al., "The Publication of Earthquake Data," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 63-86, Washington, 1930.

For some time seismologists have felt that the monthly bulletins were taking up more time than their proper use could warrant. It was felt that steps should be taken to reduce the published data. At this meeting a symposium was arranged to deal with the matter. Dr. Reid was the leader of this symposium.

A committee was appointed to discuss the question. The members of this committee are: Heck (Chairman), Reid, Joliat, Hodgson, and Sohn. The preliminary conclusions of the committee are given on account of the importance of the subject. They read as follows:

(1) Agreed that complete publication by printing of instrumental seismic data by yearly or other terms be discontinued. That further publication of this material be by monthly mimeographed bulletins issued as soon as practicable.

(2) Instrumental constants shall follow a specified form for each type of instrument.

(3) Long-wave portion of record to be handled by descriptive terms.

(4) Time of the earthquake. Method of indicating this is still being worked out. There is some difference of opinion.

(5) Arrangement. Hereafter for any central station grouping shall be by earthquakes rather than stations. Records for each station shall appear in alphabetical order.

(6) For preliminary portion of record, give times of all phases which can be distinguished.

(7) Giving of periods and amplitudes, as well as description of microseisms, are subjects for further study as there is considerable difference of opinion.

(8) It was agreed that each organization should be free to experiment during the remainder of 1930, in order that by next year a universal plan may be proposed for adoption.

776. REPETTI, W. C., S.J., "New Values for Some of the Discontinuities in the Earth," Government of the Philippine Islands, Weather Bureau, Manila Central Observatory, Seismological Bulletin for 1929, July-December, 75-89, 6 plates, Manila, 1930.

The paper is divided into the following sections: Historical summary; Core and discontinuity surfaces; Calculations; Discussion; Seismographic Evidence; Conclusion; Summary; Bibliography.

The author's summary reads: "Elastic waves produced by an earthquake afford a means of investigating regions of the interior of the earth which are inaccessible by other means, and some of their characteristics are mentioned. Calculations are then carried through to ascertain the depths of the discontinuities and the velocity of the longitudinal elastic waves at various depths. The resulting curves are shown. Some of the values of depths previously obtained are confirmed and some new values revealed, in particular, one at a depth of 970 km.

"The travel times for waves reflected from a discontinuity at 970 km. are calculated and the travel time curve drawn. A summary of the seismographical data used to verify the existence of such waves is given. The seismograms are reproduced and an explanation of them is appended. The bibliography is given at the end of the investigation."

The above paper is the author's Doctorate Dissertation as presented to the Faculty of the Graduate School of Saint Louis University.

777. REPETTI, W. C., S.J., "Installation of New Seismographs at the Manila Observatory," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 63-65, Washington, 1930.

— ROGERS, F. J., "Experiments with a Shaking Machine." See No. 724 of this list.

778. ROTHÉ, E., "Méthodes de prospection du sous-sol," Gauthier-Villars, 392 pages, 156 figures. Price 75 francs. Paris, 1930.

Part III is devoted to the seismic method, the chapter headings for this part being as follows:

Chapter VI. Methods and instruments, manipulation.

Chapter VII. Experience and interpretation.

F.W.L.

779. ROTHÉ, E., "Rapport de la Section de Séismologie," *Compte rendu, Comité National Français de Géodésie et Géophysique*, Assemblée générale du 7 Avril 1930, Annexe 2, 14-21, Paris, 1930.

780. ROTHÉ, E., et al., "Annuaire de l'Institut de Physique du Globe, 1927, Deuxième Partie—Séismologie," Special publication of the University of Strasbourg, Faculty of Sciences, 130 pages, Strasbourg, 1928.

The report presents the following information:

1. An introduction in summary form.
2. List of the French seismological stations, their equipment and their personnel.
3. Tabulation of earthquakes registered.
4. Tabulation of microseismic movements registered.
5. Reports of earthquakes felt in France or her colonies.
6. An obituary of Prof. A. Simon (1868-1928).

781. ROY, Louis, "La propagation des ondes sur les surfaces élastiques isotropes à trois paramètres," *Comptes rendus*, 190, No. 25, 1475-1477, Paris, 1930.

782. ROY, Louis, "La loi adiabatique dynamique relative aux surfaces élastiques," *Comptes rendus*, 191, No. 1, 12-14, Paris, 1930.
783. SAHLSTRÖM, K. E., "A Seismological Map of Northern Europe," *Sveriges Geologiska Undersökning*, Series C, No. 364, 8 pages and map in reprint. Price 0.50 kr. Stockholm, 1930.
- SATO, K. and SUYEHIRO, K., "On a Dynamical Model for Investigating the Collapse of Wooden Houses in an Earthquake." See No. 789 of this list.
- SCHLECHTWEIG, H. and GUTENBERG, B., "Viskosität und innere Reibung fester Körper." See No. 717 of this list.
784. SCIENCE NEWS-LETTER, "Strange Radiation of Sun Causes Weather and Earthquakes Says New Theory," *Science News-Letter* No. 492, 18, 163-164, Washington, September 13, 1930.
The article describes the hypothesis presented by Dr. Benjamin Boss, Director of the Dudley Observatory, Albany, N.Y., at a recent meeting of the American Astronomical Society in Chicago.
785. SEZAWA, K. and NISHIMURA, G., "Dispersion of a Shock in Echoing- and Dispersive-elastic Bodies," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 3, 321-337, 11 figures, September, 1930. R.R.B.
786. SIEBERG, A., "Ein Beitrag zur Statik der Erdbeben," *Praktika de l'Académie d'Athènes*, 4, from page 149 (13 pages in the reprint), Athens, 1929.
The author discusses the effect on earthquake intensity of the geological structure and its physical conditions. He outlines the effect of faults and throws. A short outline of his opinion on earthquake-proof construction and on the possibility of avoiding, to some extent, the destruction caused by earthquakes concludes the paper. A bibliography of eighteen items is appended.
- SIEBERG, A. and KRUMBACH, G., "Die wichtigeren Erdbeben des Jahres 1924 und ihre Bearbeitung." See No. 739 of this list.
- SOKURYOBU, Rikuti, "Geodetic Survey in Japan during 1927-1929."
"Re-survey of the Kwanto District after the Great Earthquake of 1923."
"Re-survey of the Tango District after the Earthquake of 1927." See No. 758 of this list.
787. SPEIGHT, R., "The Buller Earthquake," *Bulletin of the Seismological Society of America*, 20, No. 2, 88-91, Stanford, June, 1930.
788. STONELEY, R., "The Effect of Variation of Density on the Propagation of Surface Waves on an Elastic Solid," *Proceedings of the Leeds Philosophical Society*, 2, Part 3, 103-110, Leeds, July, 1930.
The author's summary reads: "The present paper is a discussion of the influence on the velocity of Love waves of a linear increase of density with depth, the rigidity remaining constant. Guidance is given by the phenomenon of total internal reflection, which presents an analogy to the problem here treated."
"Two distributions are discussed. For a solid of constant rigidity in which the density increases linearly with the depth, no wave of the Love type can exist. For a

layer of such material lying on uniform material in which the velocity of distortional waves is greater than in any part of the layer, wave-velocity equations are obtained to cover the three cases that arise. These are discussed for very long waves and for very short waves. For these two limiting cases it is shown that waves can exist only if the velocity of the Love wave is greater than the velocity of distortional waves at any point in the layer."

— SUGIYAMA, T. and INOUE, W., "On Earth-tiltings observed at Mt. Tukuba." See No. 730 of this list.

789. SUYEHRO, K. and SATO, K., "On a Dynamical Model for Investigating the Collapse of Wooden Houses in an Earthquake," *Proceedings of the Imperial Academy*, 6, No. 7, 289-292, 5 figures, Tokyo, July, 1930.

Making use of a structural material composed of paraffin wax, stearine, and beeswax in proportions designed to yield models "satisfying the law of similitude" for actual structures, it was found that the model of a two-storeyed house indicated that the house so represented would withstand the shocks of an earthquake as great as that of Kwanto (1923), in which, according to Prof. Imamura, the maximum oscillation at the seismograph station at Tokyo was 8.9 cm. (full amplitude) with a period of 1.35 seconds. The model indicated that collapse would be complete for an earthquake with an acceleration (horizontal) of about 0.2 g. The authors propose to check their findings by means of an experiment with a larger model, made of wood but also designed to satisfy the law of similitude.

— SUZUKI, T. and TAKAYAMA, T., "On the Relation between the Sunspot Number and the Destructive Earthquakes in Japan." See No. 791 of this list.

790. TAKAHASI, R., "Preliminary Report on the Observation of the Tilting of the Earth's Crust with a Pair of Water Pipes," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 2, 143-152, 7 figures, June, 1930.

791. TAKAYAMA, T. and SUZUKI, T., "On the Relation between the Sunspot Number and the Destructive Earthquakes in Japan" (in Japanese with a lengthy abstract in English), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 3, 364-374, September, 1930.

792. TAMS, E., "Die Seismizität des Südantillenbogens," *Zeitschrift für Geophysik*, 6, Heft 4-7, 361-369, Göttingen, 1930.

793. THOMSON, A., "Abnormal Audibility of Sound at Murchison Earthquake and Tarawere Eruption," *New Zealand Journal of Science and Technology*, 12, No. 1, 16, Wellington, June, 1930. R.R.B.

794. TSUBOI, Chuji, "Investigation on the Deformation of the Earth's Crust in the Tango District connected with the Tango Earthquake of 1927 (Part 1)," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 2, 153-221, 38 figures, June, 1930. R.R.B.

795. TSUBOI, Chuji, "Investigation on the Deformation of the Earth's Crust in the Tango District connected with the Tango Earthquake of 1927 (Part 2)," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 3, 338-345, 6 figures, September, 1930.

796. TURNER, H. H., "The International Seismological Summary for January, February, March, 1927," 1-107, Oxford, 1930.

Besides a discussion of the epicentres of the earthquakes registered during the first quarter of 1927, the paper gives a summary of the deep foci as determined by the Oxford analyses for the entire period covered by them up to the year 1927, a total of 114. A map indicating the location of these is given.

797. WASHINGTON, Henry S., "The Petrology of Saint Paul's Rocks (Atlantic)," *Papers from the Geophysical Laboratory, Carnegie Institution of Washington*, No. 702. (Reprinted from the report on the geological collections made during the voyage of the "Quest," on the Shackleton-Rowett Expedition, 1921-2, published by the Trustees of the British Museum, 1930), 19 pages, Washington, 1930. R.R.B.

The high seismicity of the region around Saint Paul's Rocks is mentioned as evidence of the unstable condition of the floor of the Atlantic ocean in that vicinity. Rudolph's map of the seismic zone of Saint Paul's Rocks is reproduced from *Gerlands Beiträge zur Geophysik*, 1, plate 7, Carton 1, Leipzig, 1887. S.T.

798. WASHINGTON, Henry S., "The Origin of the Mid-Atlantic Ridge," *Journal of the Maryland Academy of Science*, 1, No. 1, 20-29, Baltimore, 1930.

A short review appears in *The Geological Magazine*, No. 795, 67, 430-431, London, September, 1930.

799. WENNER, Frank, "A Proposed Accelerometer for Use in a Seismic Region," *Proceedings of the 1930 meeting of the Eastern Section of the Seismological Society of America*, held jointly with the Section of Seismology of the American Geophysical Union (see No. 702 of this list), 46-51, 3 figures, Washington, 1930.

800. WOOTTON, Thomas Peltier, "Geologic Literature of New Mexico," New Mexico School of Mines, State Bureau of Mines and Mineral Resources, Bulletin No. 5, 1-127, Socorro, N.M., 1930.

The publication is divided into three sections, an Introduction, Part I (Bibliography), and Part II (Index). The Introduction presents the plan and scope of the bibliography, outlines the abbreviations used and states how the various publications may be obtained—a most useful part of the compilation. The Bibliography is arranged in alphabetical order by authors. The Index groups the items of the Bibliography in the following subject groups: Areas described; Bibliography; Borings; Correlation; Dams and reservoir sites; Economic geology; Geologic formations described; Geologic formations, tables and sections; Geologic maps; Historical geology; Maps, general; Mineralogy; Palæontology; Petrology; Physical geology; Physiographic geology; Structural geology; Topographic maps; Underground water. The Index condenses the subject of the item to a word or two, indicating the location in the Bibliography by the name of the author, and a number where there are several items by a single author. The Bulletin may be obtained at the nominal price of 25 cents by addressing the State Bureau of Mines and Mineral Resources, Socorro, N.M., E. H. Wells, President and Director.

LIST OF COLLABORATORS

The items for this issue of the Bibliography were compiled while the editor was stationed at the Geophysical Laboratory of Saint Louis University. The compilation was made possible through the kindness of Rev. James B. Macelwane, S.J., Dean of the Graduate School, who arranged that all incoming scientific journals containing articles on seismology or allied subjects should pass through the hands of the editor. Although none of the listed items are marked with Dr. Macelwane's initials, his co-operation in the work of the entire issue is hereby gratefully acknowledged.

The initials appended to various items throughout the Bibliography indicate, in each case, the contribution by the respective collaborator.

Bodle, Ralph R., United States Coast and Geodetic Survey, Washington, D.C., U.S.A.	R.R.B.
Lee, Frederick W., Editor, "Geophysical Abstracts," United States Bureau of Mines, Washington, D.C., U.S.A.	F.W.L.
Navarro Neumann, M. Ma. S., S.J., Cartuja, Granada, Spain.	N.N.
Repetti, W. C., S.J., Manila Central Observatory, Weather Bureau, Manila, Philippine Islands.	W.C.R.
Taber, Stephen. University of South Carolina, Columbia, S.C., U.S.A.	S.T.

SUBJECT INDEX FOR THE YEAR 1930

The following subject index for the items listed in the *Bibliography of Seismology* for the year 1930 has been prepared in the same form as that for the items listed in 1929 (see pages 62-65, Vol. X, No. 4 of these *Publications*) and may be considered a continuation of that index.

- A1. Aids to Seismological Study: Nos. 419, 449, 477, 521, 691.
See also M1. (Maps.)
- B1. Building Construction: Nos. 417, 458, 461, 472, 475 (3), 475 (4), 475 (5), 475 (7), 475 (8), 475 (14), 475 (15), 475 (16), 475 (17), 475 (19), 485, 615, 703, 707, 786, 789.
- B2. Bibliographies: Nos. 443, 444, 446, 457, 549, 633, 637, 667 (23), 678, 691, 743, 786, 800.
- C1. Catalogues of Earthquakes, Lists of Aftershocks, etc.: Nos. 402, 475 (2), 475 (18), 562, 595, 599, 626, 692, 739.
See also R2. (Reports.)
- C2. Causes of Earthquakes: Nos. 543, 576, 578, 583, 624, 650, 722, 784.
See also R3. (Rotation Variation.)
- C3. Cosmogony; Theoretical Discussions of Similar Nature; Continental Drift, etc.: Nos. 425, 432, 509, 527, 538, 618, 636, 642, 696, 798.
- C4. Cycles, Earthquake: Nos. 416, 420, 511, 595, 599, 747, 791.
See also P5. (Prediction).
- D1. Dams and Earthquakes: No. 463.
See also E2. (Engineering).
- D2. Deformations, Gradual, of the Earth's Crust: Nos. 412, 431, 438, 491, 534, 535, 537, 581, 628, 629, 636, 639, 647, 648, 657, 725, 730, 731, 790, 794, 795.
- D3. Descriptions, General, of Earthquakes in Canada or the United States: Nos. 523, 571, 667 (1), 667 (2), 667 (4), 667 (5), 667 (7), 667 (9), 667 (16), 667 (25), 705, 723, 736.
- D4. Descriptions, General, of Earthquakes other than those in Canada or the United States: Nos. 409, 410, 414, 423, 430, 447, 461, 475 (1), 483, 501, 513, 517, 520, 536, 552, 562, 563, 564, 594, 625, 630, 650, 667 (10), 667 (11), 667 (12), 667 (13), 667 (14), 667 (15), 681, 685, 686, 687, 699, 714, 727, 763, 787.

- E1. Effects of Earthquakes, on Buildings, Ground, etc.; Observed during or after the Disturbance: Nos. 423, 447, 474, 576, 627, 650, 667 (2), 667 (3), 667 (8), 667 (17), 667 (28), 667 (29), 670, 671, 682, 683, 684, 708, 718, 721, 732, 794, 795.
- E1.1. Earthquake Sounds: Nos. 596, 672, 793.
- E2. Engineering; Particular Applications to Seismology or of Seismology: Nos. 426, 434, 659, 693, 703, 715, 720.
See also B1. (Building Construction) and D1. (Dams).
- E3. Explosions, Studies of Wave Propagation from: Nos. 413, 497, 768.
See also S3. (Seismic Prospecting).
- F1. Foci, Depth of Earthquake: Nos. 427, 450, 495, 532.
- G1. Geodesy and Surveying applied to Seismology: Nos. 401, 404, 437, 439, 465, 491, 534, 607, 663, 669, 671, 674, 679, 680, 733.
- G2. Geography of Seismological Interest: No. 496.
- G3. Geology of Interest to Seismologists: Nos. 467, 475 (9), 475 (10), 475 (11), 475 (12), 475 (13), 488, 491, 517, 520, 523, 529, 532, 533, 597, 598, 600, 604, 609, 617, 628, 629, 634, 667 (6), 667 (12), 667 (13), 667 (14), 667 (15), 667 (19), 667 (20), 667 (21), 667 (22), 667 (24), 667 (26), 667 (27), 697, 699, 740, 742, 754, 756, 763, 786, 797, 798.
See also M1. (Maps).
- G3.1. Geology, Experimental; Geodynamics: Nos. 424, 635.
- H1. Historical Studies of Seismological Interest: Nos. 402, 419, 441, 475 (2), 595, 599, 600, 626, 692.
- I1. Instruments; Seismographs and Accessories: Nos. 408 (1), 438, 446, 455, 460, 478, 487, 500, 514, 526, 547, 554, 555, 572, 574, 619, 640, 652, 662, 735, 746, 749, 751, 752, 768, 771, 790, 799.
- I2. Insurance and Earthquakes: Nos. 474, 515, 558.
See also B1. (Building Construction) and E2. (Engineering).
- I3. Isostasy and Gravity; Papers of Interest to Seismologists: Nos. 508, 583.
- L1. Landslides, Mudflows, etc.: Nos. 475 (19), 560.
- M1. Maps, Geological and Seismological: Nos. 498, 650, 769, 783.
See also G3. (Geology).
- M2. Materials of the Earth's Crust, Laboratory Tests of: Nos. 510, 601, 608.
- M3. Mathematical Physics; as Applied to Seismological Problems: Nos. 407, 415, 424, 440, 453, 466, 475 (20), 479, 480, 481, 482, 486, 493 (1), 493 (2), 493 (3), 494, 516, 530, 559, 579, 582, 585, 586, 587, 588, 589, 590, 591, 605, 610, 611, 616, 651, 653, 654, 656, 660, 661, 678, 712, 766, 770, 781, 782, 785, 788.
- M4. Microseisms: Nos. 522, 631, 658.
- O1. Obituaries: Nos. 644 (1), 644 (2), 695, 741, 759, 780.
- O2. Oceanography; Charting, etc.: Nos. 404, 412, 499, 542, 544, 682, 700.
- O3. Organizations for Seismological Investigations: Nos. 435, 452, 468, 473 (1), 473 (3), 507, 514, 519, 539, 584, 613, 614, 643 (1), 643 (2), 655, 673, 675, 698, 702, 704, 706, 710, 711, 716, 719, 726, 738, 758, 764, 765, 772, 775, 777, 779, 780.
- O4. Origins of Earthquakes; Methods of Locating Epicentres and Results of That Work: Nos. 408 (2), 462, 469, 475 (6), 532, 556, 646, 692, 732.
- P1. Pacific, Problems of: Nos. 404, 462, 544, 621.
See also V2. (Volcanoes).
- P2. Physics, Experimental, As Applied to Seismological Problems: No. 649.
- P3. Physics of the Earth; Density, Viscosity, Rigidity, Elasticity, Temperature, etc.: Nos. 428, 440, 442, 445, 451, 540, 541, 557, 570, 620, 621, 622, 665, 668, 709, 717, 742, 767, 776.
See also M3. (Mathematical Physics).

- P4. Popular Presentations of Various Phases of Seismology: Nos. 484, 505, 531, 690, 710, 720, 721, 784.
- P5. Prediction of Earthquakes: Nos. 438, 465, 534, 535, 537, 602, 603, 725, 730, 731.
See also C4. (Cycles).
- R1. Records, Evaluation of Earthquake: Nos. 477, 489, 546, 553, 577, 713, 718.
See also T4. (Time-Distance Curves) and W1. (Wave Study).
- R2. Reports, Seismological; Regular Series: Nos. 410, 450, 470, 492 (1), 492 (2), 492 (3), 505, 566, 606 (1), 606 (2), 632, 638, 676, 689, 739, 755, 761, 780, 796.
See also C1. (Catalogues).
- R2.1. Reviews of Various Phases of Seismology: Nos. 452, 531, 748.
- R3. Rotation Period of the Earth, Variations Therein; Wandering of the Pole; Variation of Latitude: Nos. 578, 653, 665, 666, 677.
- S1. Scales, Earthquake: No. 750.
- S2. Seismicity of Particular Regions: Nos. 421, 475 (2), 475 (13), 543, 592, 613, 688, 692, 757, 792.
See also C1. (Catalogues), D3. and D4. (Descriptions of Particular Earthquakes), M1. (Maps), O4. (Origins), and R2. (Reports).
- S3. Seismic Prospecting: Nos. 403, 405, 406, 411, 413, 418, 422 (1), 422 (2), 441, 443, 444, 446, 448, 454, 455, 456, 457, 464, 471, 476, 497, 502, 503, 516, 518, 528, 548, 549, 551, 561, 567, 573, 575, 582, 593, 633, 637, 662, 664, 743, 752, 753, 768, 773, 774, 778.
See also E3. (Explosions).
- T1. Textbooks; General Treatises on Seismology or Its Applications: Nos. 429, 506, 565, 701.
- T2. Tidal Loading; Its Effects; Sea-level Pressure Changes, etc.: Nos. 412, 499, 700.
- T3. Tides, Earth: Nos. 442, 612.
- T4. Time-Distance Curves, Tables, etc.: Nos. 512, 524, 545, 550, 734, 745, 762.
- V1. Vibrations of the Ground, Buildings, etc., Caused by Non-seismic Disturbances Other Than Explosions; as Traffic, Machinery, Falling Weights, Meteors, Frost: Nos. 438, 446, 502, 573, 641, 694, 724.
- V2. Volcanoes in Relation to Earthquakes: Nos. 433, 490, 580, 728, 729, 737, 760.
See also P1. (Pacific Problems).
- W1. Waves, Studies of Earthquake; Based on Observational Data; Velocity, Paths, Nature, etc.: Nos. 407, 415, 430, 436, 451, 453, 459, 473 (2), 487, 489, 504, 553, 557, 568, 569, 610, 611, 623, 631, 645, 718, 744, 745, 767.
See also E3. (Explosions), F1. (Foci), M3. (Mathematical Physics), O4. (Origins), R1. (Records), S3. (Seismic Prospecting), T1. (Texts), T4. (Time-Distance Curves), and V1. (Vibrations).

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802. AGAMENNONE, G., "La periodicità dei grandi terremoti marchigiani e romagnoli," *Il Messaggero*, Rome, November 22, 1930. G.A.
803. ALFANO, Giovanni Battista, "Che cosa è il terremoto," Scuola Tipografica Pontificia per i Figli dei Carcerati, fondata da Barfolo Longo, 35 pages, 11 figures, Pompei, 1930.
The paper deals with the circumstances of the Irpino earthquake of July 23, 1930.
- ALT, H., "Geometrie der Bewegungen." See No. 837 of this list.
- ANGENHEISTER, G., "Seismik (Erdbebenwellen)." See No. 701 and No. 833 of these lists.
804. ANSEL, E. A., "Das Impulsfeld der praktischen Seismik in graphischer Behandlung," *Gerlands Beiträge zur Geophysik, Ergänzungshefte für angewandte Geophysik*, 1, Heft 2, 117-136, 8 figures, Leipzig, 1930.
805. ARKHANGELSKI, A. D., "The Causes of Crimean Quakes and the Future of the Crimea" (in Russian), *Iskra*, 7, No. 6, 7-9, 4 figures, Moscow, 1929.
A popular exposition of results of the investigation of the Black sea bottom (at the Crimean coasts) by means of depth measures and borings. Connections between the results secured and the seismic activity of the Crimea are established. N.V.R.
806. BANERJI, Sudhansu Kumar, "Microseisms Associated with Disturbed Weather in the Indian Seas," *Philosophical Transactions of the Royal Society*, Series A, Vol. 229, 287-328. Price 6s. 6d. London, 1930.
An abstract, signed R.S.B., appears in *Science Abstracts*, Section A (Physics), No. 396, 33, page 1053, item 3954, London, December, 1930. R.R.B.
807. BARSCH, O. and REICH, H., "Ergebnisse seismischer Untersuchungen über den Schichtenaufbau von Norddeutschland," *Gerlands Beiträge zur Geophysik, Ergänzungshefte für angewandte Geophysik*, 1, Heft 2, 165-188, 8 figures, bibliography of 12 items appended, Leipzig, 1930.
The paper deals with the subject of geophysical prospecting by the seismic method in Northern Germany. The author advocates the adoption of the theory of rectilinear propagation of the seismic wave. In this connection see a more extended paper by the first author, listed as No. 305 of these lists.
808. BASU, N. M., "On an Application of the New Methods of the Calculus of Variations to some Problems in the Theory of Elasticity," *Philosophical Magazine*, 10, No. 66, 886-896, London, November, 1930.

809. BASU, N. M., "On the Torsion Problem of the Theory of Elasticity," *Philosophical Magazine*, **10**, No. 66, 896-904, London, November, 1930.
810. BEAMS, J. W., "A Review of the Use of Kerr Cells for the Measurement of Time Intervals and the Production of Flashes of Light," *The Review of Scientific Instruments*, **1**, No. 12, 780-793, Menasha, December, 1930.
811. BERLAGE, H. P., "Seismometer, Auswertung der Diagramme," *Handbuch der Geophysik*, **4**, Lieferung 2, Chapters 8-28, 299-686, 255 illustrations, 40 tables, Berlin, 1930. R.R.B.
See note at end of item 843 of this list.
812. BERLOTY, B., "Sur la localisation des épicentres des tremblements de terre," *Comptes rendus*, **191**, No. 19, 813-816, Paris, November 10, 1930.
813. BERNDT, G., "Die Bestimmung der elastischen Konstanten," *Zeitschrift für Instrumentenkunde*, **15**, Heft 11, 624-638: Heft 12, 679-692, 20 text figures, Berlin, November and December, 1930.
- BIEZENO, C. B., "Geometrie der Kräfte und Massen." See No. 837 of this list.
814. BOBILLIER, Carlos, "Observaciones de 1928 y Terremoto del 1.0 de Diciembre," *Boletín del Servicio Sismológico de la Universidad de Chile*. No. 20, 55 pages, Santiago, 1930.
815. BODLE, Ralph R., "Earthquake Notes," Published by the Eastern Section of the Seismological Society of America, **2**, No. 3, Washington, December 10, 1930.
Besides the current notes the issue gives a short account of the Louisiana Earthquake of October 19, 1930, by Frank Neumann, notes on the Stockholm Meeting of the International Geodetic and Geophysical Union, by N. H. Heck, and an open letter from the Director of the U. S. Coast and Geodetic Survey, in reply to an editorial in the Engineering News-Record criticizing the contributions of seismology to engineering. As usual, the epicentres of earthquakes, determined during the interval since the publication of the previous issue of Earthquake Notes, are listed with an indication of the position and time of each earthquake. The editor of the publication, Ralph R. Bodle, is a member of the staff of the U.S. Coast and Geodetic Survey, Washington, D.C. Items of interest to seismologists which might properly find place in this publication should be reported to the editor.
816. BONCHKOVSKI, V. F., "Seismology and Its Achievements" (in Russian). A paper of 26 pages (13 figures) from the series *Science and Technics in the U.S.S.R.* Price 0.35 cop. Moscow, 1928. N.V.R.
817. BOWIE, W., "River Sediment Caused New Orleans Quake," *Science News Letter*, **18**, No. 499, 280, Washington, November 1, 1930.
818. BREYER, Johannes, "Über die Elastizität von Gesteinen," *Beiträge zur physikalischen Erforschung der Erdrinde*. Heft 1 (herausgegeben von der Preussischen Geologischen Landesanstalt) 53 pages, 5 plates, 9 figures, 3 tables. Price RM 3.75. Berlin, 1929.
A brief review, in German, is given as item No. 92, pg. 21, of *Geologisches Zentralblatt*, **43**, No. 1, Berlin, November 15, 1930.
See also No. 608 of these lists.
819. BRISKE, Rudolf, "The Earthquake Resistance of Buildings," State Publishing Office (Technic), 60 pages, 71 figures. Price 1.25 rub. Moscow, 1928.
A Russian translation from the German of R. Briske's work "Die Erdbebensicherheit von Bauwerken". N.V.R.

820. BROCKAMP, B. and MOTHES, H., "Seismische Untersuchungen auf dem Pasterzegletscher," *Zeitschrift für Geophysik*, 6, Heft 8, 482-500, 5 figures, Göttingen, 1930.
 — BUSEMANN, A. and FÖPPL, Otto., "Physikalische Grundlagen der Elastomechanik." See No. 838 of this list.

821. BÜSS, Eugen, "Seismic Equidistant Map of the World on Azimuthal Projection with the Centre at Tiflis" (in Russian), *Monthly Seismic Bulletin, Geophysical Observatory of Georgia Seismological Department*, Nos. 10-12, 57-68, with 2 charts, Tiflis, October-December, 1927.

In Mercatorian cartography the map of the world is shown on one sheet; on the other hand, the peculiar distribution of isolines of azimuths and distances is prejudicial to the demonstrativeness and integrity of the map. In consequence, the author has drawn his seismic map on azimuth-zenithal projection (Postel). With brief summary in German and Georgian. N.V.R.

822. COOKE, H. C., "Studies of the Physiography of the Canadian Shield," *Transactions of the Royal Society of Canada, Section 4, Geological Sciences including Mineralogy, Third Series*, 24, Part 1, Section 4, 51-87, Ottawa, May, 1930.

The above paper is confined to a study of "Glacial Depression and Post-glacial Uplift." It supplements a previous paper with the same general title which appeared in the *Transactions of the Royal Society of Canada*, as above, but Volume 23, Section 4, 91-120, Ottawa, May, 1929.

823. DAVIS, W. M., "Origin of Limestone Caverns," *Bulletin of the Geological Society of America*, 41, No. 3, 475-628, 2 plates, 62 text-figures, Washington, September, 1930.

824. DAVISON, Charles, "Crust-movements Connected with Tango (Japan) Earthquake of 1927," *Nature*, No. 3189, 126, 923-924, 2 figures, London, December 13, 1930.

825. DELANEY, J. P., S.J., "New Galitzin Installed at Canisius," *Bulletin of the American Association of Jesuit Scientists (Eastern Section)*, 8, No. 2, 22-23, Baltimore, 1930.

The above short article, published in the indicated bulletin for private circulation by Loyola College of Baltimore, outlines the installation of the new Galitzin seismographs at the Canisius College (Buffalo) station. These are manufactured by Wilip, of Dorpat, Esthonia, under direction of H. Masing who superintended their manufacture by Galitzin. Note is made of the fact that Masing has recently died.

826. DE SOUSA, Francisco Luis Pereira, "O terremoto do 1º Novembro de 1755 em Portugal e um estudo demografico," Volume III, published by the Geological Service of Portugal, 479-939, index, 5 plates, 3 plans, 23 text figures, Lisbon, 1928.

The third volume of a monumental work describing the Lisbon earthquake of 1755.

827. DVOYCHENKO, P. A., "What Are Earthquakes and Why Do They Occur?" (in Russian), *Collected Papers of the Crimean Scientific Research Institute, "The Crimean Quakes of 1927 and the Fate of the Crimea,"* 16-42, 4 figures, Simpheropol, 1928. N.V.R.

828. (1) DVOYCHENKO, P. A., "The Black Sea Quakes of 1927 in the Crimea (preliminary report)" (in Russian), *Collected Papers of the Crimean Scientific Research Institute, "The Black Sea Quakes of 1927 and the Fate of the Crimea,"* 77-98, Simpheropol, 1928.

A description of the earthquakes of the 26th June and 12th September, 1927, and of the damages and secondary phenomena caused thereby. N.V.R.

828. (2) DVOYCHENKO, P. A., "The Black Sea Quakes of 1927 in the Crimea" (in Russian), *Priroda (Nature)*, 17, No. 6, 523-542, 7 figures, Leningrad, 1928.

The author gives a brief description of the Crimean earthquakes of June 26 and September 12, 1927, from his personal observations. N.V.R.

829. EGERVÁRY, Eugen v., "Über die seismischen Trajektorien und über das Bertrandsche Problem in der Seismologie," *Gerlands Beiträge zur Geophysik*, 14, 284-299, Leipzig, 1916.

— FÖPPL, Otto and BUSEMANN, A., "Physikalische Grundlagen der Elastomechanik." See No. 838 of this list.

830. FREDERICKS, George, "Life History and Structure of the Earth from the Point of View of Transmutation of Matter" (in Russian), *Journal of Geophysics and Meteorology*, 4, No. 1, 77-91, Leningrad, 1927.

An essay on applying the theory of transmutation of matter to the knowledge of the evolution of the universe. In search for a solution of the problem of fundamental causes to which tectonic processes are due, the author was, since 1920, led to the conclusions which furnish the basis of the present paper, namely, that there exists a primary element, called by the author "Protocosmium," possessing the highest atomic weight. In the author's opinion, the whole of matter originally existed in the form of protocosmium. Of protocosmium consisted all the cosmic bodies which acquired later a more complicated structure as a result of the transmutation of matter. On the ground of the recent geophysical evidence, the author suggests the following constitution:—

VI. The atmosphere, in its external layers is formed of H and He, whereas in the lower it is composed of N, O, CO₂, etc.

V. The zone of lighter elements being divided into—

B. The subzone of oxygen combinations—

c) Hygrosphere (water being the main component)	
b) Lithosphere (main component acid rocks SiAl).....	60 km.
a ₃) Magma (SiMa) imbued with gas.	60 km.
a ₂) Magma (SiMa) containing no gas.	100 km.
a ₁) Sulphid-Oxyd region.....	280 km.
A. The subzone of combinations devoid of oxygen.....	700 km.
IV. Iron Zone (NiFe).....	500 km.
III. Zone of heavy elements up to iron (PbCu).....	750 km.
II. Zone of radioactive elements.....	450 km.
I. Primitive nucleus of Protocosmium.....	3470 km.
An extensive summary in English is annexed to the paper.	N.V.R.

831. FREDERICKS, George, "On the Origin of Surface Foldings" (in Russian), *Journal of Geophysics and Meteorology*, 6, No. 1, 79-80, Leningrad, 1929.

An English summary accompanies the paper.

N.V.R.

832. FREEMAN, John R., "The Italian Earthquake of July 23, 1930," *Bulletin of the Seismological Society of America*, 20, No. 4 (preprint of 24 pages), Stanford, December, 1930.

This report, illustrated by means of three maps and seventeen reproductions from photographs, has resulted from the fact that the author, in Germany at the time of the earthquake, was enabled to visit the scene within a reasonably short time. He deals with the subject from the standpoint of an engineer, pointing out those details of construction which resulted in so much damage being wrought by this earthquake. J.R.F.

— FUES, E., "Störungsrechnung." See No. 837 of this list.

— FUES, E. and NORDHEIM, L., "Die Hamilton-Jacobische Theorie der Dynamik." See No. 837 of this list.

— GECKELER, J. W., "Elastostatik." See No. 838 of this list.

— GECKELER, J. W., "Elastizitätstheorie anisotroper Körper (Kristallelastizität)." See No. 838 of this list.

833. GEIGER, H. and SCHEEL, Karl, "Handbuch der Physik," A textbook in 24 volumes, published by Julius Springer, Berlin, 1927-1929.

Reference to this textbook has already been made in item No. 701 of these lists. Further reference to sections of interest to seismologists appears in this list in Nos. 837 and 838. The price for the complete set of twenty-four volumes is quoted at RM 1328.60.

834. GERMANSKY, Boris, "Über ein optisches Verfahren zur Fourieranalyse," *Annalen der Physik*, Folge 5, 7, Heft 4, 453-469, 10 figures, Leipzig, 1930.

835. GHERASSIMOFF, A. P., "Slow Movements of Firm Land and Their Study" (in Russian), *Priroda (Nature)*, 16, Nos. 7-8, 551-566, Leningrad, 1927.

The paper considers in the first place the epirogenic movements in the Black Sea-Caspian area. The author expresses the idea of the necessity of periodical accurate geodetic surveys of the said area for scientific as well as practical purposes. The motion in question is of importance with regard to the construction of new harbours, canals, etc.
N.V.R.

836. GHEORGHIEVSKI, T., "Contribution to the Question of Sounding and Vibrating of Telegraph Wires" (in Russian), *North Caucasus Transport*, 7, No. 4 (170), 8-10, Rostov-Don, 1929.

The author suggests that sounding and vibrating of wires is due to microseismic motion of the earth crust which he confirms by diagrams and points to the necessity of more extensive combined investigation of the said phenomena.
N.V.R.

837. GRAMMEL, R. et al. "Grundlagen der Mechanik: Mechanik der Punkte und starren Körper," Band V. of *Handbuch der Physik* (see No. 833 of this list), 623 pages, 256 illustrations. Price: unbound, RM 51.60; bound, RM 54. Berlin, 1927.

The table of contents, indicating the sections as written by the collaborating authors, is as follows:—

- "Die Axiome der Mechanik," by G. Hamel, Berlin.
- "Die Prinzipie der Dynamik," by L. Nordheim, Göttingen.
- "Die Hamilton-Jacobische Theorie der Dynamik," by L. Nordheim, Göttingen and E. Fues, Stuttgart.
- "Störungsrechnung," by E. Fues, Stuttgart.
- "Geometrie der Bewegungen," by H. Alt, Dresden.
- "Geometrie der Kräfte und Massen," by C. B. Biezeno, Delft.
- "Kinetik der Massenpunkte," by R. Grammel, Stuttgart.
- "Kinetik der starren Körper," by M. Winkelmann, Jena and R. Grammel, Stuttgart.
- "Technische Anwendungen der Stereomechanik," by Th. Pöschl, Prag.
- "Relativitätsmechanik," by O. Halpern, Wien.

838. GRAMMEL, R. et al., "Grundlagen der Mechanik: Mechanik der elastischen Körper," Band VI of *Handbuch der Physik* (see No. 833 of this list), 632 pages, 290 illustrations. Price: unbound, RM 56; bound, RM 58.60. Berlin, 1928.

The table of contents, indicating the sections as written by the collaborating authors, is as follows:—

- "Physikalische Grundlagen der Elastomechanik," by A. Busemann and Otto Föppl, Braunschweig.
- "Mathematische Elastizitätstheorie," by E. Trefftz, Dresden.
- "Elastostatik," by J. W. Geckeler, Jena.
- "Elastokinetik," by F. Pfeiffer, Stuttgart.
- "Elastizitätstheorie anisotroper Körper (Kristallelastizität)," by J. W. Geckeler, Jena.
- "Plastizität und Erddruck," by A. Nádai, Göttingen.
- "Der Stoss," by Th. Pöschl, Karlsruhe.
- "Seismik (Erdbebenwellen)," G. Angenheister, Potsdam. See No. 701 of these lists.
- "Tafeln der Elastizitätskonstanten und Festigkeitszahlen," by P. Riekert, Stuttgart.

- GRAMMEL, R., "Kinetik der Massenpunkte." See No. 837 of this list.

- GRAMMEL, R. and WINKELMANN, M., "Kinetik der starren Körper." See No. 837 of this list.
839. GRUNMACH, Leo., "Experimentaluntersuchung zur Messung von Erderschütterungen," Physikalisches Institut der Königlichen Technischen Hochschule zu Berlin (verlag von Leonhard Simion, Berlin), 102 pages, 59 diagrams, Berlin, 1913.
The subtitle reads: "Zusammenfassender Generalbericht über die im Auftrage der Provinzialverwaltung Schlesiens ausgeführte Untersuchung zur Messung der an der Queistalsperre bei Marklissa durch den Wasserabsturz hervorgerufenen Erschütterungen."
840. GUNN, Ross, "Earth-movements and Terrestrial Magnetic-variations," *Terrestrial Magnetism and Atmospheric Electricity*, 35, No. 3, 151-156, Baltimore, September, 1930.
The author's abstract reads: "It is shown that a general contraction of the earth or a movement of a small part of it may give rise to appreciable disturbing magnetic fields. The movement of a conducting region inside the earth across the earth's magnetic field sets up electromotive forces which may produce large current-systems. These current-systems can give rise to the observed magnetic variations if the conductivity of the earth's core is sufficiently large."
"Earlier determinations of the resistivity of the earth's core are found to be several orders of magnitude too high, due to the neglect of skin-effects. It seems probable that the electrical time-constant of the earth's core is not less than 1000 years, and therefore magnetic diurnal-variation data cannot be used to calculate its conductivity."
841. GUTENBERG, B., "Schallgeschwindigkeit und Temperatur in der Stratosphäre," *Gerlands Beiträge zur Geophysik*, 27, No. 2, 217-225, Leipzig, 1930.
Compares recorded air-waves with those reported from ear-observations, and discusses the height at which velocity of sound begins to increase. A method is given for determining sound velocity in the stratosphere.
Investigations such as this represent a further widening of the field for the application of principles of seismology which they employ. L.D.L.
842. GUTENBERG, B., "Kräfte in der Erdkruste," *Handbuch der Geophysik*, 3, Chapters 1 and 2, 1-31, Berlin, 1930. B.G.
The first chapter deals with continuing forces—those due: to temperature difference within the earth, to drift from the poles to the equator (Polfuchtkraft), to tidal action, the forces evidenced in the "wandering of the pole," and those due to changes in the rotation period of the earth.
The second chapter deals with temporary forces of local effect. These are due to: changes in barometric pressure, to physical or chemical changes in the crust of the earth, to the difference in elevation of layers of the earth, to differential warming of the crust, to differential and changing sea-level, and to a general series—sedimentation, denudation, growth or melting of ice, etc. (See note at end of next item of this issue of the Bibliography.)
843. GUTENBERG, B., "Geotektonische-Hypothesen," *Handbuch der Geophysik*, 3, Chapters 19-27, 442-547, 46 figures, Berlin, 1930.
The *Handbuch der Geophysik* is being published by Gebrüder Borntraeger, Berlin, and edited by Professor Gutenberg. See also No. 332 of these lists. B.G.
- HALPERN, O., "Relativitätsmechanik." See No. 837 of this list.
- HAMEL, G., "Die Axiome der Mechanik." See No. 837 of this list.
844. HECKER, O. et al., "Tätigkeitsbericht der Reichsanstalt für Erdbebenforschung für 1929," Mimeographed pamphlet of 14 pages published by the Reichsanstalt für Erdbebenforschung in Jena, 1930.

The pamphlet presents the following information—

- (1) Personnel of the institution.
- (2) Earthquake investigations.
- (3) Applied Geophysics:
 - (a) Gravity measurements.
 - (b) Seismograph measurements.
 - (c) Earth-magnetism measurements.
 - (d) Air wave measurements.
 - (f) Radio-active methods.
 - (g) Courses of instruction.
 - (h) Publications.
 - (i) Construction.

845. HEILAND, C. A., "A New Geophone," The American Institute of Mining and Metallurgical Engineers, Technical Publication No. 330, Class L, Geophysical Prospecting, No. 22, 10 pages, New York, 1930.
846. HEILAND, C. A., "Geophysical News and Review," *The Colorado School of Mines Magazine*, 21, No. 1, 32-33, Golden, January, 1931.
Geophysical News and Review, previously published in mimeographed form by the Colorado School of Mines, is now to appear in the printed *Colorado School of Mines Magazine*. It will continue to be edited by Dr. C. A. Heiland, assisted by Dart Wantland. The *Review* deals particularly with applied or practical geophysics, though general papers on geophysics are also reviewed in its columns. The subscription price of the *Magazine* is a dollar and a half a year. It appears monthly (twelve issues per year). The mimeographed issue of the *Geophysical News and Review* is discontinued from the above date.
847. HIGGINSON, H. W., "On the Trail of an Earthquake," *International Communications Review*, 7, No. 1, 49-56, 5 illustrations, New York, January, 1931.
 The article describes the difficulties experienced in repairing the submarine cables broken by the Grand Banks Earthquake of November 18, 1929. The author, a member of the Plant Department of the Commercial Cable Company, is particularly well situated to deal with the above subject, which he has done in an interesting and informative manner.
 H.W.H.
848. HIGUCHI, S., "On the Forced Vibration of an Elastic Rod," *Proceedings of the Imperial Academy*, 6, No. 8, 306-309, Tokyo, October, 1930.
849. HOLLANDSKI, P. T., "Earthquake Resistant Building for the Crimea" (in Russian), *Collected Papers of the Crimean Scientific Research Institute, "The Crimean Quakes of 1927 and the Fate of the Crimea,"* 99-112, Simpheropol, 1928.
 A brief general description of antiseismic measures and of methods of construction as applied to the Crimea.
 N.V.R.
850. IMBO, Giuseppe, "Il terremoto calabro del 7 marzo 1928," *Bollettino della Società Sismologica Italiana*, 29, No. 1-2, 9-25, Rome, 1930.
851. KAO, Pan-Tcheng, "Sur les vibrations du quartz piezoelectrique suivant l'axe optique," *Comptes rendus*, 191, No. 18, 768-770, Paris, November 3, 1930.
852. KLEINSCHMIDT, E., "Eine neue württembergische Erdbebenwarte," *Zeitschrift für Geophysik*, 6, No. 4-7, 370-376, Göttingen, 1930.
 A description of the establishment and organization of the new earthquake observatory in Stuttgart, Geophysikalische Abteilung, Württembergisches Statistisches Landesamt, Buchsenstrasse 56, Stuttgart, Württemberg, Germany.
 W.H.
853. KLUSSMANN, Walther, "Über das Innere der Erde," *Gerlands Beiträge zur Geophysik*, 14, 1-38, Leipzig, 1915.

854. KOTO, Bundjiro, "The Iwatsuki Seismic Zone a Factor of the Habitual Tokyo Earthquake," *Journal of the Faculty of Science, Tokyo Imperial University*, 3, Part 1, 1-21, 3 plates, 4 figures, 1929.
855. LACOSTE, J., "Sur la variation du coefficient d'amortissement avec la période dans les séismographes," *Journal de Physique et le Radium*, 10, No. 2, 54-55, Paris, 1929.
A review by Mainka appears in *Physikalische Berichte*, 11, Heft 19, page 2065, Braunschweig, October 1, 1930.
856. LAKE, Philip, "Mountain and Island Arcs," *The Geological Magazine*, No. 799, 68, 34-39, London, January, 1931.
857. LANDSBERG, Helmut, "Vergleich der Aufzeichnungen zweier Galitzinpendel mit verschiedener Eigenperiode," *Gerlands Beiträge zur Geophysik*, 27, Heft 3-4, 326-359, 8 figures, Leipzig, 1930.
The above paper comprises the author's Dissertation presented to the Naturwissenschaftlichen Fakultät der Universität Frankfurt a.M. Lengthy abstracts in German, in French, and in English are given by the author. The article describes the results of systematic recording of ninety-four earthquakes by means of two Galitzin seismographs (with free periods of three and eighteen seconds, respectively) set to record the same component on the same pier at Taunus Observatory. The relative value of the instruments is described for various parts of earthquake records and for microseisms. (A previous brief report has been published by Gutenberg—see No. 526 of these lists.)
858. LAZAREV, P. P., "Achievements of Geophysics" (in Russian), State Publishing Office, 83 pages, 43 figures. Price 1 rub. Moscow-Leningrad, 1929.
Chapter 2 deals with the experimental study of the processes occurring in the earth's crust (pp. 27-65). N.V.R.
859. LEE, Frederick W., "Geophysical Abstracts," United States Bureau of Mines, No. 18 (Circular 6393), 27 pages, October: No. 19 (Circular 6403), 31 pages, November: No. 20 (Circular 6422), 29 pages, December: Washington, 1930. F.W.L.
860. LEE, J. S., "Further Notes on Structural Types and Earth Movements," *The Geological Magazine*, No. 799, 68, 15-24, 2 figures, London, January, 1931.
861. LITCHKOV, B. L., "Isostasy and Modern Ideas of the Earth's Crustal Movements" (in Russian), *Priroda (Nature)*, 17, Nos. 7-8, 654-684, 2 figures, Leningrad, 1928.
A retrospective outline of the effect produced by the theory of isostasy upon modern ideas of geologists as to vertical and horizontal motion in the earth crust. An extensive bibliography accompanies the paper. N.V.R.
862. MARKIEWICZ, A. J., "Annals of Earthquakes in the Crimea (historical information)" (in Russian), *Collected Papers of the Crimean Research Institute*, "The Crimean Quakes of 1927 and the Fate of the Crimea," 64-73, Simpheropol, 1928.
Historical information with regard to earthquakes which have occurred in the Crimea since 480 of our era. N.V.R.
863. MARTIN, H., "Luft- und Bodenseismik: Bodenseismik," *Handbuch der Experimentalphysik*, 25, No. 3, 251-302, 47 figures, Leipzig, 1930.

The *Handbuch der Experimentalphysik* is published by Akademische Verlagsgesellschaft G.m.b.H., Leipzig. The above section by H. Martin, and the companion section by O. Meisser (see No. 864 of this list), both officials of the Reichsanstalt für Erdbebenforschung in Jena, are published as reprints. Beautifully arranged, clearly expounded, and well illustrated, they are a valuable contribution to the literature of seismology.

O.M.

864. MEISSER, O., "Luftseismik," *Handbuch der Experimentalphysik*, 25, No. 3, 211-251, 30 figures, Leipzig (Akademische Verlagsgesellschaft, G.m.b.H.), 1930. O.M.

Presents the theory, practice, and instrumental technique involved in studies of sound propagation in the atmosphere from artificial explosions, volcanic outbursts, and similar sources.

This article outlines some of the work which an increasing number of German investigators have been doing in the past few years along the line of applying principles of seismology to studies of the upper air. L.D.L.

See also No. 863 of this list, for the companion article by H. Martin.

865. MENDEL, H., "Die seismische Bodenunruhe in Hamburg und ihr Zusammenhang mit der Brandung," *Zeitschrift für Geophysik*, 6, Heft 1, 32-41, Göttingen, 1930.

The above presents a somewhat detailed summary of the author's doctorate dissertation, reported as No. 146 of these lists.

866. MOHORVIČIĆ, S., "Die reduzierte Laufzeitkurve und die Abhängigkeit der Herdtiefe eines Bebens von der Entfernung des Inflexionspunktes der primären Laufzeitkurve. (II Mitteilung: Die Ausbreitung der Erdbebenstrahlen in den tiefen Schichten der Erde.)," *Gerlands Beiträge zur Geophysik*, 14, 187-198, Leipzig, 1915.

Mitteilung I was reported as No. 62 of these lists.

- MOTHES, H. and BROCKAMP, B., "Seismische Untersuchungen auf dem Pasterzegletscher." See No. 820 of this list.

867. MYARD, F. E., "Sur une généralisation du joint de Cardan," *Comptes rendus*, 191, No. 19, 830-832, Paris, November 10, 1930.

- NÁDAI, A., "Plastizität und Erddruck." See No. 838 of this list.

868. NAKAMURA, Saemontaro, "On the Topographical Changes in the Sea-bottom of Sagami Bay preceding the Earthquake of 1923," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, Vol. 2B, page 1071, Batavia, 1930.

The above paper is reported in the Proceedings by abstract only. This reads as follows: "The writer, by studying the charts issued by the Hydrographic Department of the Imperial Navy in 1907 and in 1914, worked out the contour lines of the sea-bottom of Sagami bay for these years and found that remarkable topographical changes had been taking place there during the interval between these periods, possibly a premonitory phenomenon of the great earthquake that occurred in 1923."

869. NEUMANN, Frank, "Seismological Report, July, August, September, 1927," United States Department of Commerce, Coast and Geodetic Survey, Serial Number 495, 60 pages, Washington, 1930.

870. NIKIFOROFF, P. M., "On the Organization of Geologic-Seismological Investigations and Seismic Service in the Crimea (Report Note)" (in Russian), *Collected Papers of the Crimean Scientific Research Institute*, "The Crimean Quakes of 1927 and the Fate of the Crimea," 74-76, Simpheropol, 1928.

According to the Report Note, in order to secure materials for scientific conclusions as to the character and immediate causes of the Crimean earthquakes, it is necessary to: (1) organize regular seismometric observations at four points in the Crimea; (2) carry out the gravimetric survey of the Crimea; (3) determine the subterranean relief of the basal rocks (seismologic prospecting); (4) carry out the route survey of the Crimea. N.V.R.

871. NODON, Albert, "Recherches sur les perturbations électromagnétiques, sismiques et solaires," *Comptes rendus*, **188**, No. 10, 725-726, Paris, 1929.
A review by Ebert appears in *Physikalische Berichte*, **11**, Heft 19, 2066, Braunschweig, October 1, 1930.
- NORDHEIM, L., "Die Prinzipie der Dynamik." See No. 837 of this list.
- NORDHEIM, L. and FUES, E., "Die Hamilton-Jacobische Theorie der Dynamik." See No. 837 of this list.
872. OBRUTCHEV, V. A., "Is a Downfall of the Crimea Possible?" (in Russian), *Collected Papers of the Crimean Scientific Research Institute, "The Crimean Quakes of 1927 and the Fate of the Crimea,"* 3-15, Simpheropol, 1928.
The paper is called forth by the rumours which circulated among the population as to the possibility of a sudden sinking of the Crimean peninsula. N.V.R.
873. ODDONE, Emilio, "Sulla termicità delle acque sotterranee," *Memorie del Reale Ufficio Centrale di Meteorologia e Geofisica*, Serie III, **2**, 34 pages, Rome, 1929.
Section vi deals with the subject "Correlazione tra le sorgenti termali e le aree sismiche?"
874. ODDONE, Emilio, "Sul come rimediate, nella emissione dei radiogrammi, alle perturbazioni dovute alle oscillazioni meccaniche dei fili ad incandescenza per via degli alternatori ad alto frequenza," *Bollettino della Società Sismologica Italiana*, **28**, No. 3-4, 107-116, Rome, 1929.
875. PERRIER, Georges, "La quatrième Assemblée générale de l'Union géodésique et géophysique internationale, Stockholm, août 1930," *Comptes rendus*, **191**, No. 16, 631-634, Paris, October 20, 1930.
A brief account is given of the action taken at the Stockholm meeting with regard to organization details.
- PFEIFFER, F., "Elastokinetik." See No. 838 of this list.
876. POPOV, S. P., "Mud Volcanoes" (in Russian), *Priroda (Nature)*, **17**, No. 6, 542-554, 6 figures, Leningrad, 1928.
The author gives a brief description of the characteristics of the mud-volcanic process and its manifestation in the Caucasus, dwelling in particular upon the Crimean mud-volcanoes in connection with the earthquakes of 1927. N.V.R.
- PÖSCHL, Th., "Technische Anwendungen der Stereomechanik." See No. 837 of this list.
- PÖSCHL, Th., "Der Stoss." See No. 838 of this list.
877. RAÏKO, N. V., "Zone épiscopentrale des tremblements de terre en Crimée," *Académie des Sciences de l'Union des Républiques Soviétiques Socialistes*. No. 3, 13 pages, 5 figures, 5 tables, 1 plate, Leningrad, 1930. N.V.R.
The publication is in Russian with a lengthy abstract in French. The author describes the establishment of four stations in the Crimea, equipped with horizontal seismographs of the Nikiforoff pattern. The records obtained are listed and the actively seismic section of the Crimea defined. This is shown to be very limited in extent, the centre being approximately 44°·5 N., 54°·5 E.

878. RAÏKO, N. V., "Sur la possibilité d'observer la phase de Mohorovičić dans les tremblements de terre au Caucase," *Academie des Sciences de l'Union des Républiques Soviétiques Socialistes*, No. 12, 10 pages, 5 tables, bibliography, 2 plates, Leningrad, 1930.

N.V.R.

The paper is in Russian with the following abstract in English: "On the Possibility of Observing the Phase of A. Mohorovičić in the Seismograms of Earthquakes in the Caucasus: The phases of A. Mohorovičić, . . . P_m , have been revealed by the two Leninakan earthquakes of 22 October, 1926. That this phase is really that of A. Mohorovičić is confirmed by a computation of the velocity of propagation of the wave P_m recorded in table 4. . . The mean value of this velocity proved to be 5.75 km./sec. whereas the foreign authors have found for the velocity of propagation of seismic waves in the surface layer of Middle Europe some smaller values as shown in table 5. This may be explained by the fact that the surface layer in the Caucasus is composed of more elastic rocks than is that of Middle Europe. . . ."

- REICH, H. and BARSCH, O., "Ergebnisse seismischer Untersuchungen über den Schichtenaufbau von Norddeutschland." See No. 807 of this list.

879. REID, Harry Fielding, "On Mass Movements in Tectonic Earthquakes and the Depth of Focus," *Gerlands Beiträge zur Geophysik*, 10, 318-350, 9 figures, Leipzig, 1910.

- RIEKERT, P., "Tafeln der Elastizitätskonstanten und Festigkeitszahlen." See No. 838 of this list.

880. RODÈS, L., "Périodes diurne et annuelle dans la distribution de 1944 tremblements de terre enregistrés par un même sismographe," *Comptes rendus*, 190, No. 7, 422-424, Paris, 1930.

A review by A. Blanc is given in *Le Journal de Physique et le Radium*, Série VII, Tome I, No. 9, 755D, Paris, September, 1930. It reads as follows: "L'enregistrement de 1944 tremblements de terre, fait à l'observatoire de l'Èbre pendant seize années, manifeste un maximum diurne correspondant aux heures durant lesquelles la zone sismique qui s'étend des Andes à l'Alaska atteint sa température maxima, et un minimum diurne correspondant aux heures où les rayons solaires tombent sur l'Océan Indien et sur une grande partie des continents européen et africain. Pendant l'année, on enregistre plus de tremblements de terre quand le soleil se trouve dans l'hémisphère nord que lorsqu'il est dans l'hémisphère sud. On ne peut mettre en doute l'influence directe du soleil dans la genèse des tremblements de terre."

881. ROTHÉ, E., "Conférence sur les travaux de Emil Wiechert," *Gerlands Beiträge zur Geophysik*, 28, Heft 4, 390-412, bibliography, Leipzig, 1930.

The above review of Wiechert's work by Rothé was presented at the Stockholm conference of the International Geodetic and Geophysical Union, August 22, 1930.

- SCHEEL, Karl and GEIGER, H., "Handbuch der Physik." See No. 833 of this list.

882. SCHWINNER, Robert, "Die Makroseismen vom 14. Mai 1930, bezogen auf den Bau der Ostalpen," *Gerlands Beiträge zur Geophysik*, 28, Heft 4, 413-438, 3 text figures, Leipzig, 1930.

Non-uniformity in the diminution of intensity as estimated at 160 places distributed about the epicentre of the earthquake of the above indicated date was found to bear no relation to the surface formation. From a study of the intensity estimates (on the Forel-Mercalli scale) the author deduces the structure of the eastern Alps.

883. SCIENCE SERVICE, "A Newly-found Submarine Valley Will Guide Ocean Liners," *Science News Letter*, No 504, 18, 355-356, Washington, December 6, 1930. (Also in *Science* No. 1875, 72, x, New York, December 5, 1930.)

The article announces the discovery by the United States Coast and Geodetic Survey of a deep rift running through Georges Bank near its eastern end. The valley is about eight miles long and nearly half a mile deeper than the adjacent ocean floor. In view of the fact that it is some 500 miles distant from the epicentre of the Grand Banks Earthquake of November 18, 1929, it is concluded that there is no connection between them, the valley having been missed in the earlier soundings over this region.

884. SCIENTIFIC RESEARCH INSTITUTE OF THE CRIMEA, "The Black Sea Quakes of 1927 and the Fate of the Crimea" (in Russian), State Publishing Office of the Crimea, 112 pages. Price 1.40 rub. Simpheropol, 1928.

The publication of collected scientific papers of a popular nature referring to the earthquakes which occurred in the Crimea was undertaken in order to furnish reliable information with regard to the quakes and their effects in the Crimea, as well as to secure funds to lend assistance to those who suffered in the disaster. See also Nos. 827, 828 (1), 849, 862, 870, 872, 886 and 889 of this issue of the Bibliography. N.V.R.

885. SIEBERG, A., "Geologie der Erdbeben," *Handbuch der Geophysik*, 4, Lieferung 2, Chapters 13-28, 160 pages, 107 figures, 35 tables, Berlin, 1930. R.R.B.
See note at end of item 843 of this list.

886. SKVORTZOV, E. J., "Some Results of an Expedition for the Purpose of Investigating the Bottom of the Black Sea, in Connection with the Earthquake" (in Russian), *Collected Papers of the Crimean Scientific Research Institute, "The Crimean Quakes of 1927 and the Fate of the Crimea,"* 50-63, Simpheropol, 1928.

In connection with the earthquakes, an investigation of the bottom of the Black sea was undertaken to the depth of 100 to 1000 fathoms, between the meridians of the Tarkhankut Lighthouse and Alushta, by means of Ekman's deep sounding pipes 1.75 m. long. Two kinds of silt were discovered; the density of the former gradually increases downwards; that of the second is almost equal to stone. The latter variety occurs but at few places; it constitutes a narrow border along the southern part of the Crimea at a depth of about 700 fathoms. At about the meridian of Alushta this border seems to be torn, both extremities being displaced and overlying each other (A chart of the distribution of the latter kind of slime is annexed). According to the author, these phenomena are due to the recent earthquakes. N.V.R.

887. SOMVILLE, O., "A propos d'une onde longue dans la première phase de quelques séismogrammes," *Gerlands Beiträge zur Geophysik*, 27, Heft 3-4, 437-442, 7 figures, Leipzig, 1930.

888. STEINMANN, G., "Results of the Geotectonic Movements on the West Coast of South America with Prospects of Future Researches," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, Vol. 2B, 797-803. Batavia, 1930.

889. SZYMANOWSKI, S. V., "Communication on the Crimean Quake of September 12, 1927" (in Russian), *Collected Papers of the Crimean Scientific Research Institute, "The Crimean Quakes of 1927 and the Fate of the Crimea,"* 43-49, Simpheropol, 1928.

A chart of the isoseists of the earthquake and the records of mareographs of the Caucasian and Crimean coasts led the author to the conclusion that: (1) the epifocal zone is situated in the sea not far from the south coast of the Crimea and seems to correspond to that of the quake of June 26, 1927; (2) the epifocal zone is of linear shape and, to judge from the arrival of the tidal wave recorded by the mareographs, lies not farther than 40 km. from Sebastopol and 50 km. from Yalta. For the period from September 11 to December 31, 1927, 351 shocks were recorded at Yalta. N.V.R.

890. TAMS, E., "Das Epizentrum des südatlantischen Grossbebens vom 27. Juni 1929," *Zeitschrift für Geophysik*, 6, Heft 8, 480-482, Göttingen, 1930.

The following is a translation of the German abstract furnished by Professor Tams:

The coördinates of the epicentre, by the P-time method of Geiger, are determined as Lat. $54^{\circ}0$ S.; Long. $29^{\circ}6$ W., with an uncertainty of about 40 kilometers in latitude and in longitude. The point so designated lies in the northwestern region of the South Sandwich Deep, presumably immediately to the north of the trough. E.T.

891. TIHANOVSKI, T. T., "The Simpheropol Seismic Station of the Academy of Sciences of the U.S.S.R. (at the Crimean Scientific Research Institute)," (in Russian), *Annals of the Crimean Scientific Research Institute*, 15-20, Simpheropol, 1929.

A description of the regional seismic station Simpheropol with brief results of observations according to which: (1) the epicentral distances of the Crimean earthquakes are between fifty and seventy-four km.; (2) the azimuths of the epicentres are in the SSE-SE sectors; (3) the first arrival of longitudinal waves produces a dilatation. A brief summary in German accompanies the paper. N.V.R.

892. TIMOSHENKO, S., "Vibration Problems in Engineering," Van Nostrand and Co., 351 pages, illustrated. Price \$4.50. New York, 1928.

This publication, by Professor Timoshenko of the University of Michigan, deals with vibration essentials in combination with their application in the solution of practical problems. The subject matter ranges from harmonic and non-harmonic vibrations of a single degree of freedom, through systems of several degrees of freedom, vibrations of elastic bodies, and finally a section describing instruments used for recording vibrations. R.R.B.

— TREFFTZ, E., "Mathematische Elastizitätstheorie." See No. 838 of this list.

893. TSUBOI, Chuji, "Geophysical Significance of the Areal Deformation of the Base Line Rhombus at Mitaka," *Proceedings of the Imperial Academy*, 6, No. 9, 367-370, Tokyo, November, 1930.

The introductory paragraph reads: "There is a special set of geodetic base lines in the compound of the Tokyo Astronomical Observatory at Mitaka. They form a rhombus whose four sides as well as one of the diagonals NS are 100 m. long. In the interval of twelve years from 1916 to 1927, the lengths of the lateral sides and the diagonal NS of the rhombus were measured fifteen times with the accuracy up to 0.01 mm. by the hands of the Land Survey Department of the Imperial Army under the supervision of the Imperial Japanese Geodetic Commission. It was found that these lengths did not remain exactly constant but were subject to small variations between two successive measurements which were usually less than 0.5 mm. An abnormally large elongation occurred at the time of the great Kwanto earthquake of 1923 in the length of the diagonal NS which was as much as 3.54 mm."

894. VAUGHAN, T. Wayland et al., "Report of the Committee on Submarine Configuration and Oceanic Circulation," published in mimeographed form by the United States National Research Council, of which body the above Committee is a part. The report was presented at the Annual Meeting of the Division of Geology and Geography of the National Research Council, May 3, 1930, 134 pages, Washington, 1930.

Included in this report is an account of the oceanographic phases of the Fourth Pacific Science Congress at Java, 1929. The papers on oceanographic subjects are listed under various headings—Gravity, Physical Oceanography, etc. Although other papers listed will be of interest to seismologists, the only ones directly dealing with that science are: E. L. Jones, "The Relation of Earthquake Epicentra and Ocean Deeps," and S. Nakamura, "On the Topographical Changes in the Sea Bottom of Sagami-bay Preceding the Earthquake of 1923."

895. VAUTIER, Th., "Recherches expérimentales sur la propagation d'ondes aériennes dans un long tuyau cylindrique," *Annales de Physique*, 14, 263-614, 69 figures, 30 plates, Paris, November, 1930.
896. WANNER, E., "Geschwindigkeit der Phasen der Erdbebenwellen im Alpengebiet," *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, 75, 195-210, 8 tables, 9 plates, Zürich, 1930. E.W.
897. WILIP, J., "Über ein in Pulkovo registriertes künstliches Erdbeben," *Comptes rendus des seances de la Commission Sismique Permanente*, Tome 6, Livraison 2, 173-184, Petrograd, 1914. J.W.
898. WILIP, J., "Über Temperaturkompensation bei Vertikalseismographen," *Sitzungsberichte der Naturforscher-Gesellschaft*, 35,, Heft 3-4, 147-154, Dorpat, 1930. J.W.
899. WILIP, J., "A Galvanometrically Registering Vertical Seismograph with Temperature Compensation," *Acta et Commentationes Universitatis Tartuensis (Dorpatensis)*, A. XX. 6, 54 pages, 8 figures, 10 tables, Dorpat, 1930.

The author's summary reads:

"A description is given here of a vertical seismograph with temperature compensation, which until now has only been constructed in Estonia.

"The theory of this apparatus is deduced and proved by means of measurements, the conformity being found to be sufficiently great.

"Directions are given for the adjustment of the apparatus and especially of the temperature compensation.

"The temperature compensation proves to be very correct with proper treatment, and the vertical seismograph will stand prolonged working in the pendulum room without any protection against heat.

"Methods are discussed for a more precise adjustment of the period symmetry.

"The pendulum shows a very regular oscillation with a weak proper damping, the period depending only very little on the amplitude.

"The principles of construction advocated by the author have proved very successful and allow a general application of them in the construction of vertical seismographs of different sensitiveness and methods of registration to be expected.

"With a loosely fitting cover the influence of variable atmospheric pressure is observed. The seismograph acts like a baroscope.

"The dependence of the proper period on the temperature is ascertained and a method is recommended for easily avoiding possible errors.

"The constants are determined and the sensitiveness is examined, which gives a maximum magnification of about 1500 times and may be increased at wish.

"A secondary phenomenon is observed in the apparatus and precautionary measures are indicated for removing the same.

"The difference of temperature outside and inside the glass cover is examined.

"Henceforth cellar rooms with small annual amplitude of temperature are found to be no longer necessary for the erection of seismographs.

"Any quiet room with provision for heating can be used as a room for a seismic station." J.W.

— WINKELMANN, M. and GRAMMEL, R., "Kinetik der starren Körper." See No. 837 of this list.

900. ZEPPIERI, Giuseppe, "L'Osservatorio sismico del Collegio Alberoni in Piacenza," *Bollettino della Società Sismica Italiana*, 29, No. 1-2, 43-52, 3 diagrams, 2 plates, Rome, 1930.

The article describes the station at Piacenza. It announces the installation of the Wiechert obtained from Pola—a seismograph station formerly operated by the Austrian government. A description is given of the improvements introduced in the Vicentini seismographs. The gravity restoring force is left the dominating one but it is reduced by the introduction of a magnetic field, thus greatly increasing the sensitivity of the instruments. J.B.M.

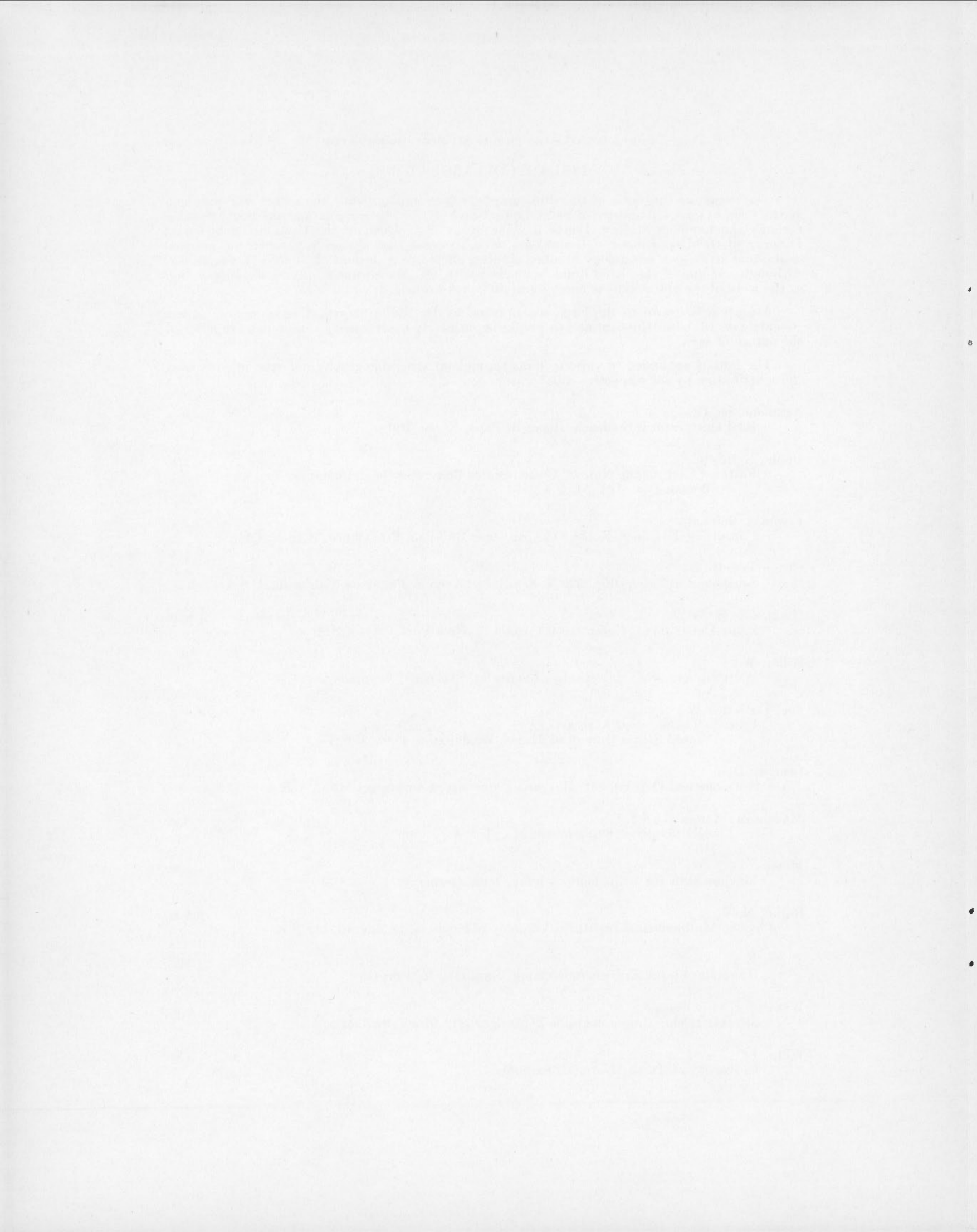
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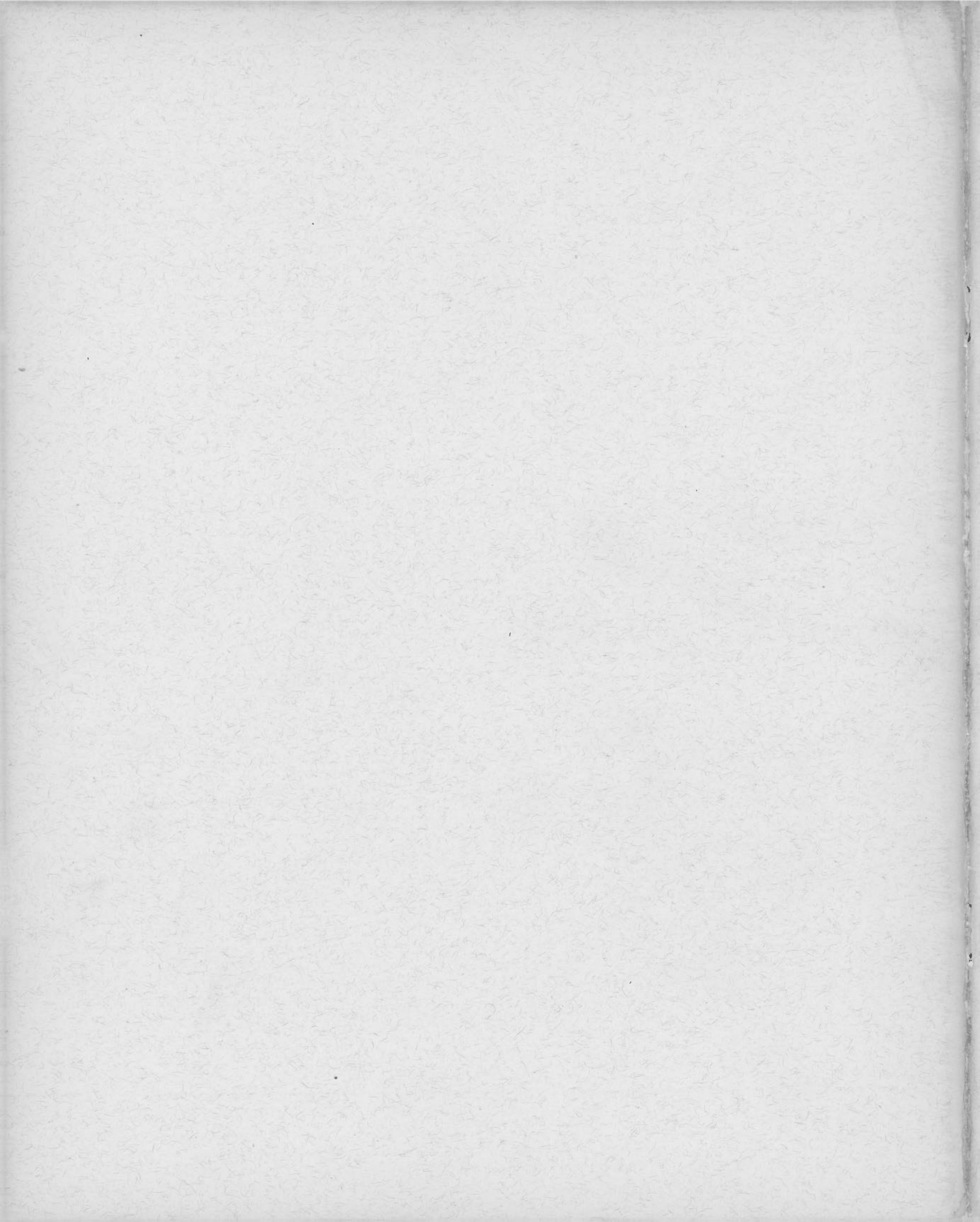
The items for this issue of the Bibliography were compiled while the editor was stationed at the Geophysical Laboratory of Saint Louis University. The compilation was made possible through the kindness of Rev. James B. Macelwane, S.J., Dean of the Graduate School and Director of the Department of Geophysics, who arranged that all incoming scientific journals containing articles on seismology or allied subjects should pass through the hands of the editor. Although but one of the listed items is marked with Dr. Macelwane's initials, his coöperation in the work of the entire issue is hereby gratefully acknowledged.

Attention is drawn to the large contribution by Dr. Raïko in reporting numerous papers (twenty-two titles) in Russian, and in preparing, in nearly every case, a comprehensive index of the nature of each.

The initials appended to various items throughout the Bibliography indicate, in each case, the contribution by the respective collaborator.

- | | |
|--|--------|
| Agamennone, G.,
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PUBLICATIONS

OF THE

Dominion Observatory

OTTAWA

R. MELDRUM STEWART, *Director*

Vol. X

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April, May, June, 1931

901. ADAMS, C. E., "Report of the Dominion Astronomer and Seismologist, for the Year 1929," Extract from the *Annual Report of the Department of Scientific and Industrial Research*, 7 pages, 2 maps, issued as *Dominion Observatory (New Zealand) Bulletin*, No. 79, Wellington, 1931.
902. ADAMS, C. E. and HENDERSON, J., "Seismology of New Zealand," Extract from the *New Zealand Official Year-book, 1931*, issued as *Dominion Observatory (New Zealand) Bulletin*, No. 80, 8 pages, 2 figures, 6 tables, Wellington, 1931.
903. AGAMENNONE, G., "Nuove considerazioni sulla periodicità dei terremoti," *Corriere Adriatico*, Rome, March 11, 1931. G.A.
- AGAR, William M., "A Textbook of Geology, Part I: Physical Geology." See No. 972 of this list.
904. ALFANI, Guido, *D.S.P.*, "Un nouveau type de sismographe photographique," *Ciel et Terre*, June, July, August, 1930, reprinted as a Publication of Osservatorio Ximeniano dei Padri Scolopi, Firenze, No. 143, 1-8, 2 plates, Brussels, 1930.

The seismograph, of horizontal pendulum type, is electromagnetically damped. It is coupled, by means of a permanent magnet mounted on the boom extension, to a mirror mounted on a vertical torsion member and provided with a bit of soft iron on the side of the mirror. In this manner a high magnification is obtained. The author gives a sample record from the new instrument, printed on the same plate with the record for the same earthquake as registered on a Galitzin seismograph.

905. ANGENHEISTER, G., "Handbuch der Experimentalphysik." This Handbuch is being published by W. Wien and F. Harms, under the auspices of Akademische Verlagsgesellschaft, M.B.H., Leipzig. It is edited by Professor Angenheister. The publication is being written by a group of collaborating authors. The following items in this and previous issues of the Bibliography are parts of this extended publication now appearing in sections: Nos. 863, 864, 950, 962, and 982. E.T.
906. AUGHTIE, F., "A Source of Mechanical Vibration for Experimental Purposes," *Philosophical Magazine*, Seventh Series, No. 70, 11, 517-522, 9 figures, London, February, 1931.

The author's abstract reads as follows: "Following a brief *résumé* of early attempts to vibrate a loaded beam in a vertical plane, which were unsuccessful due either to bad wave form or the presence of excessive horizontal movement, a description is given of the final satisfactory method, which gave a controllable amplitude up to 0.002 inch at frequencies from 8 to 35 cycles/sec. with negligible horizontal movement and good wave form. The necessary force for vibrating the beam was obtained from resonant vibrations of an auxiliary mass-spring system tuned to the working frequency. The oscillations were maintained by a small crank and electric motor, and an important feature was the use of solid friction to give a true flat-topped resonance curve, thus permitting small changes of motor speed without variation of amplitude. The equivalent electrical circuit is given of the mechanical filter system used, and records are reproduced of wave forms obtained with different methods."

- BATEMAN, Alan M., "A Textbook of Geology, Part I: Physical Geology." See No. 972 of this list.
907. BODLE, Ralph R., "Earthquake Notes," 2, No. 4, published by the Eastern Section of the Seismological Society of America, Washington, March 30, 1931.
The issue, after making current announcements, presents notes on seismograph stations. Besides activities reported from other stations previously in existence, two new stations—one at Columbia, S.C., and the other at Pittsburgh—are described. Seismograph records from the latter are reproduced. The recent paper by Dr. Macelwane on the South Pacific Earthquake (see No. 956 of this list) is reviewed. Notes of general interest and a tabulation of the epicentres located from November 28, 1930, to March 19, 1931, complete a 10-page bulletin of interest to all working seismologists.
The editor, Ralph R. Bodle, is a member of the staff of the U.S. Coast and Geodetic Survey, Washington, D.C., Items of interest to seismologists, which might properly find place in this publication, should be reported to the editor.
908. BORCHERT, H., "Über die Bildung der ersten Erstarrungskruste der Erde," *Gerlands Beiträge zur Geophysik*, 28, Heft 1-3, 32-54, 1 figure, Leipzig, 1931.
909. BORN, A., "Erdkrustenbewegungen," *Handbuch der Geophysik*, 3, Lieferung 1, Abschnitt III, 349-411, Berlin, 1930.
The *Handbuch der Geophysik* is being published by Gebrüder Borntraeger, Berlin, and edited by Prof. B. Gutenberg. See No. 332 of these lists.
910. BOWIE, William, "Elements of Isostasy—Observations and Interpretation," *Scientific Monthly*, 31, 163-176, New York, August, 1930.
An abstract, signed W. Ayvazoglou, appears in *Geophysical Abstracts*, No. 22 (see No. 954 of this list) at pages 33-34. F.W.L.
911. BROOKS, C. E. P., "Changes of Climate in the Old World during Historic Times," *Quarterly Journal of the Royal Meteorological Society*, No. 238, 57, 13-30, London, January, 1931.
912. BYERLY, Perry, "The California Earthquakes of November 28, 1929, and the Surface Layers of the Earth in California," *Proceedings of the National Academy of Sciences* 17, No. 2, 91-100, Washington, February, 1931.
These earthquakes were the first to be so well recorded by so many stations relatively close to the epicentre. As such, the records merited close study. The author discusses the direct longitudinal wave \bar{P} and also a wave which he designates \bar{P}_s and which is supposed due to compressional waves set up at the surface of the earth on the arrival of the shear wave at that horizon. Although not satisfied with the analysis results, Dr. Byerly gives the deductions as he obtains them from the data treated as outlined in his paper. He finds the thickness of the granitic layer to be indicated as about 23km. The indicated thickness of the intermediate layer is, however, 80 to 90 km.! The depth of focus was computed as 5 km. The author rejects the extraordinary value for the thickness of the intermediate layer and outlines his reasons for so doing.
- CASSINIS, G. and DE MARCHI, L., "Bollettino del Comitato Nazionale Italiano, per la Geodesia e la Geofisica." See No. 919 of this list.
913. CHAMBERLIN, Rollin T., "Isostasy from the Geological Point of View," *Journal of Geology*, 39, No. 1, 1-23, Chicago, January-February, 1931.
The author's summary reads: "The principle of isostasy has come to stay, but it appears to have been overworked. If folded mountain chains were formed by the forces tending toward isostatic equilibrium, departures from adjustment should be greatest immediately before the mountains were built. Making the mountains should restore equilibrium, and the adjustment should be most nearly achieved, and most perfect, just

as the forces had been spent in completing the mountain folding. Just the reverse, however, appears to be the case. Recently folded mountains are particularly out of adjustment. Hence, because of this and other considerations already discussed, we are forced to conclude that mountain folding is primarily independent of isostasy and in direct opposition to it. The mountains are formed in spite of isostasy. Isostatic forces, however, are all in the whole equation of mountain-building forces, and play their appropriate part, but that part is secondary and subordinate. Their function is to preserve balance disturbed by other forces and processes. Isostasy is not an accelerator; rather is it a restrainer. Isostasy works in opposition to mountain folding; it works in opposition to erosion. When things are doing, or done, it tends to restore equilibrium. Limited thus to its proper sphere, it is an important principle and should be used as such."

914. CHAPMAN, S., "The Solar and Lunar Diurnal Variation of Terrestrial Magnetism," *Philosophical Transactions of the Royal Society*, Series A, No. 218, 1-118, London, 1919.

See reference to the above paper in No. 942 of this list.

W.W.D.

915. CHRISTENSEN, Adolf, "Seismologische Studien im Gebiete der Ostalpen," *Gerlands Beiträge zur Geophysik*, 11, 1-105, Leipzig, 1912.

916. CRITIKOS, N. A., "Über die Ursachen der mikroseismischen Bodenunruhe von 4 bis 8 sec. Periode in Athen," *Zeitschrift für Geophysik*, 7, Heft 1-2, 22-26, Göttingen, 1931.

A translation of the author's abstract may be given as follows: An investigation of the correlation between the microseisms at Athens and the meteorological data shows that a land wind from the north appears to be the condition under which the movements are greatest, while winds from the sea, and surf seem to have little effect.

917. DAVISON, Charles, "The Japanese Earthquake of 1923," Thomas Murby and Co., xii+128 pages, 32 text-figures, 6 plates. Price 7s. 6d. net. London, 1931.

The table of contents is as follows:

List of Illustrations.—Part I. Introduction; the earthquake in Tokyo; the earthquake in Yokohama; the earthquake in the epicentral region; the loss of life and property.—Part II. The investigation of the earthquake; the preparation for the earthquake; intensity and nature of the earthquake motion; position of the focus; propagation of the earthquake waves; dislocations of the crust; seismic sea-waves; effects of the earthquake on the ground; after-shocks; the origin of the earthquake.

918. DAVISON, Charles, "The New Zealand Earthquake of February 3," *Nature*, No. 3198 127, 243-244, London, February 14, 1931.

919. DE MARCHI, L. and CASSINIS, G., "Bollettino del Comitato Nazionale Italiano, per la Geodesia e la Geofisica, Consiglio Nazionale delle Ricerche," Second Series, Anno I, No. 1, 16 pages, Rome, January, 1931.

This is the first issue of the Bulletin of the National Committee of Italy of the International Geodetic and Geophysical Union, which Bulletin is to appear monthly. It is compiled by the Secretary, G. Cassinis, and bears an introduction by the President, L. De Marchi.

The articles in this particular issue are not of direct interest to seismologists, so are not reported. The appearance of the new series is noted for the information of those interested.

- DUNBAR, Carl O., "A Textbook of Geology, Part I: Physical Geology." See No. 972 of this list.

920. EARTHQUAKE RESEARCH INSTITUTE, "The Result of the Precise Levelling carried out along the East Coast of the Province of Idu just before the Occurrence of the Recent Strong Idu Earthquake," *Proceedings of the Imperial Academy*, 6, No. 10, 399-400, 1 figure, Tokyo, December, 1930.
- FLINT, Richard F., "A Textbook of Geology, Part I: Physical Geology." See No. 972 of this list.
921. GEIGER, Ludwig, "Herdbestimmung bei Erdbeben aus den Ankunftszeiten," *Nachrichten der Königlichen Gesellschaft der Wissenschaften zu Göttingen, Mathematisch-physikalische Klasse*, 19 pages, May, 1910.
The original paper outlining the method of determination of an epicentre by applying the Least Squares Theory to arrival times.
922. GHERZI, E., S.J., "On some Long Waves Registered on the Galitzin Vertical Component at the Zi-Ka-Wei Observatory," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2A, 357-362, Batavia, 1930. R.H.F. + W.W.D.
923. GOESSE, John B., S.J., "Seismology at Saint Louis University," *Bulletin of Saint Louis University*, 8, No. 1, Part II, 56-76, April, 1912.
The methods of Galitzin, of Klotz, and of Geiger for determining the epicentre of an earthquake from instrumental data are described and the respective methods applied to the Mexican earthquakes of June 7 and December 16, 1911. The method of Geiger is described on pages 60-76 under the title "Probability Method for the Determination of Earthquake Epicentres from the Arrival Time Only." See No. 921 above.
924. GOLD, S., "Seismology at the Dominion Observatory," *Journal of the Royal Astronomical Society of Canada*, Whole No. 199, 24, No. 10, 442-451, Toronto, December, 1930.
The paper outlines, in popular form, and with several illustrations, the seismological work carried out at the Dominion Observatory, Ottawa, Canada. W.W.D.
925. GREGORY, J. W., "The Machinery of the Earth," *Nature*, No. 3190, 126, 959-963, London, December 20, 1930.
This paper presents the material of the Thomas Hawksley Lecture of the Institution of Mechanical Engineers, as delivered on November 7. The sub-headings are, in order:
"The Structure of the Earth"
"Origin and History of the Earth"
"The Earth in Motion".
926. GREGORY, J. W., "The Earthquake off the Newfoundland Banks of November 1929," *The Geographical Journal*, 77, No. 2, 123-139, February, 1931. W.W.D.+R.R.B.
927. GUTMANN, J., "Jährliche und tägliche Häufigkeitsschwankung der Beben in den Vereinigten Staaten," *Gerlands Beiträge zur Geophysik*, 28, Heft 1-3, 101-113, 10 figures, Leipzig, 1931.
The author's abstract reads: "The earthquakes of the catalogue by N. H. Heck for the U.S.A. are investigated statistically. Neither the criterium by A. Schuster nor the criterium of phases shows a real period in the length of a year or of a day. The distribution in relation to the intensity scale by Rossi-Forel indicates that first of all there are in question quakes of great intensity."
928. HAALCK, H., "Zur Frage der Beschaffenheit des Erdinnern," *Zeitschrift für Geophysik*, 7, Heft 1-2, 68-74, 3 figures, Göttingen, 1931.

929. HAENO, S., "The Radio-seismograph," *Japanese Journal of Astronomy and Geophysics* 8, No. 2, 39-50, 16 text-figures, 1 table, Tokyo, 1931.
The above well-illustrated paper describes clearly the important seismograph developed by Dr. Haeno for use in seismic prospecting.
930. HAURWITZ, B., "Über die Änderung der Schwere im Erdinnern," *Gerlands Beiträge zur Geophysik*, 28, Heft 1-3, 126-128, Leipzig, 1931.
931. HAYASAKA, Ichiro, "The Post-Tertiary Earth-movements and the Distribution of Earthquake Epicentres in the Island of Taiwan (Formosa)," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2B, 819-829, Batavia, 1930.
R.H.F. + W.W.D.
932. HEISKANEN, W., "Isostasy and the Figure of the Earth," *American Journal of Science*, Fifth Series, No. 121, 21, 39-50, 1 figure, bibliography, New Haven, January, 1931.
See also the comments by J. de Graaff Hunter in *Nature*, No. 3207, 127, 593-594, London, April 18, 1931.
Also in this connection see "Note on the Theoretical Basis of Isostasy," by Walter D. Lambert, in *American Journal of Science*, Fifth Series, No. 124, 21, 345-349, New Haven, April, 1931.
Items Nos. 910, 913, 934 and 973 of this list are other current contributions to the subject.
- HENDERSON, J. and ADAMS, C. E., "Seismology of New Zealand." See No. 902 of this list.
933. HONDA, H., "The Pulsatory Oscillations and the Stationary Surface Tremors of the Love Type," *The Geophysical Magazine*, 3, No. 3, 177-181, 2 figures, Tokyo, December, 1930.
934. HUBBERT, M. King and MELTON, F. A., "Isostasy, a Critical Review," *Journal of Geology*, 38, No. 8, 673-695, 5 figures, Chicago, November-December, 1930.
The authors' summary reads: "The fields providing data on the subject of isostasy are geodesy, seismology, and geology. The data of the first, which until recently have provided the main support of the isostatic theory, have been shown by Hopfner to be invalid. The data of the second have only an indirect bearing upon the question. The data of the last are more often than not contrary to isostatic expectations. Hence the theory of isostasy must, for the present, be regarded as resting upon a none too secure foundation and is hardly trustworthy for use as a major premise in present discussions of earth problems."
- HUNTER, J. de Graaff, "Isostasy." See No. 932 of this list.
935. IMAMURA, Akitune, "A Comparison of the Earth-movements Accompanying Volcanic Eruptions with Those Accompanying Earthquakes," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2B, 561-566, Batavia, 1930.
R.H.F. + W.W.D.
936. IMAMURA, Akitune, "On the Secular Variation of Land-level in the Littoral of Central Etigo," *Proceedings of the Imperial Academy*, 6, No. 10, 412-414, 3 figures, Tokyo, December, 1930.
A.I.
937. IMAMURA, Akitune, "On the Block Movement accompanying and following the Great Kwanto Earthquake of 1923," *Proceedings of the Imperial Academy*, 6, No. 10, 415-418, 4 figures, Tokyo, December, 1930.
A.I.

938. IMAMURA, Akitune, "On the Recent Destructive Idu Earthquake of 1923," *Proceedings of the Imperial Academy*, 6, No. 10, 419-422, 3 figures, Tokyo, December, 1930.

A.I.

939. IMAMURA, Akitune, "On the Block Movements that Preceded and Accompanied the Severe Tokyo Earthquake of May 21, 1928—Active Faults across the City of Tokyo," *Proceedings of the Imperial Academy*, 7, No. 1, 1-4, 5 figures, Tokyo, January, 1931.

A.I.

940. IMAMURA, Akitune, "A Seismometric Study of the North Idu Earthquake of November 26, 1930," *Japanese Journal of Astronomy and Geophysics*, 8, No. 2, 51-65, 5 text-figures, 6 plates, Tokyo, 1931.

The paper presents a thorough discussion of the data which throw light on the mechanics of the earthquake indicated.

941. ISHIMOTO, M. and TAKAHASI, R., "Séismes d'Ito et l'observation sur les variations de l'inclinaison de la surface terrestre" (in Japanese with lengthy summary in French), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 8, Part 4, 427-458, 1 plate, December, 1930.

The summary, which is too long to be reproduced here, deals with the inclination observations made at Ito and Kawana after the earthquakes of February 14 and April 22, 1930, discussing them with reference to the seismic phenomena at Ito.

942. JEFFREYS, Harold, "The Revision of Seismological Tables," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 7, 329-348, London, January, 1931.

The author's concluding summary reads: "A reduction of 85 earthquakes recorded in the last $3\frac{1}{2}$ years of the *International Seismological Summary*, and well observed over epicentral distances from under 20° to over 80° , has led to a fresh determination of the errors in the tables at present in use, which have been compared with those obtained in earlier investigations. It is believed that the resulting times are accurate to within about 1 second for both P and S, except possibly between 20° and 30° . The apparent velocities of P and S at short epicentral distances have been redetermined, and their probable errors are substantially reduced. There appears to be a sudden increase of velocity for waves emerging at about 20° . This corresponds to a discontinuity at a depth of about 270 km., corresponding apparently to one inferred by S. Chapman from the diurnal variations of terrestrial magnetism." See reference in No. 914 of this list.

943. JEFFREYS, Harold, "The Mechanics of Mountains," *Nature*, No. 3197, 127, 219, London, February 7, 1931.

The too-brief note presents the "substance of a lecture by Dr. H. Jeffreys, F.R.S., on 'The Mechanics of Mountains,' at the Geological Society of London, on December 31, 1930. . . Emphasis is laid on the importance of recognizing the intermediate layer in discussions of the mechanics of geological processes. Isostatic readjustment can take place by horizontal outflow in this layer as in the lower layer, though much more slowly, and this process may play an important part in the formation of geosynclines and the levelling of old mountain systems."

An abstract of this paper is given also in *Philosophical Magazine*, No. 71, 11, 799-800, London, March, 1931.

944. JOLY, John, "The Surface History of the Earth" (Second Edition), Oxford University Press, xxi+211 pages, 13 plates. Price 8s. 6d. net. London, 1930.

A review by Arthur Holmes appears in *Nature*, No. 3198, 127, 227-228, London, February 14, 1931, under the caption, "The Theory of Geological Thermal Cycles".

A review by Chester R. Longwell is published in the *American Journal of Science*, Fifth Series, No. 123, 21, 272-273, New Haven, March, 1931.

945. (1) JONES, E. Lester, "Work of the U.S. Coast and Geodetic Survey Which has a Bearing on the Development of the Pacific Region," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2A, 197-202, Batavia, 1930.

One section of the paper deals with the relation of earthquake epicentres and ocean deeps. W.W.D.

945. (2) JONES, E. Lester, "Recommendation to the Fourth Pacific Science Congress," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2A, 231-232, Batavia, 1930.

A recommendation that Manila should be made a central station for determining epicentres for that part of the Pacific lying west and southwest of Hawaiian islands; also that Batavia be selected for the same work for the region south and southeast of the continent of Asia. W.W.D.

946. JONES, J. H., "The Microid Seismograph," Griffin and Tatlock, Ltd., London. See advertisement in *Nature*, No. 3195, 127, Page i of Supplement, London, January 24, 1931.

The advertisement announces the above publication on "a super-sensitive instrument intended for the detection of the two compressional waves set up by artificial explosions."

947. KATO, Yosio and NAKAMURA, Saemontaro, "On the Piezo-electric Accelerometer and Its Use in the Measurement of the Velocity of the Elastic Waves Produced by Artificial Shocks," *Science Reports of the Tohoku Imperial University, Series I*, 19, No. 6, 761-772, Sendai, December, 1930.

For a previous report of this same instrument see No. 735 of these lists. The abstract published by the authors reads: "The writers have constructed a new piezo-electric accelerometer. The piezo-electric potential is amplified by a valve amplifier. The plate current in the galvanometer circuit is compensated by using two valves in parallel. The sensibility as accelerometer is 0.0003 cm./sec.² per unit displacement on record. Accordingly, in the meaning used in seismometry in ordinary cases, it has magnification (V) from 10⁶ to 10¹⁰ for shocks whose period of oscillation is from one to 1/50 sec. Or a displacement of one millimeter on the record corresponds to a displacement of ground of 10⁻⁶ to 10⁻¹⁰ mm. if its period is 1 to 1/50 sec.

"With this instrument the velocity of elastic waves in the soil was measured. For that purpose an inertia-less time signal was designed.

"The velocities of longitudinal and traverse waves in the soil were 403 m./sec. and 197 m./sec., respectively.

"Microseisms were also recorded. It was found that an oscillation whose period varies from one to two seconds is predominant at Sendai."

- KNOFF, Adolph, "A Textbook of Geology, Part I: Physical Geology." See No. 972 of this list.

948. KORTE, Walter, "Beiträge zur experimentellen Seismik," *Zeitschrift für Geophysik*, 7, Heft 1-2, 57-68, 7 figures, Göttingen, 1931.

949. KREIS, Alfred, "Über die Beseitigung des Störenden Einflusses der Schaukelung bei Universalseismographen mit drei Komponenten," *Annalen der Schweizerischen Meteorologischen Zentralanstalt*, 23-29, 12 text figures, Zürich, 1929.

950. KRUMBACH, G., "Seismik," *Handbuch der Experimentalphysik*, 25, Teil 2, 464-566, with 58 illustrations, Leipzig, 1931.

For particulars regarding the *Handbuch* see No. 905 of this list.

The above comprises the second, third, and fourth chapters dealing with the subject indicated. For an announcement regarding the first chapter see No. 962 of this list.

In this section the author deals with the various instruments. Following an historical introduction, the theory of seismic instruments is dealt with at some length. Then follows a description of seismographs in general and of some of the more important special types in particular. The method of taking the constants concludes the chapter. In Chapter 3 the subject of records receives attention, and leads to a discussion of time curves and phases. The chapter deals also with methods of determining the epicentre and with the subject of microseisms. Chapter 4 is devoted to a study of the structure of the earth. The section concludes with a brief account of the seismological services of Germany and the various lines of research now receiving attention there.

951. KUNITOMI, S. I., "Note on the Abnormal Propagation of Seismic Wave," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2A, 17-20, Batavia, 1930.

R.H.F. + W.W.D.

952. KUNITOMI, S. I., "Seismometrical Study of the Great Kwanto Earthquake Occurred on September 1st, 1923," *The Geophysical Magazine*, 3, No. 3, 149-164, 2 tables, 5 diagrams, Tokyo, December, 1930.

- LAMBERT, Walter D., "Note on the Theoretical Basis of Isostasy." See No. 932 of this list.

953. LANDSBERG, H., "Beobachtungen zur PL-Welle," *Gerlands Beiträge zur Geophysik*, 29, Heft 1, 64-68, 2 figures, Leipzig, 1931.

The author's English summary reads: "New observations of the PL-wave found by O. Somville in the case of diagrams produced by the earthquakes of the middle parts of Italy are given from the records of the Taunus-Observatory. The wave is found, too, at another focus of the Mediterranean district and it seems to have appeared also in the case of an island-quake. The time curve published by Somville is completed and drawn as far as 2500 km."

- LEE, A. W. and WHIPPLE, F. J. W., "Studies in Microseisms: (a) The Question of Diurnal Variation; (b) The Variation of Amplitude with Period." See No. 998 of this list.

954. LEE, Frederick W., "Geophysical Abstracts," United States Bureau of Mines, No. 21 (Circular 6441), pp. 1-30, January; No. 22 (Circular 6452), pp. 31-59, February; No. 23 (Circular 6461), pp. 60-85, March; No. 24 (Circular 6478), pp. 86-111, April, Washington, 1931.

F.W.L.

Attention is drawn to the reports of patents granted in the United States on methods or apparatus for geophysical prospecting. These appear on pages 106-110 of No. 24. Six are for seismometers or methods involving their use.

955. LEHMANN, I., "The Earthquake of 22 III 1928," *Gerlands Beiträge zur Geophysik*, 28, Heft 1-3, 151-164, Leipzig, 1931.

The author's summary reads: "In the earthquake of 22 III 1928 the observations of P for distances from about 30 to 45 degrees and from about 80 to 90 degrees follow the Byerly-Jeffreys time-curve very closely. For distances from 78 to 94 degrees from the epicentre, where the European stations are, the S phase has been studied more particularly. S_n is found to be a strong phase which is very well defined; up to 90 degrees the equation of the time-curve is: $S_n - C = 22 \text{ m. } 28 \text{ s.} + (\Delta - 80^\circ) \times 10.7 \text{ s.}$ $S_{cP}S$ precedes S_n from a distance of 81.7 degrees. Its time-curve cannot be determined with much certainty, since the beginning of the phase is weak and there are irregularities in its appearance."

— LONGWELL, Chester R., "A Textbook of Geology, Part I: Physical Geology." See No. 972 of this list.

956. MACELWANE, James B., S.J., "The South Pacific Earthquake of June 26, 1924," *Gerlands Beiträge zur Geophysik*, 28, Heft 1-3, 165-227, 5 plates, 72 figures, Leipzig, 1931.

The author's abstract is too lengthy to be reproduced in this list. One of the most interesting results of his investigation is the discovery of satisfactory instrumental evidence that the S'-wave exists; that is to say that shear waves appear to be propagated by the core. The reference in the author's abstract reads: "The S waves have been observed in the shadow zone of P and as far as $\Delta = 167.3^\circ$. They seem to have a linear travel time-curve like that of P. A later S' phase has been observed beginning like P' in the shadow zone of P. Its travel time-curve branches at about $\Delta = 145^\circ$ into S₁' and S₂' corresponding to P₁' and P₂'; and the travel times are not very different from those calculated by Gutenberg (1914) for shear waves through the core of the earth. However, no focal zone was found." The large number of reproductions from seismograms make it easy and profitable to follow the arguments of the author.

— MARTIN, H. and MEISSER, O., "Beitrag zur Schaffung einer Zeitnormale äusserster Konstanz." See No. 963 of this list.

957. (1) MATUYAMA, Motonori, "Gravity Measurements in Tyosen and Manchuria," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2B, 745-747, Batavia, 1930.

957. (2) MATUYAMA, Motonori, "Study of the Underground Structure of Suwa Basin by Means of the Eötvös Gravity-Variometer," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2B, 869-872, Batavia, 1930. R.H.F. + W.W.D.

958. McCOMB, H. E. and WEST, Clarence J., "List of Seismological Stations of the World," *Bulletin of the National Research Council*, No. 82, 1-119. Price \$1.50. Washington, 1931.

This is the second edition of the list. It may be obtained from the Publication Office, National Research Council, Washington, D.C.

The stations are first listed in alphabetical order. For each is given: postal address; official in charge and other personnel; geographical co-ordinates, elevation, foundation, etc.; instruments and date when installed; supporting institution or affiliated organization; publication.

Altogether, more than 350 stations are listed, each being assigned a serial number for index purposes—a convenient method since some stations are commonly referred to in seismological literature by more than one name.

The instrumental constants are given in a separate tabulation. They are listed, first by make of instrument, and within that category alphabetically by names of stations concerned.

Finally, the stations are arranged by countries, the number index following each.

The new list meets a distinct need in seismology. It will be welcomed by all working seismologists.

959. McLAUGHLIN, Donald H., "Geophysical Prospecting in 1930," *Mining and Metallurgy*, No. 289, 12, 22-26, New York, February, 1931.

A review, signed W. Ayvazoglou, appears in *Geophysical Abstracts*, No. 22 (see No. 954 of this list), pages 47-48. F.W.L.

960. MEINESZ, Vening, "Results of Gravity Determinations upon the Pacific and the Organization of Further Research," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2B, 661-667, Batavia, 1930. R.H.F. + W.W.D.

961. MEISSER, O., "Die Schallausbreitung in der Atmosphäre bei künstlichen Sprengungen," *Physikalische Zeitschrift*, **30**, 170-175, 7 text figures, Leipzig, 1929.

O.M.

The paper describes and explains the distribution of areas of audibility about an explosion set off for the purpose of studying such phenomena.

962. MEISSER, O., "Seismik," *Handbuch der Experimentalphysik*, **25**, Teil 2, 441-463, 17 illustrations, Leipzig, 1931.

For particulars regarding the *Handbuch*, see No. 905 of this list.

The above is the first chapter dealing with the subject indicated. For an announcement regarding the second, third, and fourth chapters see No. 950 of this list.

In this section the author deals with the theory of earthquake waves. The treatment is under the following heads:

1. Elastic Constants.
2. Free Waves in an Elastic Isotropic Medium of Infinite Extent.
3. Reflection and Refraction at a Boundary Surface.
4. Reflection at the Surface.
5. Coupled Elastic Waves in an Elastic Medium of Infinite Extent but Bounded by a Plane Surface. (*ein Halbraum*).
 - (a) Rayleigh Waves.
 - (b) Shear Waves (*Querwellen*).
 - (c) Rayleigh Waves in a Layered Medium.
 - (d) Group Velocity.
6. Periods of the Seismic Waves.
7. Dissipation of Energy in the Case of Surface Waves.

O.M.

963. MEISSER, O. and MARTIN, H., "Beitrag zur Schaffung einer Zeitnormale äusserster Konstanz," *Physikalische Zeitschrift*, **32**, Heft 6, 233-243, 13 text figures, Leipzig, 1931.

O.M.

The authors present a method of comparing two periodicities with a precision of the order of 10^{-7} of the unit of time concerned, and for a duration as great as ten minutes.

— MELTON, F. A. and HUBBERT, M. King, "Isostasy, a Critical Review." See No. 934 of this list.

964. (1) MIYABE, Naomi, "On the Vertical Earth Movement in the Kwanto District," *Proceedings of the Imperial Academy*, **6**, No. 10, 405-408, 2 figures, Tokyo, December, 1930.

964. (2) MIYABE, Naomi, "On the Relation between Horizontal and Vertical Movements of Earth's Crust in Kwanto District," *Proceedings of the Imperial Academy*, **6**, No. 10, 409-411, Tokyo, December, 1930.

965. MOTHEs, Hans, "Seismographen im Dienst der Gletscherforschung," *Forschungen und Fortschritte*, **6**, Nr. 28, 363-365, Berlin, 1930.

— NAKAMURA, Saemontaro and KATO, Yosio, "On the Piezo-electric Accelerometer and Its Use in the Measurement of the Velocity of the Elastic Waves Produced by Artificial Shocks." See No. 947 of this list.

966. NATIONAL RESEARCH COUNCIL, U.S.A., "The Physics of the Earth's Crust." The National Research Council is sponsoring a series of nine bulletins on the above general topic. The subjects to be dealt with are: Volcanology; The Figure of the Earth; Meteorology; The Age of the Earth; The Internal Constitution of the Earth; Seismology; Oceanography; Field Methods of Detecting Unhomogeneities of the Earth's Crust; Terrestrial Magnetism and Electricity.

The first four of these are now ready for distribution. The others will be published as they are completed. Each is entrusted to a group of experts for the subject concerned. A leaflet describing the four bulletins which have so far appeared and giving details regarding the others may be obtained through the Publication Office, National Research Council, Washington, D.C., U.S.A.

967. NAVARRO NEUMANN, M. Ma. S., S.J., "Un petit grain blanc, enregistré par des séismographes," *Zeitschrift für Geophysik*, 7, Heft 1-2, 26-33, 3 figures, Göttingen, 1931.

968. NEUMANN, Frank, "The Velocity of Seismic Surface Waves over Pacific Paths," *Proceedings of the Fourth Pacific Science Congress, Java, 1929*, 2B, 705-709, Batavia, 1930.

A discussion on Love- and Rayleigh-waves based on records obtained by two Milne-Shaw seismographs at Honolulu. See also No. 368 of these lists. W.W.D.

969. NEUMANN, Frank, "Seismological Report, October, November, December, 1927," United States Department of Commerce, Coast and Geodetic Survey, Serial Publication No. 503, 57 pages, 1 map, Washington, 1931.

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The following abstract has been translated into English from one furnished by the author of the above summary: The paper is a detailed discussion of the seismicity of Finland. For the period 1610 to 1929 macroseismic data for a total of 235 earthquakes have been compiled. For the past four decades during which the records have been complete, there has been a yearly average of three earthquakes. The intensity has reached a maximum not greater than six of the Mercalli-Cancani scale, but the areas affected by the tremors were extensive. The graphical exposition of the seismicity is of a new type which is most informative. It shows the connection between the earthquakes and the progress of elevation of the Fennoscandinavian shield. There is presented a statistical investigation of the daily and yearly cycles in the case of the definitely-known earthshocks. There is a discussion of the mechanics of the earthquakes. The author presents a graphical demonstration of the connection between various areas and their corresponding seismicity by means of the hypsographic curve of the earth's surface. E.T.

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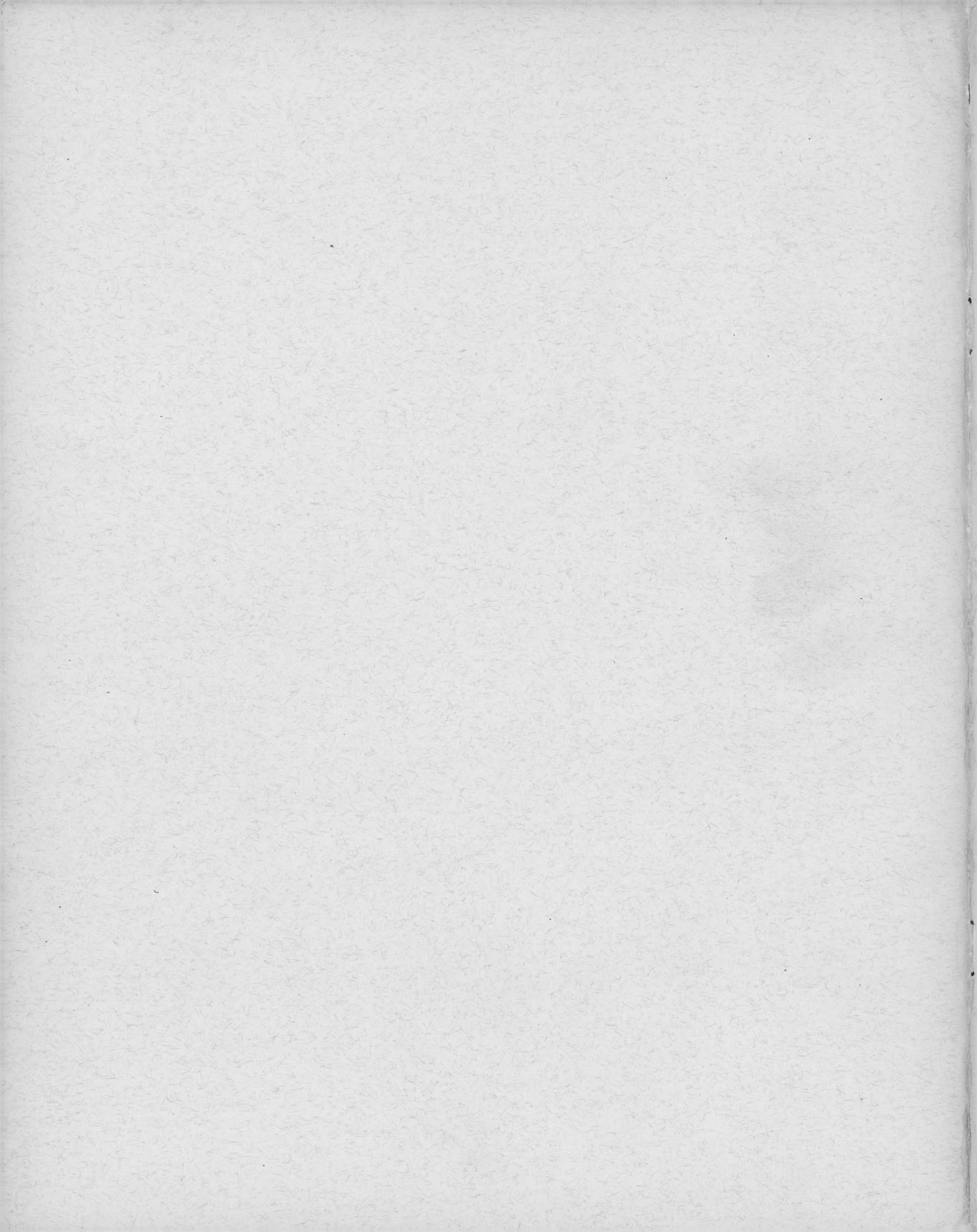
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LIST OF COLLABORATORS

The items for this issue of the Bibliography were compiled while the editor was stationed at the Geophysical Laboratory of Saint Louis University. The compilation was made possible through the kindness of Rev. James B. Macelwane, S.J., Dean of the Graduate School and Director of the Department of Geophysics, who arranged that all incoming scientific journals containing articles on seismology or allied subjects should pass through the hands of the editor. Although none of the listed items is marked with Dr. Macelwane's initials, his co-operation in the work of the entire issue is hereby gratefully acknowledged.

The initials appended to various items throughout the Bibliography indicate, in each case, the contribution by the respective collaborator.

Agamennone, G., Real Osservatorio Geofisico, Rocca di Papa, Rome, Italy.	G.A.
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Vol. X

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1036. IMAMURA, Akitune, "Further Studies on the Chronic Block Movements in the Kyoto-Osaka District," *Proceedings of the Imperial Academy*, 7, No. 3, 92-95, 4 figures, Tokyo, 1931. A.I.
1037. IMAMURA, Akitune, "On the Block Movements That Preceded and Accompanied the Severe Tokyo Earthquake of May 21, 1928—Active Faults across the City of Tokyo," *Japanese Journal of Astronomy and Geophysics*, 8, No. 3, 177-186, 6 figures, 3 tables, 1 plate, Tokyo, 1931. A.I.
See also No. 939 of these lists.
1038. INOUE, Win and SUGIYAMA, Tomonori, "On Sound Phenomena of the Idu Earthquake of Nov. 26th, 1930," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 9, Part 2, 168-176, 4 figures, June, 1931.
1039. ISHIMOTO, Mishio, "Étude préliminaire sur l'accélération des séismes," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 9, Part 2, 159-167, 4 figures, 1 plate, June, 1931.
1040. ITOO, Tokunosuke, "Über Oberflächenwellen" (Erste Mitteilung), *Gerlands Beiträge zur Geophysik*, 30, Heft 3-4, 366-407, Leipzig, 1931.
1041. JEFFREYS, Harold, "Thermodynamics of an Elastic Solid," *Proceedings of the Cambridge Philosophical Society*, 26, 101-106, January, 1930.
1042. JEFFREYS, Harold, "Damping in Bodily Seismic Waves," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 7, 318-323, London, January, 1931.
1043. JEFFREYS, Harold, "The Formation of Love Waves (Querwellen) in a Two-layer Crust," *Gerlands Beiträge zur Geophysik*, 30, Heft 3-4, 336-350, Leipzig, 1931.
The author's summary reads: "The generation of SH- and Love-waves from an impulsive source is considered. It is found that the disturbance transmitted through the lower layer consists of a series of overlapping pulses, each starting at an instant corresponding to the time of transmission of a pulse that has undergone an integral number of reflexions in the upper layer. The recovery after each pulse leads to a train of waves, the superposition of which gives the Love-waves."
1044. JOHNSTONE, J. H. L., "The Acadian-Newfoundland Earthquake of November 18, 1929," *Proceedings and Transactions of the Nova Scotian Institute of Science*, 17, Part 4, 223-237, 3 illustrations, Halifax, 1930.
The author's abstract reads: "Field data obtained by some observers in Nova Scotia and Newfoundland are given. The seismograms of three of the aftershocks recorded at Halifax are discussed. The first part of the P-wave to reach Halifax was a compression. The seismogram obtained at the island of Saint Helena is briefly discussed and a copy of the tide gauge record obtained at Halifax is shown. The damage to cables is briefly discussed and photographs of broken cable ends found at N. Lat. 43° 26' 54" and W. Long. 56° 12' 54" are given. No exhaustive investigation has been undertaken as this is being carried out by the Dominion Observatory, Ottawa, and by the United States Coast and Geodetic Survey."

1045. KINDLE, Edward M., "Sea-bottom Samples from Cabot Strait Earthquake Zone" (abstract only), *Pan-American Geologist*, 55, No. 4, 306, Des Moines, May, 1931.
The paper was presented at the Toronto meeting of the Geological Society of America (1931).
1046. KISHINOUE, Fuyuhiko, "Report of the Strong Earthquake in the Southwestern Part of Kaga Province, Oct. 17, 1930," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 9, Part 2, 216-223, June, 1931.
The paper is in Japanese with a short abstract in English on page 223.
1047. KRANZ, Walter, "Bodenerschütterungen, Geophysik, und Ingenieurgeologie," *Zeitschrift für praktische Geologie*, 39, No. 3, 38-40, Halle, 1931.
An abstract by W. Ayvazoglou appears in *Geophysical Abstracts*, No. 26, at page 142. See No. 1053 of this list. F.W.L.
1048. KRAUZ, E., "Die Seismotektonik der Tiroler Alpen," *Gerlands Beiträge zur Geophysik*, 30, Heft 1-2, 96-135, 2 figures, Leipzig, 1931.
1049. KRUMBACH, G., "Seismogrammformen und Vorgänge in Herdgebiet," *Gerlands Beiträge zur Geophysik*, 30, Heft 3-4, 351-365, 5 figures, bibliography, Leipzig, 1931.
The author makes use of the Kamtschatka earthquakes of 1904, 1920, and 1929 to illustrate the characteristic records of earthquakes originating at the same epicentre, though recorded at different stations and at different times. He examines the probable causes of this established observation.
An interesting report along this same line is given on pages 297-298 of the paper by Dr. Leet, reported as No. 1054 of this list.
1050. LAMBERT, Walter D., "Note on Prey's Article: 'Zur Frage nach dem isostatischen Massenausgleich in der Erdrinde,'" *Gerlands Beiträge zur Geophysik*, 30, Heft 1-2, 239-240, Leipzig, 1931.
See No. 1070 of this list.
1051. LARSEN, Palmer, "Index to Geophysical Abstracts No. 1 to No. 20," United States Bureau of Mines, Information Circular, No. 6438, 1-38, Washington, May, 1931. F.W.L.
- LA RUE, Wilton W. and McCOLLUM, Burton, "Use of Existent Wells as an Adjunct to Seismograph." See No. 1059 of this list.
1052. LAWSON, Andrew C., "The Isostasy of the Uinta Mountains," *Journal of Geology*, 39, No. 3, 264-276, Chicago, April-May, 1931.
1053. LEE, Frederick W., "Geophysical Abstracts," United States Bureau of Mines, No. 25 (Circular 6500), pages 112-135, May; No. 26 (Circular 6511), pages 136-159, June; No. 27 (Circular 6528), pages 160-192, July, Washington, 1931.
No. 27 is devoted entirely to listing patents granted in Germany since 1904 to devices or methods for use in geophysical prospecting. In this issue only electrical methods are considered. Abstracts from German patents concerning other methods of geophysical prospecting will be published in special issues of *Geophysical Abstracts* appearing later. F.W.L.
1054. LEET, L. Don, "Empirical Investigation of Surface-waves Generated by Distant Earthquakes," *Publications of the Dominion Observatory*, 7, No. 6, 267-322, 25 figures, 6 tables, bibliography, Ottawa, 1931.
The above constitutes the author's Doctorate Dissertation presented to Harvard University. The following are excerpts from the Summary:

"The earth particle during the passage of Rayleigh-waves was found, without exception in the cases studied, to rotate in an elliptical path in a retrograde sense as regards the propagation direction of the disturbance. The same was found to be true for the W_2 -waves which, arriving from the opposite direction, exhibit a rotation sense which is the reverse of that in R. It is shown that this is required by the theory of Rayleigh."

"The Z:H ratio of vertical to horizontal displacements differs from the ratio predicted by theory for an isotropic medium."

"It was found that there is a distinct tendency for longer periods to exhibit greater velocities, that is, for the waves to be subject to dispersion."

"There was, further, a definite correlation between the values obtained for north-west and south continental paths, while the values for the Atlantic indicated a markedly higher velocity than for continental paths."

"It seems clear that no part of the horizontal record of a quake whose azimuth was not one of the cardinal instrument directions can be selected with assurance as representative R-wave registration—there is at practically all times a transverse element of unknown magnitude present The problem of instrument orientation seems to assume important proportions For this reason, it is suggested that recording stations, to render optimum service, should orient at least some of their instruments with reference to one or more epicentral regions from which most of their records are obtained, rather than in the traditional NS-EW planes."

1055. LEET, L. Don and EWING, Maurice, "Velocity of Explosion-generated Longitudinal Waves in a Nepheline Syenite," *Transactions of the American Geophysical Union, Twelfth Annual Meeting, April 30 and May 1, 1931. Special Publication of the National Research Council, U.S.A.*, 61-65, 2 figures, Washington, 1931.
1056. LINK, Theodore A., "Individualism of Orogenies Suggested by Experimental Data," *Bulletin of the American Association of Petroleum Geologists*, **15**, No. 4, 385-403, 21 figures, Tulsa, April, 1931. T.A.L.
1057. MATHER, Kirtley F., "Plumbing the Depths of the Earth," *Scientific Monthly*, No. 185, **32**, No. 2, 165-168, New York, February, 1931.
The above paper was presented over the Columbia Broadcasting System as one of the Science Service Radio Talks.
1058. MCADIE, Alexander, "Terramotum: Quid Bonum?" *Harvard Alumni Bulletin*, Cambridge, June 18, 1931.
An interesting article, with illustrations, descriptive of the San Francisco earthquake, presented by one who experienced that disaster. R.R.B.
1059. MCCOLLUM, Burton and LA RUE, Wilton W., "Use of Existent Wells as an Adjunct to Seismograph," *Oil Weekly*, **62**, No. 1, 29-34, Houston, June 19, 1931.
The authors state: "The discovery of production in sands beneath the overhanging cap rock and salt at Barbers Hill and the Allen Dome suggests the possibility of similar deposits on other Gulf Coast domes. The making of well locations for the development of such deposits is a difficult procedure in which a deep profile of the mushroomed flank is of great assistance to the geologist. For this reason certain methods of developing such a profile, here described, are thought to be of special interest."
The article is a qualitative description of the method, to be followed by a more complete discussion in a forthcoming issue of the *Bulletin of the American Association of Petroleum Geologists*. L.D.L.
1060. MCCOMB, H. E., "Progress-report on Development of Seismological Instruments," *Transactions of the American Geophysical Union, Twelfth Annual Meeting, April 30 and May 1, 1931. Special Publication of the National Research Council, U.S.A.*, 74-75, 2 figures, Washington, 1931.

- McCOMB, H. E. and WENNER, Frank, "Progress-reports on Development of Instruments—the Shaking-table." See No. 1098 of this list.
1061. MEINESZ, F. A. Vening,
 (1) "Gravity Anomalies in the East Indian Archipelago," *Geographical Journal*, 77, No. 4, 323-337, 2 figures, London, April, 1931.
 (2) "By Submarine through the Netherlands East Indies," *Geographical Journal*, 77, No. 4, 338-349, 18 illustrations, London, April, 1931.
 An account of the discussion of the above papers when they were presented before the Royal Geographical Society is given in each case.
1062. MERRITT, George E., "The Development of a Tilt-meter," *Transactions of the American Geophysical Union, Twelfth Annual Meeting, April 30 and May 1, 1931. Special Publication of the National Research Council, U.S.A.*, page 73, Washington, 1931.
1063. MIYABE, Naomi, "On Block Movements of the Earth's Crust," *Proceedings of the Imperial Academy*, 7, No. 4, 150-152, 2 figures, Tokyo, April, 1931.
- MIYABE, Naomi and TERADA, Torahiko, "On Heterogeneous Distribution of Houses Destroyed by Earthquake." See No. 1089 of this list.
1064. MOURANT, A. E., "A Study of the Seismograms of English Channel Earthquakes," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 7, 374-383, London, January, 1931.
1065. MUSYA, Kinkiti, "On the Luminous Phenomenon That Attended the Idu Earthquake, November 26th, 1930," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 9; Part 2, 177-215, numerous illustrations, June, 1931.
 This highly interesting paper is given in Japanese but a two-page English abstract appears on pages 214-215. The introductory paragraph may be quoted as follows:
 "In the old records of earthquakes in Japan it is often stated that a luminous phenomenon was observed at the time of great seismic disturbances. The writer of this thesis has long been in the belief that those statements are not entirely groundless. Fortunately he was able to observe the phenomenon at the time of the earthquake which occurred in Idu on November 26th, 1930. It has also been found that many people witnessed the same spectacle. So the author asked the teachers and pupils of about 150 intermediate schools in the affected area to furnish him with data concerning the phenomenon. As a result he received about 1,500 replies with some sketches."
1066. NETTLETON, L. L., "Graphic Solution of Strike and Dip from Two Angular Components," *Bulletin of the American Association of Petroleum Geologists*, 15, No. 1, 79-82, 3 figures, Tulsa, January, 1931.
1067. OBSERVATORY, The, "Meeting for the Discussion of Geophysical Subjects," *The Observatory*, No. 680, 54, 15-18, London, January, 1931.
 The meeting was devoted to a discussion of the subject of microseisms, and of two papers by Dr. Jeffreys, published in the *Geophysical Supplement*, and reported in these lists as No. 942 and No. 1042, respectively.
1068. OXFORD UNIVERSITY, "The International Seismological Summary for 1927, July, August, September," Pages 233-364, Oxford, 1931.
 This is the continuation of the series issued under the direction of the late Prof. H. H. Turner.

1069. PAULO DE OLIVEIRA, Euzebio, "Methodos geophysicos applicados às fundações de barragens," *Serviço Geologico e Mineralogico do Brasil, Special Publication*, 9 pages, 5 figures, Rio de Janeiro, 1929.

1070. PREY, A., "Zur Frage nach dem isostatischen Massenausgleich in der Erdrinde," *Gerlands Beiträge zur Geophysik*, 29, Heft 2, 201-225, Leipzig, 1931.

The author's English abstract reads: "To decide the question started by Hopfner, whether the isostasy be nothing but an illusion produced by the methods of reduction, the case of a non-isostatic earth has been completely treated. Based on the author's development of the heights of the earth in spherical harmonics, the level-surface (geoid) and the values of gravity on the surface of the continents and oceans have been computed. It is thereby regarded that the heights are to be counted not from a normal-earth but from the disturbed level-surface. On the values of the gravity gained in this manner the free-air and the Bouguer's reduction are applied, as usual. The result shows that only in a few regions of the earth an ambiguity, isostatic or non-isostatic, is possible. In general the values of gravity on a non-isostatic earth are not consistent with the observations. There is an obvious asymmetry in the North-South and in the East-West direction caused by the terms of the first order in the development. Accordingly the values of the gravity in America and in Europe treated in like manner should differ by about $100 \cdot 10^{-8}$ cm/sec², not corresponding to the observations. The absence of this difference seems to be a proof of the existence of a compensation of the masses in the earthcrust."

See also No. 1050 of this list.

- PRICE, A. T. and CHAPMAN, S., "The Electric and Magnetic State of the Interior of the Earth, as Inferred from Terrestrial Magnetic Variations." See No. 1013 of this list.

- RECK, Hans, "The Geology of Jan Mayen" and "The Petrography of Jan Mayen." See No. 1100 of this list.

1071. REEDS, Chester A., "Seismic Maps of Major Earthquakes" (abstract only), *Pan-American Geologist*, 55, No. 1, 68, Des Moines, February, 1931.

The above abstract of a paper presented before the American Geological Society at the Toronto meeting, 1931, announces the publication of seismic maps of the world by the American Museum of Natural History, New York.

1072. REID, Harry Fielding, "The Origin of Earthquake-waves," *Transactions of the American Geophysical Union, Twelfth Annual Meeting, April 30 and May 1, 1931. Special Publication of the National Research Council, U.S.A.*, 67-70, 2 figures, Washington, 1931.

1073. REYNOLDS, W. H., "Report on the Construction of a Three-drum Seismograph-recorder," *Transactions of the American Geophysical Union, Twelfth Annual Meeting, April 30 and May 1, 1931. Special Publication of the National Research Council, U.S.A.*, 76-77, 2 figures, Washington, 1931.

1074. ROTHÉ, E. et al., "Annuaire de l'Institut de Physique du Globe, 1928" (Deuxième Partie, Séismologie), *Special Publication, University of Strasbourg, Faculty of Sciences*, 104 pages, Strasbourg, 1929.

1075. RUTTEN L., "Geologische Nomenclator," Compiled under the auspices of the Geologisch-Mijnbouwkundig Genootschap voor Nederland en Koloniën, under the editorship of L. Rutten, Quarto, 338 pages, The Hague (G. Naeff), 1929.

An abstract signed E. S. B. appears on page 187 of *Journal of Geology*, 38 No. 2, Chicago, February-March, 1930. The publication presents in parallel columns the

corresponding technical geologic terms in use in Dutch, German, English, and French. A report on the section devoted to seismology (pages 167-182) was given as No. 691 of these lists.

1076. SCHWINNER, Robert, "Richtigstellungen zu: H. Borchert, 'Über die Bildung der ersten Erstarrungskruste der Erde,'" *Gerlands Beiträge zur Geophysik*, 29, Heft 2, 239-246, Leipzig, 1931.

See also No. 908 and 1007 of these lists.

1077. SCIENTIFIC AMERICAN, "Preserved for 10,000 Years to Come," *Scientific American*, pages 42-43, 6 illustrations, New York, July, 1931.

This article, copied from *The Digest*, International General Electric Company, describes the efforts made to preserve the statistics of the great earthquake of Japan (1923).

1078. SCRASE, F. J., "Deep Focus Earthquakes," *Nature*, No. 3204, 127, 486, London, March 28, 1931.

1079. SCRASE, F. J., "The Instrumental Phase-difference of Seismograph Records: an Illustration of the Properties of Damped Oscillatory Systems," *Proceedings of the Physical Society*, 43, Part 3, No. 238, 259-273, Cambridge, 1931.

The author's abstract reads: "A discussion is given of the method of interpretation of the maxima shown on the records of earthquakes during the surface-wave phase. The usual procedure is to treat the waves (which actually appear as beats) as being truly simply-harmonic and to apply the formulae which are derived on this assumption. It is shown that, in general, this procedure does not necessarily lead to the correct interpretation. In the case of direct registration the true earth-maximum may have occurred one half-period later than the time obtained by the usual correction. With galvanometric registration the maximum may have occurred either one, two, or three half-periods earlier than the time indicated by the usual formula due to Galitzin. Some curves are included to illustrate these points, and an attempt is made to obtain a mathematical explanation.

It is shown that there is no easy method of eliminating an ambiguity of one half-period. For direct registration, therefore, the phase-correction at present in use appears to be as good as the one alternative. In the case of galvanometric registration, although there are altogether four forms of phase-correction, the number of alternatives for any particular period cannot exceed two. The final recommendation in this case is that the correction suggested by Somville and which is one half-period less than Galitzin's, be adopted for general use."

F.J.S.

1080. SEZAWA, Katsutada, "On the Transmission of Seismic Waves on the Bottom of an Ocean," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 9, Part 2, 115-143, 13 figures, June, 1931.

1081. SHEPARD, Francis P., "Glacial Troughs of the Continental Shelves," *Journal of Geology*, 39, No. 4, 345-360, 12 figures, Chicago, May-June, 1931.

The author's abstract reads: "Submarine valleys may be classified into three groups. One group resembles youthful river valleys, another fault grabens, and a third glacial troughs. There are many reasons for believing that the valleys of this last group have been shaped by glacial excavation. They are found exclusively off glaciated coasts. They contain the deep-rimmed depressions, trough-shape, and relatively straight walls characteristic of glacially excavated valleys. Evidence of the presence of moraines within these shelf-troughs has been discovered. Finally, the continental shelves off glaciated coasts are much deeper on the average than those off unglaciated areas."

Part of the data of the above paper was presented before the Toronto Meeting of the Geological Society of America (1931), with the title "Saint Lawrence (Cabot Strait) Submarine Trough." An abstract of this appears in *Pan-American Geologist*, 55 No. 4, 308, Des Moines, May, 1931.

1082. SOHON, F. W., S.J., "Registration of the Time-signals at Georgetown," *Transactions of the American Geophysical Union, Twelfth Annual Meeting, April 30 and May 1, 1931. Special Publication of the National Research Council, U.S.A.*, 66-67, 1 figure, Washington, 1931. F.W.L.

1083. SOKOLOV, P. T., "Collection of Articles on the Theory of the Seismic Method of Geological Prospecting" (in Russian), *Transactions of the Geological and Prospecting Service of the U.S.S.R.*, No. 17, 72 pages, Leningrad, 1931.

An abstract by W. Ayvazoglou is given on pages 144-145 of *Geophysical Abstracts*, No. 26. See No. 1053 of this list.

The abstract states, in part, that the following four problems are discussed:—

1. Resolution of the hodograph function into series.
2. The methods for calculating the hodographs of waves caused by explosions.
3. Some suggestions concerning the theory of seismic prospecting.
4. Application of the seismic method to the measurement of the deviation of bore holes. F.W.L.

1084. SOMVILLE, O., "A propos d'une onde longue dans la première phase de quelques séismogrammes" (II^e Communication), *Gerlands Beiträge zur Geophysik*, 29, Heft 2, 247-251, 4 figures, Leipzig, 1931.

The first paper was reported as No. 887 of these lists.

1085. STONELEY, R., "Some Near Earthquakes Reported in the International Seismological Summary," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 7, 349-362, London, January, 1931.

1086. STONELEY, R., "On Deep-focus Earthquakes," *Gerlands Beiträge zur Geophysik*, 29, Heft 3-4, 417-435, 4 figures, 3 plates, Leipzig, 1931.

The author's English abstract reads: "Prof. Turner has found that the foci of earthquakes may occasionally be situated as low as 0.09 of the earth's radius below normal, that is, they may occur 580 km. below the surface.

"Allowance for the known errors of the Zöppritz-Turner tables would probably reduce these depths considerably.

"According to a general reciprocal theorem in dynamics, since the amplitudes of surface waves fall off rapidly at great depths, the surface waves of deep focus earthquakes should be small or insensible. Yet the International Seismological Summary gives L and M readings even for the deepest foci contemplated.

"It is here shown that in some of the deepest focus earthquakes, the recorded L and M are sparse, and often non-existent at great distances. The recorded observations mostly refer to S, SS, SSS, etc., or else to Gutenberg's early long wave G, for which the almost complete extinction is not to be expected as the period is very long.

"The actual records of these very deep-seated shocks show a very conspicuous P, a large S, SS, and further disturbances, and no L or M. The amplitudes of the general disturbance at the calculated positions of L and M are smaller, often much smaller, than that of P.

"Finally, a tribute must be paid to the pioneer work of the late Prof. Turner. His deep-focus earthquakes, even if not of such great depth as he thought, have at any rate a focus in some cases far below normal."

- SUGIYAMA, Tomonori and INOUE, Win, "On Sound Phenomena of the Idu Earthquake of Nov. 26th, 1930." See No. 1038 of this list.

- TAKAYAMA, T. and FUJIWARA, S., "Note on the Mechanism of the North Izu Earthquake of Nov. 26th, 1930 in Japan." See No. 1024 of this list.

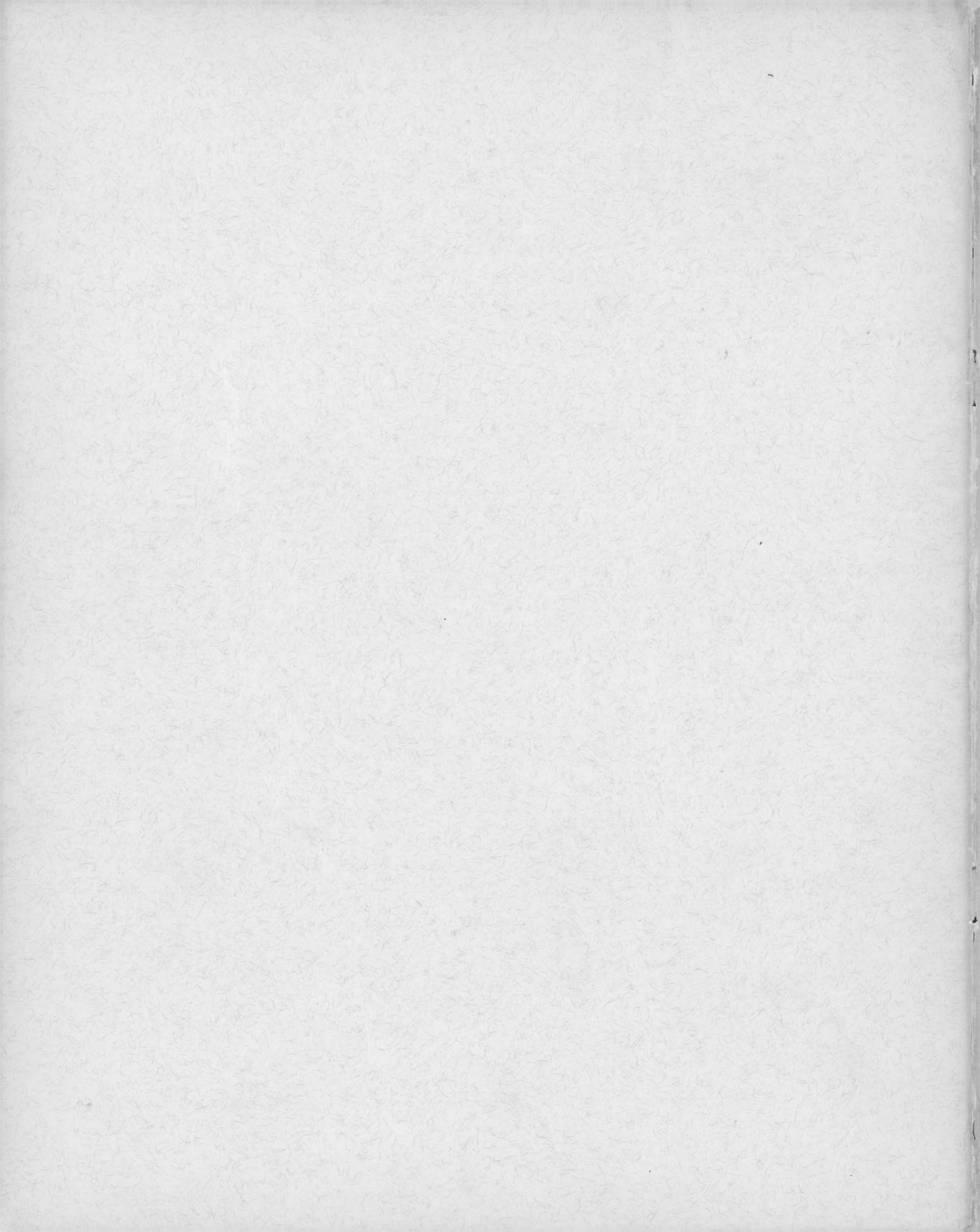
1087. TERADA, Torahiko, "On the Curvature of Islands Arc and Its Relation to the Latitude," *Proceedings of the Imperial Academy*, 7, No. 4, 143-145, 1 figure, Tokyo, April, 1931.
1088. TERADA, Torahiko, "On the Curvature of Islands Arc," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 9, Part 2, 144-150, June, 1931.
1089. TERADA, Torahiko and MIYABE, Naomi, "On Heterogeneous Distribution of Houses Destroyed by Earthquake," *Proceedings of the Imperial Academy*, 7, No. 4, 146-149, 1 figure, Tokyo, April, 1931.
1090. TSUBOI, Chuji, "A Note on the Results of the Repeated Precise Levellings across the Ito Seismic Region," *Proceedings of the Imperial Academy*, 7, No. 4, 153-154, 2 figures, Tokyo, April, 1931.
1091. TSUBOI, Chuji, "Supplementary Note on the Areal Deformation of the Base Line Rhombus at Mitaka," *Proceedings of the Imperial Academy*, 7, No. 4, 155-157, 3 figures, Tokyo, April, 1931.
See No. 893 of these lists.
1092. TSUBOI, Chuji, "Independent Relative Vertical Movements of Land Blocks as Revealed by Means of Repeated Precise Levellings along the Western Coast of Idu Peninsula," *Proceedings of the Imperial Academy*, 7, No. 4, 158-160, 3 figures, Tokyo, April, 1931.
1093. TSUBOI, Chuji, "A Note on the Results of the Repeated Precise Levellings across the Ito Earthquake Area," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 9, Part 2, 131-158, June, 1931.
- TYRRELL, G. W. and WORDIE, J. M., "The Petrography of Jan Mayen" and "The Geology of Jan Mayen." See No. 1100 of this list.
1094. ULLER, Karl, "Die Entwicklung des Wellen-Begriffes, V," *Gerlands Beiträge zur Geophysik*, 29, Heft 2, 252-266, Leipzig, 1931.
1095. VISSER, S. W.,
- (1) "Aardbevingen in en om West-Java," *Natuurkundig Tijdschrift voor Nederlandsch Indië*, 79, 181 Batavia, 1919.
 - (2) "Aardbevingen in Midden-en Oost-Java," *Verhandelingen Tweede Nederlandsch-Indisch Natuurwetenschappelijk Congres*, Bandoeng, 1922.
 - (3) "Inland and Submarine Epicentra of Sumatra and Java Earthquakes," *Koninklijk Magnetisch en Meteorologisch Observatorium te Batavia*, Verhandelingen No. 9, 14 pages, Batavia, 1922.
 - (4) "Over de waarneming van de stootrichting van aardbevingsschokken," *Natuurkundig Tijdschrift voor Nederlandsch Indië*, 83, Batavia, 1923.
 - (5) "Over de plaatsbepaling van epicentra van aardbevingen" (with English summary), *Natuurkundig Tijdschrift voor Nederlandsch Indië*, 83, Batavia, 1924.

- (6) "On the Distribution of Earthquakes in the Netherlands East Indian Archipelago, II: 1920-1926, with a Discussion of Time Tables," *Koninklijk Magnetisch en Meteorologisch Observatorium te Batavia, Verhandelingen No. 22*, 116 pages, Batavia, 1930. H.P.B.
1096. VISSER, S. W., "Vulkanische verschijnselen en aardbevingen in den Oost-Indischen Archipel, waargenomen gedurende het jaar 1929," *Natuurkundig Tijdschrift voor Nederlandsch Indië*, 319-347, Batavia, 1930.
1097. VISSER, S. W., "Earthquakes and Tides," *Proceedings of the Koninklijke Akademie van Wetenschappen te Amsterdam*, 34, No. 1, 6 pages in the reprint, Amsterdam, 1931. H.P.B.
- The paper discusses the possibility of a correlation between earthquakes and the tides. It was suggested by a popular belief of natives on the south coast of Ceram (Moluccas) that earthquakes occur during ebb tide only. The conclusion is that such belief is without foundation in general, but certain limited cases are disclosed in which some correlation is found.
1098. WENNER, Frank, "Progress-reports on Development of Instruments,—Vertical Component Seismometer: Shaking-table: Accelerometer," *Transactions of the American Geophysical Union, Twelfth Annual Meeting, April 30 and May 1, 1931. Special Publication of the National Research Council, U.S.A.*, 71-72, Washington, 1931.
- The second section of this paper—dealing with the Shaking-table—has been prepared with the collaboration of H. E. McComb.
1099. WILLIS, Bailey and WILLIS, Robin, "Geologic Structures" (Second Edition), McGraw-Hill Book Company, xv + 518 pages, 152 figures, 12 plates. Price \$4.00. New York, 1929.
- A lengthy review, signed R. T. C., appears on pages 664-666 of *Journal of Geology*, 38, No. 7, Chicago, October-November, 1930.
- WILLIS, Robin and WILLIS, Bailey, "Geologic Structures." See No. 1099 of this list.
1100. WORDIE, J. M. and TYRRELL, G. W., "The Geology of Jan Mayen" and "The Petrography of Jan Mayen" (by the respective authors), *Transactions of the Royal Society of Edinburgh*, 54, Nos. 18 and 19, 741-765, 1926.
- A review by Hans Reck, appears on pages 261-263, *Zeitschrift für Vulkanologie*, 13, Heft 4, Berlin, April, 1931.

LIST OF COLLABORATORS

The appended initials are those used to indicate, in each case, the items contributed by the respective collaborator.

Agamennone, G., Real Osservatorio Geofisico, Rocca di Papa, Rome, Italy.	G.A.
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Bodle, Ralph R., Editor, "Earthquake Notes," United States Coast and Geodetic Survey, Washington, D.C., U.S.A.	R.R.B.
Gutenberg, Beno, 220 North San Rafael Avenue, Pasadena, California, U.S.A.	B.G.
Imamura, A., Seismological Institute, Tokyo Imperial University, Tokyo, Japan.	A.I.
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Leet, L. Don, Harvard University, Cambridge, Mass., U.S.A.	L.D.L.
Link, Theodore A., Imperial Oil Co., Calgary, Alberta, Canada.	T.A.L.
Scrase, F. J., Kew Observatory, Richmond, Surrey, England.	F.J.S.
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DEPARTMENT OF THE INTERIOR
CANADA

HON. THOMAS G. MURPHY, *Minister*

H. H. ROWATT, *Deputy Minister*

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OF THE

Dominion Observatory

OTTAWA

R. MELDRUM STEWART, *Director*

Vol. X

Bibliography of Seismology

No. 12

OCTOBER, NOVEMBER, DECEMBER, 1931

BY

ERNEST A. HODGSON

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The author's summary reads: "From measurements on the effect of pressure on the volume of (1) a rock consisting of olivine containing 7 per cent FeO and (2) pure fayalite (Fe_2SiO_4) it has been found that the compressibility, β , of forsterite (Mg_2SiO_4) is 0.82×10^{-6} and 0.73×10^{-6} per bar respectively at atmospheric pressure and at 15000 bars. The latter pressure is equivalent to a depth of about 50 km. below the surface of the earth. For fayalite, the compressibility is notably higher, namely, 0.96×10^{-6} and 0.84×10^{-6} at 1 and 15000 bars respectively. The velocity of longitudinal waves through rocks varying in composition between pure forsterite and pure fayalite would therefore range between 8.6 and 7.1 km./sec. at a pressure of 15000 bars. On the reasonable assumption that in peridotite within the earth the molecular ratio of MgO to FeO is about 4 to 1, the velocity of longitudinal waves in this peridotite would be 8.2 km./sec. at a depth of 50 km. (disregarding the unknown effect of temperature). It may be noted that previous measurements on pyroxenes have shown that in the enstatite-hypersthene series the variation of velocity with iron-content is much less than in the olivine series; the velocity of longitudinal waves at $P = 15000$ in any enstatite-hypersthene can not be far from 7.4 km./sec."

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$$T_p = 14.30 \Delta - 2.00 (\Delta/10)^3$$

$$T_s = 25.70 \Delta - 3.50 (\Delta/10)^3$$
 The cube terms are about double those given previously.
 "(2) P and S at stations within this range are usually followed by other pulses at intervals of about 8 s. It seems probable that the curious behaviour of the S residuals, derived from the *Summary*, is due to the reading of one or other of these later pulses for S.
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- PEARCE, C. E. and MORRIS, S. B., "Earthquake Forces on Dams." See No. 1157 of this list.
1165. PEISINO, Giovanni, "Il nouvo servizio sismico presso la Stazione Astronomica di Carloforte," *Bollettino della Società Sismologica Italiana*, **29**, No. 3-4, 43-49, 6 illustrations, Rome, 1931.
1166. PERRI, Emilio, "Isostasia e forze elastiche sismoattive," *Bollettino della Società Sismologica Italiana*, **29**, No. 3-4, 8-21, 3 illustrations, bibliography, Rome, 1931.
1167. PROVIERO, A., "Intorno ad alcuni recenti studi sullo smorzamento dei sismografi," *Bollettino della Società Sismologica Italiana*, **29**, No. 3-4, 22-30, Rome, 1931.
1168. RAMIREZ, John Emilio, S.J., "The Earthquakes of August 29 and September 1, 1930, in the New Madrid Region," *Bulletin of the Seismological Society of America*, **21**, No. 2, 159-169, 1 map, Stanford, June, 1931.
- RENQVIST, Henrik, "Rapport sur le service séismologique en Finlande," pages 191-192 of the *Proceedings of the Section of Seismology of the International Geodetic and Geophysical Union for the Stockholm Meeting, 1930*. See No. 1171 of this list.
- RICHTER, Charles F. and GUTENBERG, Beno, "On Supposed Discontinuities in the Mantle of the Earth." See No. 1118 of this list.
- RICHTER, Charles F. and GUTENBERG, Beno, "Pseudoseisms Caused by Abnormal Audibility of Gunfire in California." See No. 1119 of this list.
- RICHTER, Charles F. and WOOD, Harry O., "A Study of Blasting Recorded in Southern California." See No. 1197 of this list.
- RICHTER, Charles F. and WOOD, Harry O., "Recent Earthquakes near Whittier, California." See No. 1198 of this list.
1169. RIEBER, Frank, "Results of Elastic-wave Surveys in California and Elsewhere," *Bulletin of the American Association of Petroleum Geologists*, **14**, No. 12, 1557-1571, Tulsa, 1930.
F.W.L.
1170. ROMBERG, Arnold, "Influence of Wire or Ribbon Suspension on the Horizontal Pendulum," *Bulletin of the Seismological Society of America*, **21**, No. 3, 224-228, Stanford, September, 1931.

1171. ROTHÉ, E., "Comptes rendus des séances de la quatrième conférence réunie à Stockholm du 14 au 23 août 1930," Publication of the Section of Seismology, International Geodetic and Geophysical Union, 330 pages, Strasbourg, 1931.

On pages 50-74 of the above publication appears the Report of the Secretary—Professor Rothé. It is given first in French and then in English.

On pages 192-197 of the above publication, the same author presents the "Rapport sur l'état de la séismologie en France."

Attention is drawn to the reports on "Tables d'hodographes," and on "Notation séismographique internationale," given on pages 246-251 and 251-262 respectively of the *Proceedings*.

1172. RYBNER, J., "Investigations on the Theory of the Galitzin Seismograph," *Gerlands Beiträge zur Geophysik*, 31, Heft 1-3, 259-281, Leipzig, 1931.

The author's summary reads: "The following is a preliminary account of an investigation on the theory of the Galitzin seismograph. The research is based on the extended form of the differential equation given by Wenner, from which the results are derived by means of the Heaviside Operational Calculus.

"A general solution for any movement of the soil is obtained in the form of a definite integral and particular solutions are worked out for the movements $x = \sin \omega t$ and $x = e^{at} \sin \omega t$, both starting at $t = 0$. The results are shown in curves, and a method of utilizing such curves for a speedy evaluation of the records is sketched.

"A general equation for the movement of the galvanometer by the usual determination of the constants is given. Finally, the possibility of improving the seismograph by altering its constants is briefly discussed."

1173. SAGISAKA, K., "On the Velocity of a Seismic Wave in the Upper Layers of the Earthcrust," *Geophysical Magazine*, 4, No. 2, 147-155, 4 text figures, Tokyo, September, 1931.

The author concludes from his study of the trajectories of seismic waves determined in the case of several Japanese earthquakes that, "at least in central Japan and Kwanto district, there exists no such a discontinuity stratum as that assumed by Mohorovičić."

- SALINAS, Salazar, "Le service séismologique au Mexique," pages 221-227 of the *Proceedings of the Section of Seismology of the International Geodetic and Geophysical Union for the Stockholm Meeting, 1930*. See No. 1171 of this list.

1174. (1) SARASOLA, S., S.J., "Se pueden predecir los terremotos?" *Noticias Científicas publicadas por el Observatorio Nacional de San Bartolomé (Colombia)*, 3, No. 25-26, 135-138, Bogota, 1929.

1174. (2) SARASOLA, S., S.J., "Los terremotos y los cambios en la corteza terrestre," *Noticias Científicas publicadas por el Observatorio Nacional de San Bartolomé (Colombia)*, 3, No. 29, 220-221, Bogota, 1930.

1174. (3) SARASOLA, S., S.J., "Un eminente sismólogo. En memoria del Reverendo Padre Tondorf, S.J.," *Noticias Científicas publicadas por el Observatorio Nacional de San Bartolomé (Colombia)*, 4, No. 32, 69-70, Bogota, 1930.

1175. SCRASE, F. J., "The Reflected Waves from Deep Focus Earthquakes," *Proceedings of the Royal Society, Series A*, 132, 213-235, 10 text figures, London, July, 1931.

The author's summary reads: "The effect of an abnormally deep focus on the reflected waves of earthquakes is considered. In general a number of supplementary reflected waves may occur and if the focus is sufficiently deep, they should produce

definite separate phases on the records. The times of travel of both the supplementary waves and the more normal waves have been derived for several depths of focus, C. G. Knott's paths of longitudinal and transverse waves being taken as a basis.

"It is found that the commencements of the additional phases can generally be recognized on the seismograms and that the times of transit are in reasonable agreement with the calculated times. This, it is considered, is definite confirmation of the occurrence of deep focus earthquakes. Further, the appearance of the supplementary reflected waves provides a means of recognizing a deep focus earthquake from the records of a single station.

"The results of the investigation favour the idea that the initial phase of an earthquake is a direct compressional wave and is not generated by reflexion of a distortional wave."

F.J.S.

1176. SEZAWA, Katsutada, "A Kind of Waves Transmitted over a Semi-infinite Solid Body of Varying Elasticity," *Bulletin of the Earthquake Research Institute*, 9, Part 3, 310-315, Tokyo, September, 1931.

1177. SEZAWA, Katsutada and NISHIMURA, Genrokuro, "Movement of the Ground Due to Atmospheric Disturbance in a Sea Region," *Bulletin of the Earthquake Research Institute*, 9, Part 3, 291-309, Tokyo, September, 1931.

The authors conclude that:

"(1) The movement of the ground is composed of four kinds of displacements; namely the displacement due to the transmission of shallow water waves, that due to Rayleigh-waves, that due to distortional waves, and that due to dilatational waves.

"(2) The velocity of the transmission of the displacement of the body due to shallow water waves is equal to that of shallow water waves, while the transmission of the displacements of other kinds have their own velocities peculiar to the respective waves.

"(3) The amplitudes of the deformation of the solid body due to Rayleigh-waves and also to shallow water waves change as inverse square root of the epicentral distance, while those due to the dilatational and distortional waves diminish as inverse square of the epicentral distance.

"(4) Microseisms due to a disturbed weather occurring in a different region are chiefly due to long water waves, including breakers at the coast, advancing near the observing station, but not the seismic waves directly transmitted from the region of the disturbed weather. The action of the long water waves is, however, relatively small compared with that of breakers.

"(5) The amplitude of the ground due to pulsatory original disturbance of long periods is smaller than that due to short periods, even though the amplitude of the disturbing pressure is kept constant."

1178. SIEBERG, A., "Die Erforschung des Erdinnern. Arbeitsmethoden und Ergebnisse," *Handbuch der biologischen Arbeitsmethoden*, Abteilung X, Heft 8, 883-942, 30 illustrations, Berlin, 1930.

A short review by H. Martin appears in *Geologisches Zentralblatt*, 45, No. 1, 17 (item 55), Leipzig, August 15, 1931.

- SMITH, L. L., "The Charleston Earthquake." See pages 14-15 of *Earthquake Notes*, reported as No. 1106 of this list.

- SOHON, F. W., S.J., "The Determination of the Constants of the Galitzin Seismographs." See page 21 of *Earthquake Notes*, reported as No. 1106 of this list.

1179. SOMMER, H. Henrietta, "On the Question of Dispersion in the First Preliminary Seismic Waves," *Bulletin of the Seismological Society of America*, **21**, No. 2, 87-158, Stanford, June, 1931.

The general conclusion is that there is no evidence for dispersion in waves of longitudinal type given by observation of periods. It is shown that, if dispersion did exist, the travel time of the beginning would be a continuous function of epicentral distance, and, therefore, Mohorovičić's curves are not evidence for dispersion. The observations of the epicentral distances at which P_1 , P_2 , and P_n are most frequently recorded are contrary to dispersion. In the Alaskan earthquake here studied, the distribution of first motion (condensation or rarefaction) is very complicated. Dispersion offers no explanation for this fact, and it is believed that complex movements at the source are responsible for the observed distribution.

- SOMVILLE, O., "État de la séismologie dans Congo Belge: Station séismologique de Guba," pages 169-170 of the *Proceedings of the Section of Seismology of the International Geodetic and Geophysical Union for the Stockholm Meeting, 1930*. See No. 1171 of this list.

1180. SPLENDIANI, G., "L'osservatorio meteorico-sismico del Seminario di Camerino," *Bollettino Società Sismologica Italiana*, **29**, No. 3-4, 31-35, Rome, 1931.

1181. STECHSCHULTE, V. C., S.J., "Deep Focus Earthquakes," *Nature*, No. 3233, **128**, 673-674, London, October 17, 1931.

The above note refers to the paper of the same title by F. J. Scrase, reported as No. 1078 of these lists.

1182. STONELEY, R., "Deep Focus Earthquakes," *Nature*, No. 3211, **127**, page 740, London, 1931.

The above article refers to the paper of the same title by F. J. Scrase, reported as No. 1078 of these lists.

1183. STONELEY, R., "The Thickness of the Continental Layers of Europe," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, **2**, No. 8, 429-433, London, June, 1931.

The author's summary reads: "Data concerning the periods and group-velocities of Love waves are found by measurement of selected seismograms. To separate the Love waves from Rayleigh waves, records are chosen in which the waves reach the recording station in an easterly azimuth. The waves of group-velocities greater than 3.7 km./sec. give 12 km. for the thickness of the granitic layer, supposed half the thickness of the intermediate layer. If velocities down to 3.5 km./sec. are included, the corresponding thickness of the granitic layer is 13 km. The inclusion of lower group-velocities would require taking the sedimentary layer into account. The measures afford data for studying this effect, but the formulae become much more complicated."

- TABER, Stephen, "The Seismic Belt near Santiago de Cuba." See page 13 of *Earthquake Notes*, reported as No. 1106 of this list.

1184. TABER, Stephen, "The Structure of the Sierra Maestra Near Santiago de Cuba," *Journal of Geology*, **39**, No. 6, 532-557, 16 illustrations, Chicago, August-September, 1931.

The author's abstract reads: "The rocks of the Sierra Maestra near Santiago de Cuba are chiefly well-stratified volcanic breccias and tuffs, with interbedded limestones and andesitic intrusives. The mountains are simple block mountains, uplifted along

normal east-west faults and tilted toward the north. The uplift and tilting have accompanied the subsidence of the great Bartlett Trough that lies between Cuba and Jamaica.

"The fault blocks are of different age. The oldest, and highest, forms the coastal ridge west of Santiago Bay. It possibly received part of its present elevation during the Pleistocene, but the uplift has continued intermittently down to the present time. The Sierra de Boniato, farther inland and northwest of Santiago, has been uplifted in post-Pleistocene time. Immediately in front of it on the south is a lower ridge, known as the Puerto Pelado, with scarp so fresh that its age must be measured in hundreds of years rather than tens of thousands. The region is unstable, and the displacements may be expected to continue at any time."

S.T.

1185. TABER, Stephen, "The Problem of the Bartlett Trough," *Journal of Geology*, 39, No. 6, 558-563, 1 map, Chicago, August-September, 1931.

The author's abstract reads: "Little is known concerning the great submarine troughs, although they must be classed among the major tectonic features of the earth. The Bartlett Trough offers many advantages for purposes of research. The present status of the problem is here briefly outlined and methods are suggested for continuing the investigation of its origin and structure."

As one of the subdivisions of the discussion on *Origin and Structure*, the seismological evidence is presented. The subdivision closes with the paragraph: "Seismograph stations are now located at Port-au-Prince, Haiti; Kingston, Jamaica; Havana, Cuba; Merida, Mexico; and other places more distant from the trough. It would help if seismographs could be installed at Santiago, Cuba, and on Grand Cayman Island."

S.T.

- TAKAYAMA, Takeo and FUJIWHARA, Sakuhei, "On Crack Systems Especially Those of Echelon Formation." See No. 1113 of this list.

1186. TERADA, Torahiko, "On Luminous Phenomena Accompanying Earthquakes," *Bulletin of the Earthquake Research Institute*, 9, Part 3, 225-255, Tokyo, September, 1931.

1187. TILLOTSON, Ernest, "On an Earthquake near Imotski, Yugoslavia, 1923 March 15," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 2, No. 8, 416-429, London, June, 1931.

The records for epicentral distances up to 20 degrees were studied. Phases P , P^* , P_g , S , S^* , and S_g were verified and also the possible compressional wave in the sedimentary layer here called P_s and previously noticed by Jeffreys. Its possible S equivalent, S_s was also observed. There are indications in some records of two more pulses, coming immediately after P and S respectively, which have been studied by Stoneley. Travel times for P agree best with Jeffrey's tables. The thicknesses of the various layers appear to be: sedimentary 4 km., granitic 13 km., intermediate 25.3 km., and depth of focus 12 km., reckoned from the top of the granitic layer.

1188. TOKYO IMPERIAL UNIVERSITY, "Outline of Investigations of the Great Idu Earthquake," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, 9, Part 1, 111-114, March, 1931.

1189. TSUBOI, Chuji, "On the Results of Fifth Precise Levellings in the Tango Earthquake District," *Proceedings of the Imperial Academy*, 7, No. 6, 234-237, Tokyo, June, 1931.

1190. TSUBOI, Chuji, "On the Results of Repeated Precise Levellings around Idu Peninsula," *Bulletin of the Earthquake Research Institute*, 9, Part 3, 271-290, 11 text figures, Tokyo, September, 1931.
1191. TSUYA, Hiromichi, "Petrographic Notes on the Sedimentary Rocks of Southwest Sagami Province (Part II)," *Bulletin of the Earthquake Research Institute*, 9, Part 3, 353-373, Tokyo, September, 1931.
- TURNER, H. H., "Address of the President of the Section of Seismology," pages 35-50 of the *Proceedings of the Section of Seismology of the International Geodetic and Geophysical Union for the Stockholm Meeting, 1930*. See No. 1171 of this list.
The text of the address is given first in English and then in French. Professor Turner died suddenly while presiding at the Conference of which the above was the opening address.
1192. ULLER, Karl, "Die Entwicklung des Wellen-Begriffes, VI," *Gerlands Beiträge zur Geophysik*, 31, Heft 1-3, 40-82, 2 text figures, Leipzig, 1931.
A bibliography of 16 items lists earlier publications by the same author, all dealing with some part of wave theory.
1193. UNION GÉODÉSIQUE ET GÉOPHYSIQUE INTERNATIONALE, "Quatrième Assemblée Générale réunie à Stockholm, 15-23 août 1930, Procès-verbaux des séances," Publication of the International Research Council, 100 pages, Toulouse, 1931.
- VISSER, S. W., "Seismological Observations in the Netherlands and in the Netherlands East Indies," pages 227-230 of the *Proceedings of the Section of Seismology of the International Geodetic and Geophysical Union for the Stockholm Meeting, 1930*. See No. 1171 of this list.
1194. WANNER, E., "Beiträge zum Studium der PS-Phase und Mächtigkeit der Molasse unterhalb Zürich," *Gerlands Beiträge zur Geophysik*, 32, 231-241, 7 text figures, Leipzig, 1931.
E.W.
- WANTLAND, Dart and HEILAND, C. A., "A Selected List of Books and References on Geophysical Prospecting." See No. 1122 of this list.
- WEED, Arthur J., "A Seismograph for Use in Earthquake Regions." See page 22 of *Earthquake Notes*, reported as No. 1106 of this list.
A picture of the seismograph is given, supplementing the brief description of the abstract.
- WENNER, Frank, "Status of Instruments under Construction." See pages 18-20 of *Earthquake Notes*, reported as No. 1106 of this list.
- WHIPPLE, F. J. W., "Seismology in Great Britain 1927-1930," pages 198-199 of the *Proceedings of the Section of Seismology of the International Geodetic and Geophysical Union for the Stockholm Meeting, 1930*. See No. 1171 of this list.
1195. WHIPPLE, F. J. W., "On Methods of Estimating the Heights Reached by the Air-waves Which Descend in Zones of 'Abnormal Audibility'," *Gerlands Beiträge zur Geophysik*, 31, Heft 1-3, 158-168, 2 text figures, Leipzig, 1931.

1196. WILIP, J., "Experimentelle Prüfung von Verspätungsfragen bei der galvanometrischen Registriermethode," *Zeitschrift für Geophysik*, 7, Heft 5-6, 219-225, Braunschweig, 1931.
A galvanometrically-recording seismograph was arranged in such a way that it recorded also directly and optically, with high magnification. The instrument, so equipped, was then subjected to periodic oscillations, the two records being obtained side by side. The galvanometric method gave excellent records without lag even in the case of short-period oscillations.
1197. WOOD, Harry O. and RICHTER, Charles F., "A Study of Blasting Recorded in Southern California," *Bulletin of the Seismological Society of America*, 21, No. 1, 28-46, 2 text figures, Stanford, March, 1931.
1198. WOOD, Harry O. and RICHTER, Charles F., "Recent Earthquakes near Whittier, California," *Bulletin of the Seismological Society of America*, 21, No. 3, 183-203, 4 text figures, Stanford, September, 1931.
1199. YABE, Hisakatsu, "Geological Growth of the Tokyo Bay," *Bulletin of the Earthquake Research Institute*, 9, Part 3, 333-339, Tokyo, September, 1931.
- YASUDA, Ch. and NASU, N., "Seismometrical Report." See No. 1158 of this list.
1200. ZELLER, W., "Praktische und theoretische Untersuchung von Schwingungsmessern zur Aufnahme und Beurteilung von Verkehrserschütterungen," *Zeitschrift für Bauwesen*, 80, No. 7, July, 1930.
Table of Contents: Theory of Instruments; Vibration-meters, Piezo-electric Accelerometers—Absolute Intensity-scale for Earthquakes and Artificial Vibrations—Results of Measurements. W.H.

LIST OF COLLABORATORS

The items for this issue of the Bibliography were compiled while the editor was stationed at the Geophysical Laboratory of Saint Louis University. The compilation was made possible through the kindness of Rev. James B. Macelwane, S.J., Dean of the Graduate School and Director of the Department of Geophysics, who arranged that all incoming scientific journals containing articles on seismology or allied subjects should pass through the hands of the editor. Although none of the listed items is marked with Dr. Macelwane's initials, his co-operation in the work of the entire issue is hereby gratefully acknowledged.

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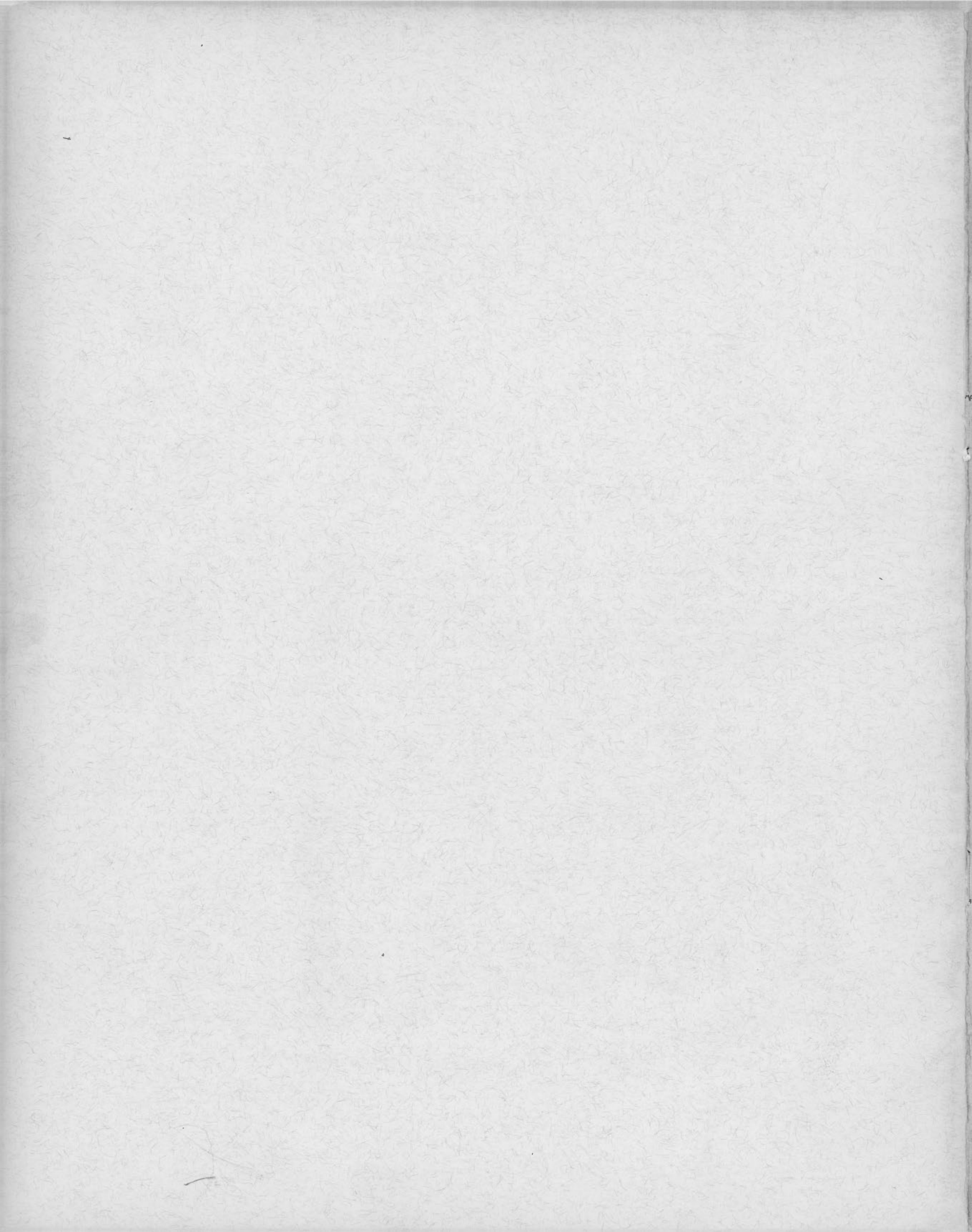
SUBJECT INDEX FOR THE YEAR 1931

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- D3. Descriptions, General, of Earthquakes in Canada or the United States: Nos. 847, 912, 926, 1031, 1045, 1106, 1162.
- D4. Descriptions, General, of Earthquakes other than Those in Canada or the United States: Nos. 801, 803, 814, 826, 832, 850, 882, 889, 890, 917, 918, 938, 940, 952, 970, 975, 980, 991, 1002, 1017, 1024, 1038, 1044, 1046, 1102, 1108, 1109, 1120, 1127, 1136, 1137, 1138, 1139, 1151, 1161, 1168, 1188, 1198.

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- O1. Obituaries: Nos. 881, 1004, 1011, 1135, 1174(3).
- O2. Oceanography; Charting, etc.: Nos. 805, 868, 883, 886, 894, 979, 1026, 1045, 1185.
- O3. Organizations for Seismological Investigations; Inaugurations, Reports, New Equipment, etc.: Nos. 825, 844, 852, 870, 875, 891, 900, 901, 919, 924, 945(1), 945(2), 958, 966, 986, 1021, 1067, 1106, 1110, 1112, 1122, 1145, 1158, 1164, 1165, 1171, 1180, 1193.
- O4. Origins of Earthquakes; Methods of Locating Epicentres and Results of That Work: Nos. 812, 869, 921, 923, 988, 1068, 1095(3), 1106.
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- P3. Physics of the Earth; Density, Viscosity, Rigidity, Elasticity, Temperature, etc.: Nos. 830, 842, 853, 871, 908, 912, 925, 928, 930, 1007, 1013, 1027, 1033, 1105, 1106, 1115, 1118, 1144, 1174(2), 1178, 1183, 1194.
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- P5. Prediction of Earthquakes: Nos. 1001, 1140, 1174(1).
See also C4. (Cycles).
- R1. Records, Evaluation of Earthquake: Nos. 811, 955, 956, 967, 977, 1049, 1064, 1084, 1133, 1106.
See also T4. (Time-Distance Curves) and W1. (Wave Study).
- R2. Reports, Seismological; Regular Series: Nos. 815, 869, 901, 907, 969, 988, 1031, 1068, 1074, 1106.
See also C1. (Catalogues).
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HON. THOMAS G. MURPHY, *Minister*

H. H. ROWATT, *Deputy Minister*

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OF THE

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OTTAWA

R. MELDRUM STEWART, *Director*

Vol. X

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JANUARY, FEBRUARY, MARCH, 1932

BY

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With this issue, the *Bibliography* enters its seventh year of publication, a three-year series in the *Bulletin of the Seismological Society of America* and a three-year series in the *Publications of the Dominion Observatory* having already appeared. The co-operation of seismologists in many parts of the world has slowly but steadily increased. The editor wishes to voice his appreciation of this continued co-operation and to express the hope that it may continue to be extended. For the convenience of those willing to collaborate, report forms have been prepared which will be sent on request. These forms also tend to ensure that reports will meet the requirements of this publication as to completeness of detail and absence of abbreviations. Correspondence regarding the *Bibliography* should be addressed to the editor at the Dominion Observatory, Ottawa, Canada.

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The different result of Epstein:

$$K_{\varphi} = \frac{3}{2} m \omega^2 \delta n \sin (2\varphi)$$

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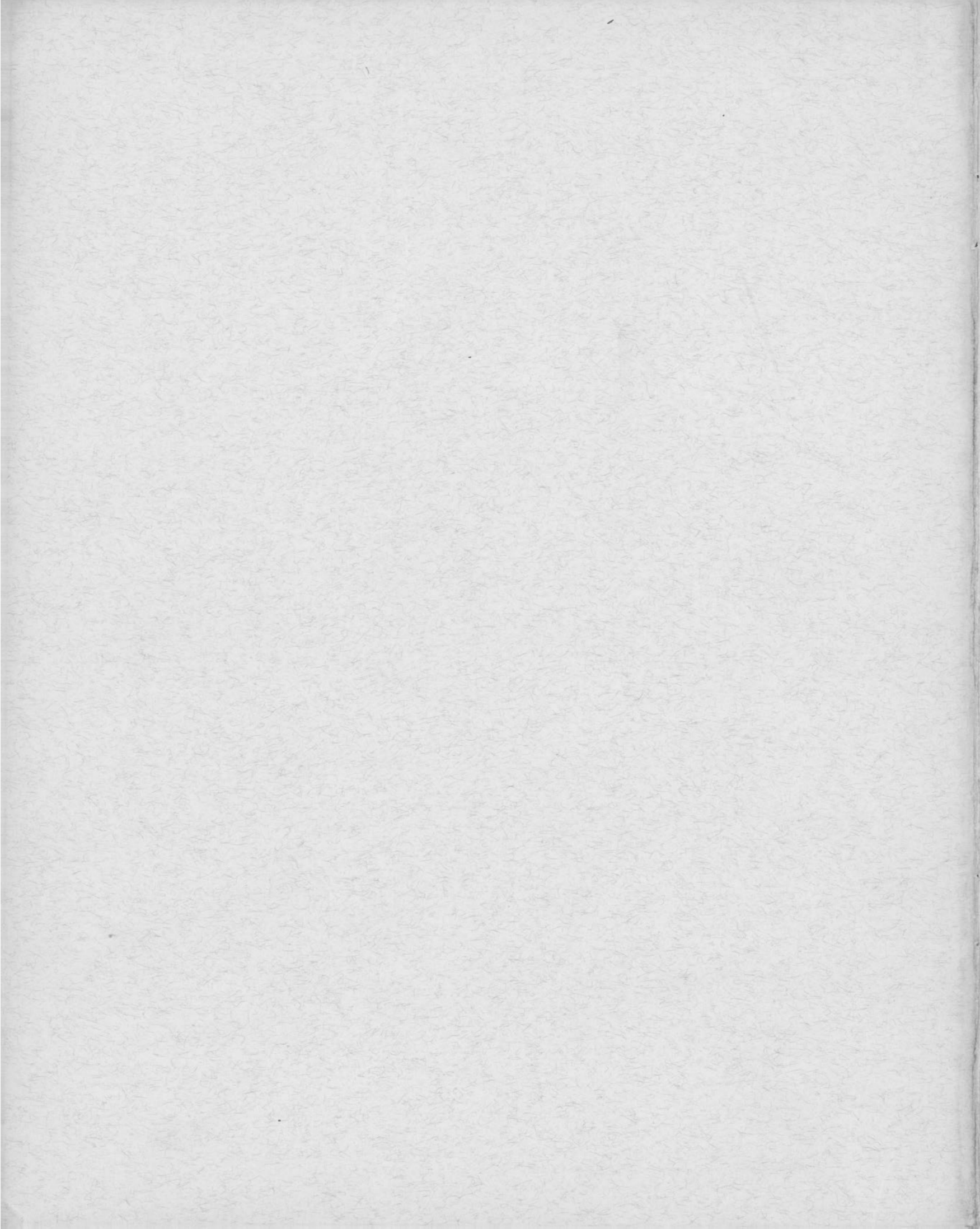
The items for this issue of the Bibliography were compiled while the editor was stationed at the Geophysical Laboratory of Saint Louis University. The compilation was made possible through the kindness of Rev. James B. Macelwane, S.J., Dean of the Graduate School and Director of the Department of Geophysics, who arranged that all incoming scientific journals containing articles on seismology or allied subjects should pass through the hands of the editor. Although none of the listed items is marked with Dr. Macelwane's initials, his co-operation in the work of the entire issue is hereby gratefully acknowledged.

The initials appended to various items throughout the *Bibliography* indicate, in each case, the contribution by the respective collaborator.

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1339. JEFFREYS, Harold, "Variation of Melting Point within the Earth," *Monthly Notices Royal Astronomical Society, Geophysical Supplement*, **3**, No. 1, 6-9, London, January, 1932.
1340. JEFFREYS, Harold, "On the Stresses in the Earth's Crust Required to Support Surface Inequalities," *Monthly Notices Royal Astronomical Society, Geophysical Supplement*, **3**, No. 1, 30-41, London, January, 1932.
1341. JEFFREYS, Harold, "Seismology," *Nature*, No. 3257, **129**, 487-488, London, April 2, 1932.
A review and discussion of three sections of the *Handbuch der Geophysik*: "Theorie der Erdbebenwellen," by Gutenberg; "Seismometer—Auswertung der Diagramme," by Berlage; and "Geologie der Erdbeben," by Sieberg, which have been reported respectively as Nos. 332, 811, and 885 of these lists. The review deals more particularly with the section by Sieberg.
- JEFFREYS, Harold and COMRIE, L. J., "A Smoothing Device Applied to the New Seismological Tables." See No. 1312 of this list.
1342. JONES, J. H. and JONES, D. T., "A Portable Seismograph for Recording Artificial Earthquakes," *Journal of Scientific Instruments*, **9**, No. 1, 8-16, 13 figures, London, January, 1932.
The author's abstract reads: "A portable seismograph for recording artificial earthquakes is described. The motion of the pendulum is magnified by means of an arrangement of two small magnets and a soft iron element suspended on a phosphor-bronze strip which is attached to the pendulum.
"The coupling of the magnifying system to the pendulum introduces a couple which opposes the restoring moment of the pendulum and lengthens the periodic time of the seismograph.
"Other important features of the instrument are the absence of friction from the magnification linkage and simple methods for the remote control of the 'zero', the period, and the sensitivity.
"An experimental investigation of the relation between the period and the sensitivity is described."
R.R.B.
- KANAI, Kiyoshi and SEZAWA, Katsutada, "Possibility of Free Oscillations of Strata Excited by Seismic Waves. Part III." See No. 1374 of this list.

1343. KAWASUMI, Hirose, "Study on the Propagation of Seismic Waves (First Paper)," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 94-129, 6 figures, 15 tables, Tokyo, March, 1932.
1344. KEESE, W. J., "America's Largest Controlled Blast: 440,966 lb. of dynamite in a single shot," *Explosives Engineer*, **10**, No. 5, 147-150, 15 illustrations, Wilmington, May, 1932.
A brief description of the blasting details of the Manistique blast of March 16, 1932.
1345. KIROV, K. T., "La fréquence des jours à secousses séismiques ressenties en Bulgarie," *Calendrier de l'Institut Météorologique Central de Bulgarie pour l'an 1931*, 133-136, Sofia, 1931.
1346. KIROV, K. T., "Intensité des séismes qui ont eu lieu en Bulgarie du Sud du 14 et du 18 avril 1928," *Calendrier de l'Institut Météorologique Central de Bulgarie pour l'an 1931*, 137-146, 2 plates, Sofia, 1931.
A review in German, signed J. F. Gellert, appears in *Geologisches Zentralblatt*, **46**, No. 5, Item 1262, Leipzig, March 1, 1932.
1347. KISHINOUE, Fuyuhiko, "A Portable Horizontal Pendulum Seismometer," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 188-191, 1 plate, Tokyo, March, 1932.
1348. KLOTZ, Otto, "Seismological Tables," *Publications of the Dominion Observatory*, **3**, No. 2, 19-62, Ottawa, 1916.
The *P*- and *S*-curves are those of Mohorovičić who furnished them in manuscript form. Mohorovičić published them later, in 1922 (See No. 1262 of these lists). The reflected wave tables were prepared from the others on the assumption of reflection at the surface.
The bulk of the tables is made up with compilations for various seismological stations of the *d* and *r* values required in the stereographic method of determining the position of an epicentre.
The number of seismographic stations has greatly increased since 1916. Tables of *d* and *r* values for 63 additional stations have been prepared in mimeographed form by Mr. W. W. Doxsee of the Dominion Observatory, Division of Seismology. Those interested may obtain a copy of these additional tables on application to the Director of the Dominion Observatory, Ottawa, Canada.
- KOCH, H. W. and ZELLER, W., "Kritik der Aufzeichnung von Schwingungsmessern." See No. 1398 of this list.
- KODAIRA, T. and IMAMURA, A., "On the Seiches of the Lake Asino-ko with Special Reference to the N. Idu Earthquake of 1930." See No. 1329 of this list.
- KOTANI Masao, SAKADI, Zyuro, and INUI, Teturo, "On the Motion of the Earth's Surface under the Influence of a Heavy Moving Body." See No. 1335 of this list.
1349. LANDSBERG, H., "Über einen Fall angeblicher Erdbebenvorgefühle," *Zeitschrift für Geophysik*, **8**, Heft 1-2, 107-108, Braunschweig, 1932. H.L.
1350. LARSEN, Palmer, "Index to Geophysical Abstracts, XXI to XXXII," Department of Commerce, Bureau of Mines, Circular No. 6589, 331-364, Washington, January, 1932.

1351. LEE, A. W., "The Determination of Thicknesses of the Continental Layers from the Travel Times of Seismic Waves," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 3, No. 1, 13-21, 3 figures, London, January, 1931.

The author's summary reads: "A novel method is given for analysis of the connection between time of origin of an earthquake, the depth of focus, apparent times of starting of the seismic waves, and the thicknesses of the layers through which they travel.

"Application of the method to the available data for an earthquake near Imotski, Yugoslavia, on 1923 March 15, shows that the focus was near the bottom of the granitic layer. The approximate thicknesses of the layers are determined as 1 km. of sedimentary material, 11.5 km. of granite, and between 22 and 33 km. of intermediate rock.

"The travel times of the waves from the shocks in Jersey on 1926 July 30, and in Herefordshire on 1926 August 15, indicate that the thicknesses of the granitic and basaltic layers were 14 km. and 15 km. and that the foci were 10 km. and 6 km. respectively below the top of the granite."

A.W.L.

1352. LEE, A. W., "The North Sea Earthquake of 1927 January 24," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 3, No. 1, 21-30, London, January, 1932.

The author's summary reads: "Data given in the *International Seismological Summary* for the North Sea Earthquake of 1927 January 24 have been supplemented by measurements of the original seismograms for Dyce, Edinburgh, Stonyhurst, Copenhagen and Kew, for determination of the epicentre and study of the phases recorded. The epicentre is located as 59°.4 N., 2°.9 E., with time of origin 5^h 18^m 11^s.

Times of transmission for the *P* and *S* phases may be represented closely by the formulae:

$$T_p = 5^h 18^m 22^s + 14.21\Delta - 2.00 (\Delta/10)^2$$

$$T_s = 5^h 18^m 17^s + 25.50\Delta - 3.50 (\Delta/10)^2$$

A number of measurements indicate other waves with velocities 7.0 km./sec. (*P_Q*), 4.0 km./sec. (*S_Q*), and 3.6 km./sec. (*S**).

The focus was situated near the bottom of the granitic layer."

A.W.L.

1353. LEE, Frederick W., "Geophysical Abstracts," United States Bureau of Mines, No. 33 (Circular 6593), 331-353, January: No. 34 (Circular 6569), 354-380; February: No. 35 (Circular 6606), 381-409, March: Washington, 1932.

F.W.L.

— LEE, L. Don and EWING, Maurice, "Comparison of Two Methods for Interpretation of Seismic Time-Distance Graphs which are Smooth Curves." See No. 1315 of this list.

— LEE, L. Don and EWING, Maurice, "Velocity of Elastic Waves in Granite." Abstract only. See No. 1302 of this list.

— LESTER, O. C. and ROSAIRE, E. E., "Seismological Discovery and Partial Detail of the Vermillion Bay Salt Dome." Abstract only. See No. 1302 of this list.

1354. MACELWANE, James B., S.J., "Our Present Knowledge Concerning the Interior of the Earth," *Bulletin of the Seismological Society of America*, 21, No. 4, 243-250, bibliography, Stanford, December, 1931.

This paper was presented at a meeting of the Eastern Section of the Seismological Society of America, Columbia, S.C., June 11 and 12, 1931. It is a concise review with bibliographical references of the subject indicated by the title.

1355. MAEDA, S., "The Seismological Bulletin in Osaka from 1882 to 1929." Published by the Osaka Meteorological Observatory, 122 pages, 1931.

The body of the text deals with the two subjects: "Report of the Earthquakes" and "Number of Earthquakes." The supplement is devoted to a discussion of "The Great Earthquakes in Japan" and "The Catastrophic Earthquakes in Osaka District." The text is partly in Japanese, partly in English.

1356. MAILLET, Raymond and BAZERQUE, Jean, "La prospection séismique du sous-sol," *Annales des Mines, Douzième Série, Tome XX, 10^e Livraison de 1931*, 287-341, 29 figures, Paris, 1931.

The publication includes:

(1) a discussion of theory, with formulas for computation on the assumption of straight-line paths, and the effect of a buried low-speed layer.

(2) description of some instruments used, and certain phases of field procedure.

(3) several examples of actual shooting done by the authors. L.D.L.

1357. MARRISON, W. A., "Quartz Crystal Resonators," *Bell Laboratories Record*, **10**, No. 6, 194-199, 6 figures, New York, February, 1932.

— MARSHALL, Kenneth, BYERLY, Perry, and HESTOR, James, "The Natural Periods of Vibration of Some Tall Buildings in San Francisco." See No. 1311 of this list.

— McCOLLUM, Burton and SNOLL, F. A., "Assymmetry of Sound Velocity in Stratified Geologic Formations." Abstract only. See No. 1302 of this list.

1358. McCOMB, H. E., "Testing of Photographic Recorders," *Bulletin of the Seismological Society of America*, **22**, No. 1, 56-59, 2 figures, Stanford, March, 1932.

The author illustrates a method of determining the rate of a recording drum by the simple process of photographing short lines at right angles to the progress movement of the drum due to its angular rotation, the regularity of the registered lines being an indication of the uniformity of rate of rotation.

— McDERMOTT, Eugene, "The Reflection Seismograph—an Application." Abstract only. See No. 1302 of this list.

1359. MINTROP, L., "On the History of the Seismic Method for the Investigation of Underground Formations and Mineral Deposits." Publication of the Seismos Company, 128 pages, 14 illustrations, Hannover, 1930.

The publication is a valuable outline of the subject indicated by the title, from the time of Mallet to date, including many of the patent papers which mark various steps of the development. Being the publication of a company interested in its own investments, the treatment is somewhat biased but it is nevertheless an important contribution to the history of seismic prospecting.

— MIYABE, Naomi and TERADA, Torahiko, "Landslide at Hatano." See No. 1382 of this list.

1360. MUKAI, Masayuki, "On the Seiches of a Frozen Lake and the Motion of Ice-plate," *Proceedings of the Imperial Academy*, **8**, No. 1, 5-7, 3 figures, Tokyo, January, 1932.

1361. MUTO, K., "Synopsis of Precise Levellings Executed for the Purpose of Investigating Crustal Deformations," *Japanese Journal of Astronomy and Geophysics*, **9**, No. 2, 99-100, 4 tables, 1 plate, Tokyo, 1932.

1362. NASU, N. and YASUDA, Ch., "Seismometrical Report, July 1-September 30, 1931," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 264-272, 1 figure, 11 plates, Tokyo, March, 1932.
- NEUMANN, Frank and WOOD, Harry O., "Modified Mercalli Intensity Scale of 1931." See No. 1394 of this list.
1363. NISHIMURA, Genrokuro, "On the Deformation of a Semi-infinite Elastic Body Having a Surface Layer Due to the Surface Loading," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 23-28, Tokyo, March, 1932.
- O'CONNOR, J. S., S.J., "The Georgetown Seismological Observatory." See pages 3-5 of *Earthquake Notes* reported as No. 1307 of this list.
1364. ODDONE, E., "Un contributo della sismometria alla storia della terra," *Atti della Reale Accademia Nazionale dei Lincei*, **14**, 192-197, 1931.
A review, in German, signed F. Lotze, appears in *Zentralblatt für Mathematik und ihre Grenzgebiete*, **3**, Heft 4, 187-188, Berlin, March 15, 1932.
1365. OTUKA, Yanosuke, "The Geomorphology of the Kano-gawa Alluvial Plain, the Earthquake Fissures of Nov. 26, 1930, and the Pre- and Post-seismic Crust Deformations," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 235-246, 16 figures, 6 plates, Tokyo, March, 1932.
1366. RICHTER, Charles F., "Earthquake of January 28, 1931," *Bulletin of the Seismological Society of America*, **21**, No. 4, 284, Stanford, December, 1931.
1367. RIZZO, G. B., "Sulla propagazione dei movimenti prodotti dal terremoto di Messina del 28 Dicembre 1908," *Reale Accademia delle Scienze di Torino, Anno 1909-1910, Series 2*, Tome 61, 355-417, 1 plate, Torino, 1910.
An analysis of the travel times of the earthquake waves of the Messina shock. The author deduces a curve for P and for S , as well as for three phases which he calls L_1 , L_2 , and L_3 . The former are found to be in strikingly good agreement with the curves proposed by Jeffreys in 1931. See No. 942 of these lists.
- ROSAIRE, E. E. and LESTER, O. C., "Seismological Discovery and Partial Detail of the Vermillion Bay Salt Dome." Abstract only. See No. 1302 of this list.
1368. ROTHÉ, E., "Rapport de la Section de Séismologie," Comité National Français de Géodésie et Géophysique, Assemblée générale du 9 mai 1931, *Compte rendu*, 25-36, Paris, 1931.
- RUTHERFORD, H., "Reflection Profiles as Aids to the Reflection Methods." Abstract only. See No. 1302 of this list.
1369. RUTLEDGE, George, "A Reliable Method of Obtaining the Derivative Function from Smoothed Data of Observation," *Physical Review*, **40**, No. 2, 262-268, 3 tables, Minneapolis, April 15, 1932.
The author's abstract reads: "In this process of differentiation there is involved no attempt to determine empirically an equation capable of representing the given data sufficiently well to admit differentiation. On the contrary, a differentiating tool is applied successively to various small sections of the data. This tool is the fourth degree polynomial determined by five points."

- SAKADI, Zyuro, INUI, Teturo, and KOTANI, Masao, "On the Motion of the Earth's Surface under the Influence of a Heavy Moving Body." See No. 1335 of this list.

1370. SAYLES, Robert W., "Bermuda During the Ice Age," *Proceedings of the American Academy of Arts and Sciences*, 66, No. 11, 381-467, 17 figures, 11 tables, 13 plates, bibliography, Boston, November, 1931.

The author discusses the formation of the series of marine beaches on Bermuda. He finds as the latest movement of the shorelines, one of retreat due to erosion. A twelve-foot drop in sea-level is recorded by an emerged bench, "cut in geologically very recent time, perhaps during the time of written history."

R.W.S.

1371. SCHÜNEMANN, Heinrich, "Die Seismische Bodenunruhe II. Art in Hamburg (Wellenperioden 10 sec.—40 sec.) und ihre Ursache." Dissertation presented to the Faculty of Mathematics and Natural Science of the University of Hamburg, 43 pages, 9 figures, numerous tables, bibliography, Hamburg, 1931.

The following is a translation of an abstract furnished by Professor Tams: A systematic study is here made of the wave periods and amplitudes resulting from seven severe storms as registered on the horizontal seismographs of Hecker at Hamburg from 1908 to 1914. The relation between the two magnitudes is investigated. On the basis of about 4,800 measurements, it is shown that the amplitudes lie, as a rule, between 3μ and 5μ , although a maximum of 23μ was reached. It also appears that the periods lie between the limits of 11 and 26 seconds, the usual period being 28 seconds. As in the case of microseisms of the first class, large values of the period are associated with amplitudes. As to the cause, it is shown that there is a strong correlation for Hamburg between the strength of the earth movement and the strength of the local winds (velocity and pressure). The theory of direct effect of resulting air movements in the recording room upon the registering pendulum is not tenable. In agreement with observations at Kew, Ottawa, and Washington, it is shown also for Hamburg that the earth movements are always weakest in the direction more or less parallel to the longer axis of the superposed building, for which case a relatively smaller surface is exposed to the action of the wind.

E.T.

1372. SCIENCE NEWS LETTER. The following series of short articles of interest to seismologists have appeared at intervals during the past few months and have been reported for review in these lists. In each case, the place of publication is Washington.

(1) "Instrument with Pendulum Measures 'Quake Force'," No. 535, 20, 24, July 11, 1931.

A popular review of a paper by Prof. J. A. Anderson of Mount Wilson Observatory, dealing with a device consisting of a series of pendulums and electrically operated semaphores which record the force of seismic disturbances—a seismic intensity meter.

F.L.T.

(2) "Explosives Used to Produce Earth Tremors Artificially," No. 545, 20, 191, September 19, 1931.

A popular description of experiments with explosives to determine effects of vertical-walled valleys on earthquake waves. Experiments are being conducted in Yosemite National Park (U.S.A.) by the Carnegie Institution of Washington and the California Institute of Technology under the direction of John P. Buwalda, Beno Gutenberg, and Henry Salvatori.

F.L.T.

1372. SCIENCE NEWS LETTER—*Concluded.*

(3) "Submarine Shock Breaks Earthquake Moratorium," No. 562, **21**, 41, January 16, 1932.

Reports from five seismograph stations indicated that the earthquake "moratorium" existing since November 20, 1931, had been broken, a submarine disturbance having occurred near Easter island, South Pacific ocean, on January 4. F.L.T.

(4) "U.S. Submarine S-48 May Determine Cause of Santiago Earthquake," No. 566, **21**, 101, February 13, 1932.

The U.S. submarine S-48, carrying an international expedition sponsored by the U.S. Navy Department and Princeton University and other institutions to study causes of changes in earth's crust in the region of Cuba and the Caribbean, will survey the four-mile depression known as Bartlett Deep, south of Cuba, where the Santiago earthquake and other disturbances are thought to have originated. F.L.T.

(5) "Watching for Earthquakes Latest Task of Electric Eye," No. 567, **21**, 121, February 20, 1932.

The note announces the use of a photo-electric cell in conjunction with a seismograph by Rev. John P. Delaney, S.J. of Canisius College, Buffalo, for the purpose of attracting the attention of the seismologist to the fact that an earthquake is being registered. Without some such arrangement the record would not be detected until the removal and development of the photographic sheet, an attention accorded the seismograph but once a day as a rule. W.W.D.

(6) "Giant Blast Felt as Quake by Distant Seismographs," No. 572, **21**, 192, March 26, 1932.

A short account of the great blast at Manistique, Michigan, with a section of the seismogram obtained at Canisius College, Buffalo. It was also registered at the University of Wisconsin and at Georgetown University, Washington, D.C. The explosion was filmed from the air by the U.S. Bureau of Mines, the records being made for further study. F.L.T.

For other reports on this blast see No. 1344 of this list.

(7) "Submarine Cruise Yields Data on Earthquakes," No. 573, **21**, 209, April 2, 1932.

Deals with gravity determinations made during the West Indian cruise of the U.S. submarine S-48, the expedition having been under the leadership of Dr. Richard M. Field and Dr. F. A. Vening Meinesz. W.W.D.

(8) "Great Submarine Gorge Acted as Dump Cart for Glaciers," No. 574, **21**, 232, April 9, 1932.

Prof. Shepard's theory as to the new submarine valley discovered subsequent to the earthquake of November 18, 1929. W.W.D.

See also the note by E.A.H. in connection with Prof. Shepard's article reported as No. 1375 of this list.

1373. SEZAWA, Katsutada, "Notes on the Waves in Visco-elastic Solid Bodies," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 20-22, Tokyo, March, 1932.

1374. SEZAWA, Katsutada and KANAI, Kiyoshi, "Possibility of Free Oscillations of Strata Excited by Seismic Waves. Part III," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 1-18, 19 figures, 2 plates, Tokyo, March, 1932.

1375. SHEPARD, Francis P., "Saint Lawrence (Cabot Strait) Submarine Trough," *Bulletin of the Geological Society of America*, 42, No. 4, 853-864, 9 figures, New York, December, 1931.

The author's summary reads: "Evidence has been presented to show that the Grand Banks earthquake was associated with the irregular topography of the continental slopes and deep ocean basin rather than with the Saint Lawrence submarine trough, suggesting that the proximity of the trough may be coincidental. Evidence was also introduced to the effect that glaciers have moved down the Saint Lawrence trough, that the form of the trough is suggestive of glacial erosion, and that similar troughs occur off other glaciated coasts. Therefore, the conclusion seems warranted that the trough has been shaped principally by glacial erosion." w.w.d.

The epicentre of the earthquake to which Prof. Shepard refers was, on the certain evidence of the seismograph records, located well off the coast and in the Saint Lawrence submarine trough, i.e. at Lat. 44.5° N. Long. 55° W. This does not, necessarily, imply that the earthquake and the trough are evidences of a common force but it does preclude the possibility of the epicentre having been appreciably closer to the continental slopes than the co-ordinates named. If it be mechanically possible that the glacial debris could gradually flow out of an old river gorge after having been disturbed by the earthquake tremors as suggested by Prof. Shepard in a recent note in *Science News Letter* (see No. 1372 (8) of this list), it would account for the breaking of submarine cables at intervals up to 24 hours after the earthquake as reported by Hodgson and Doxsee (see No. 723 of these lists), but to account in this way for the final breaking of cables we shall have to assume that the debris was carried more than 400 miles in a single day and that there was enough of it in the gorge to be spread over this great area involved, to a depth sufficient to rupture the cables. E.A.H.

- SLICHTER, Louis B. and GABRIEL, V. Gabrilovitch, "Some Special Cases of the Reflection and Refraction of Seismic Waves between Similar Rocks, with Application to the Study of Crystal Layers by Distant Quakes." Abstract only. See No. 1302 of this list.

- SNOLL, F. A. and McCOLLUM, Burton, "Assymetry of Sound Velocity in Stratified Geologic Formations." Abstract only. See No. 1302 of this list.

1376. SOHON, F. W., S.J., "Introduction to Theoretical Seismology: Part II, Seismometry," John Wiley and Sons, 149 pages, 26 figures, 5 plates, 8 tables. Price \$2.75. New York, 1932.

The publishers' announcement describes the book as "An adequate treatment of the mathematical theory of the seismograph." The table of contents is as follows: Oscillatory Motion: The Horizontal Seismograph: The Vertical Seismograph: The Recorder: Amplification: Actual Magnification: Friction: Galvanometric Registration: The Onset of a New Phase: The Tapping Test: Appendix-Miscellaneous Graphical Methods: Identification of Phases: Zeissig's Method for Determining Epicentres: Solution of Spherical Triangles: The Stereographic Projection: Tables and Index.

As stated by the author, the purpose of the book is to enable the observer of earthquakes to understand the principles which underlie his instrument, in order that he may be able to test it, keep it in adjustment, understand its shortcomings, and give an intelligent account of its behaviour.

The book is the first of two companion volumes to be published. Part I, Geodynamics, by James B. Macelwane, S.J., is now in preparation. These have been needed for many years by English-speaking seismologists. The volume which has already appeared should be in the hands of everyone interested in seismology or its applications, whether engaged in research or in routine observation in charge of instruments. It should result in a marked improvement in the quality of the data obtained and compiled for detailed study both in the purely academic work and in the application of the seismograph to geophysical prospecting.

1377. SOMMERVILLE, D. M. Y., "A Criticism of Professor L. A. Cotton's Theory Regarding Tidal Stresses and the Prediction of Earthquakes," *Monthly Notices Royal Astronomical Society, Geophysical Supplement*, 3, No. 1, 1-5, 1 figure, London, January, 1932.

— SWINNERTON, A. C., "Contributions to the Study of Mountain-Building." See No. 1395 of this list.

1378. TABER, Stephen, "Santiago Earthquake not Major Shock, Says Geologist," *Science News Letter*, No. 566, 21, 101, Washington, February 13, 1932.

A description of the Santiago earthquake by Dr. Taber who was at Guantanamo Naval Station near Santiago during the quake. Dr. Taber surveyed the damage; he states that it was mainly caused by poorly constructed buildings, as was the case in the Porto Rico earthquake of 1928.

F.L.T.

1379. TAKAHASI, Ryutaro, "Tilting Motion of the Earth's Crust Observed at Kawana," *Bulletin of the Earthquake Research Institute*, 10, Part 1, 145-170, 6 figures, numerous tables, 1 plate, Tokyo, March, 1932.

— TAYAMA, Risaburo and YABE, Hisakatsu, "Hôjô Trough." See No. 1396 of this list.

1380. TERADA, Torahiko, "Deformation of the Rhombic Base Lines at Mitaka and Earthquakes in Kwanto," *Proceedings of the Imperial Academy*, 8, No. 1, 8-11, 1 figure, 3 tables, Tokyo, January, 1932.

1381. TERADA, Torahiko, "On Swarm Earthquakes," *Bulletin of the Earthquake Research Institute*, 10, Part 1, 29-35, 4 figures, Tokyo, March, 1932.

1382. TERADA, Torahiko and MIYABE, Naomi, "Landslide at Hatano," *Bulletin of the Earthquake Research Institute*, 10, Part 1, 192-199, 6 figures, 8 tables, 2 plates, Tokyo, March, 1932.

In Japanese, with a lengthy abstract in English.

1383. TIERCY, Georges, "Les dimensions du sphéroïde terrestre," *Comptes rendus de la Société de Physique de Genève*, 47, No. 3, 134-136, 1930.

The following measurements of the earth ellipsoid, as proposed by the author of the above paper for general use, are quoted from a short abstract by K. Jung, in *Physikalische Berichte*, 12, Heft 22, 2696, Braunschweig, November 15, 1931, namely:

Equatorial axis, $a = 6378.250$ km.

Polar axis, $b = 6356.555$ km.

Flattening, $(a-b)/a = 1/294$

Average density = 5.525

Density of the crust = 2.6

1384. TSUBOI, Chuji, "On the Possibility of Finding the Permanent Crust Dislocation Caused by an Earthquake by Means of its Seismogram," *Proceedings of the Imperial Academy*, 7, No. 10, 371-374, 2 figures, Tokyo, December, 1931.

See also the paper by H. A. Wilson, reported in No. 1302 of this list. The methods proposed are practically identical.

1385. TSUBOI, Chuji, "Report on the Activity of the Earthquake Research Institute, Tokyo Imperial University, During the Second Half of 1930," *Gerlands Beiträge zur Geophysik*, 35, Heft 1, 113-122, 8 figures, Leipzig, 1932.

1386. VAN DIJK, G., (1) "Seismische Registreringen te Heerlen. 2 Mei 1929-7 Mei 1930," *Jaarverslag Geologisch Bureau voor het Nederlandsche Mijng gebied 1929*, 41-44, 3 illustrations, De Bilt, 1930.
- (2) "Seismische Registreringen te Heerlen, 8 Mei 1930-30 April 1931," *Jaarverslag Geologisch Bureau voor het Nederlandsche Mijng gebied 1930*, 25-27, 4 illustrations, De Bilt, 1930. G.v.D.
1387. VARI, Venanzio, "Il terremoto dell'Alta Irpinia (23 luglio 1930)," *Bollettino della Società Sismologica Italiana*, **29**, No. 6, 183-196, 12 illustrations, Rome, 1931.
1388. VISSER, S. W., "Aardbevingen en getijden (Earthquakes and Tides)," *Natuurkundig Tijdschrift voor Nederlandsch Indië*, **91**, 153-156, 6 figures, 1 table, Batavia, 1931.
- A review, in German, signed Neumann van Padang, appears in *Geologisches Zentralblatt*, **46**, No. 5, Item 1257, Leipzig, March 1, 1932.
1389. WADATI, K., "Shallow and Deep Earthquakes" (Third Paper), *Geophysical Magazine*, **4**, No. 4, 231-283, 11 figures, 10 tables, 4 plates, Tokyo, December, 1931.
1390. WANNER, E., "Jahresbericht des Schweizerischen Erdbebendienstes 1930," *Annalen der Schweizerischen Meteorologischen Zentralanstalt*, Jahrgang 1930, No. 5, 15 pages, 1 plate, Zürich, 1931.
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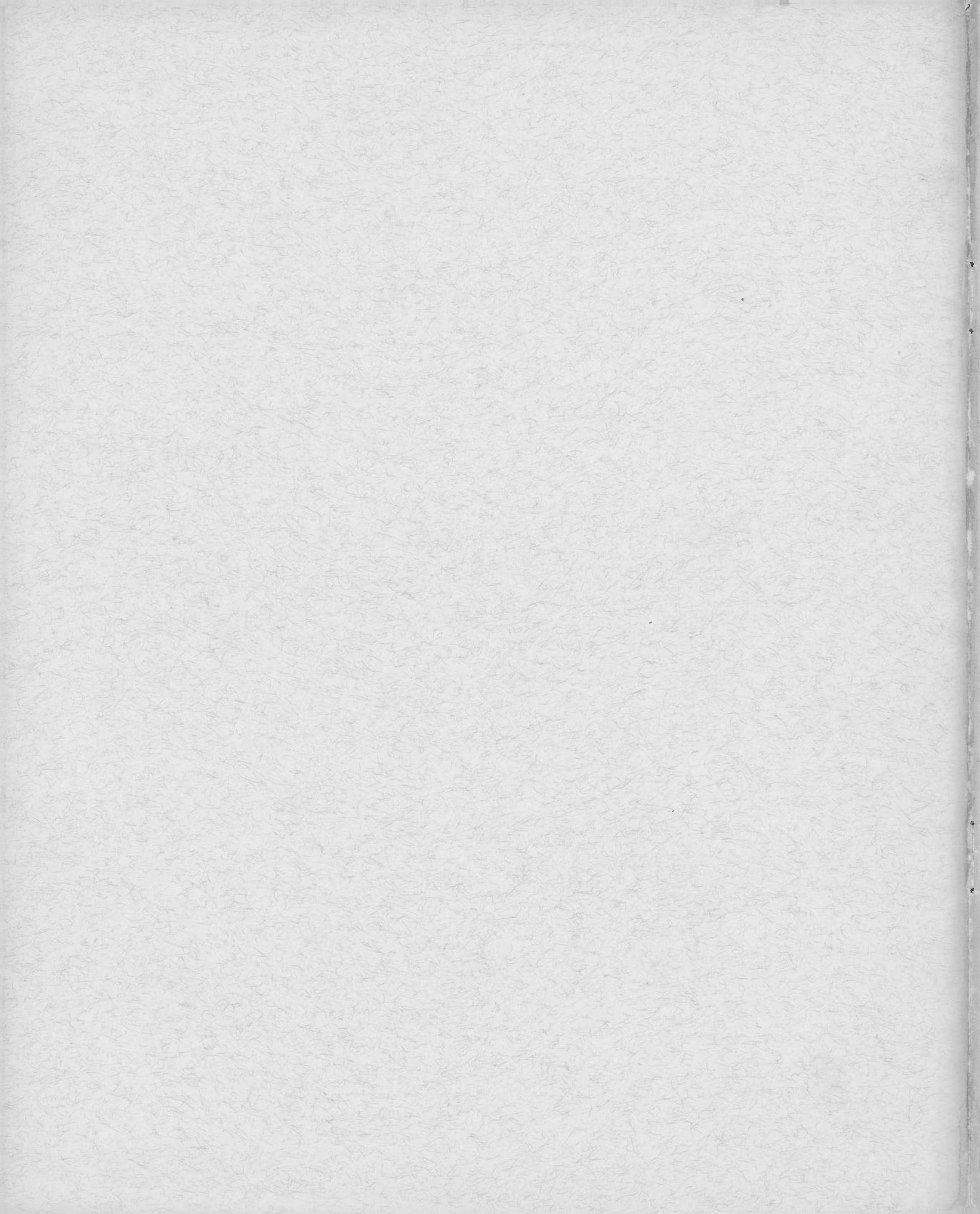
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The items for this issue of the *Bibliography* were compiled while the editor was stationed at the Geophysical Laboratory of Saint Louis University. The compilation was made possible through the kindness of Rev. James B. Macelwane, S.J., Dean of the Graduate School and Director of the Department of Geophysics, who arranged that all incoming scientific journals containing articles on seismology or allied subjects should pass through the hands of the editor. Although none of the listed items is marked with Dr. Macelwane's initials, his co-operation in the work of this entire issue is hereby gratefully acknowledged.

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(2) Earthquake epicentres as reported since 1913 by the British Association, the International Summaries, and the U.S. Coast and Geodetic Survey.

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During the seven years which have elapsed since the first issue of the first series of this *Bibliography* in 1916, a total of 2,800 items have been reported, including those of this issue. From time to time, we receive requests for information as to the journals and other publications in which these articles have appeared.

In order that such information may be complete and authoritative, questionnaires have recently been sent to the publishers concerned asking for a tabulation of data: the exact title of the publication, the name of the society it represents (if any), the subscription price per year, the cost of single numbers, etc. These data will be placed on file at the Dominion Observatory, Ottawa.

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Of particular interest to seismologists are the "Symposium on the Application of Geophysics to Ocean Basins and Margins," which formed part of the program of the general assembly, and the "Symposium on the Application of Seismology to the Study of Ocean Basins," which received the attention of the Section of Seismology. Those participating in the first of these were: Messrs. Field, Bucher, Taber, Heck, Hess, Littlehales, DeGolyer, Barton, and Day. Those contributing to the latter were: Messrs. Heck, Newmann, Merritt, Thom, and de Smitt. The papers by these contributors will be found listed in this issue of the *Bibliography*.

Other papers of interest to seismologists are as follows: "Landslide-modifications of Submarine Valleys," by Francis P. Shepard and the report on the survey of the Atlantic coast as included in the paper by Frank S. Borden on "Oceanographic Work of the Coast and Geodetic Survey during the Past Year." These papers will also be found indicated by authors in this issue of the *Bibliography*.

1509. AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, "Geophysical Prospecting, 1932," *Transactions of the American Institute of Mining and Metallurgical Engineers*, 510 pages, illustrated. Price \$5. New York, 1932.

A review, signed H. Shaw, appears on page 160 of *The Mining Magazine*, 47, No. 3, London, September, 1932. w. w. d.

1510. AMERICAN NATIONAL RED CROSS, "Managua Earthquake, Official Report of the Relief Work in Nicaragua after the Earthquake of March 31, 1931." Publication of the American National Red Cross, A. R. C. 903, 43 pages, illustrations, Washington, October, 1931.

A review in French, signed W., appears on pages 279-280 of *Matériaux pour l'Étude des Calamités*, No. 27, Geneva, 1932.

1511. BANERJI, S. K. and JOSHI, S. S., "Disturbance of Pressure at the Bed of a Deep Sea." A reprint of two pages (1 figure), from *Current Science*, Bombay, July, 1932.
A note reporting experiments with a small tank model, in support of the theory that microseisms are caused by pressure changes on the bed of the sea due to the passage of water waves. See also No. 806 of these lists.
- BARTON, D. C., "Torsion-balance Surveys in Southwest Louisiana and Southeast Texas," pp. 40-42 of the report on the program of the general assembly at the annual meeting of the American Geophysical Union, being part of the Symposium on the Application of Geophysics to Ocean Basins and Margins. See No. 1508 of this list.
1512. BEUERMANN, W., "Untersuchung der Schallausbreitung bei Unterwasserexplosionen," *Zeitschrift für Geophysik*, 8, No. 1-2, 1-16, Braunschweig, 1932.
A summary by W. Ayvazoglou appears on page 473, of *Geophysical Abstracts*, No. 38. See No. 1453 of these lists. F. W. L.
- BLAKE, A., "The Recording of Strong Seismic Motion" (abstract only). See No. 1514 of this list.
- BLAKE, A. and McCOMB, H. E., "Analysis of Rates of Rotation of Recording Drums" (abstract only). See No. 1514 of this list.
1513. BLUT, Heinrich, "Ein Beitrag zur Theorie der Reflexion und Brechung elastischer Wellen an Unstetigkeitsflächen," *Zeitschrift für Geophysik*, 8, Heft 6-7, 305-322, 16 figures, Braunschweig, 1932.
This paper appeared in two sections, the first having been reported as No. 1407 of these lists. The second section, noted above, is No. 7 of the series *Seismische Untersuchungen des Geophysikalischen Instituts in Göttingen*.
1514. BODLE, Ralph R., "Earthquake Notes." Publication of the Eastern Section of the Seismological Society of America, 4, Nos. 1 and 2, 1-15, Washington, September, 1932.
The above issue reports the Philadelphia Meeting of the Eastern Section, May 2-3, 1932. Abstracts are presented of papers by each of the following authors, to which reference will be found in this issue of the *Bibliography*: Taber, Neumann, Lynch, Eikelberg, Leet and Ewing, Stechschulte, Shepard, O'Connor, Fleming, Hand, Wrocklage, Merritt, Wenner, Robison, McComb and Blake, Weed.
- BODLE, R. R. and NEUMANN, Frank, "United States Earthquakes, 1930." See No. 1559 of this list.
1515. BOIS, Ch., "Chronique Sismologique," *Matériaux pour l'Étude des Calamités*, No. 27, 260-263, Geneva, 1932.
- BORDEN, Frank S., "Oceanographic Work of the Coast and Geodetic Survey during the Past Year," pp. 211-224 (9 figures) of the report of the Section of Oceanography of the American Geophysical Union in connection with the program of the annual meeting. See No. 1508 of this list.
- BUCHER, Walter H., "Problems of Island-arcs and Ocean-deeps," pp. 12-19 of the report on the program of the general assembly at the annual meeting of the American Geophysical Union, being part of the Symposium on the Application of Geophysics to Ocean Basins and Margins. See No. 1508 of this list.

1516. CAGNIARD, Louis, "Sur la propagation d'un séisme à l'intérieur d'un solide homogène, isotrope, élastique, semi-indéfini, limité par une surface plane," *Comptes rendus*, **194**, No. 10, 899-902, Paris, March, 1932.

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1517. CASTLE, William R., "Tokyo To-Day," *The National Geographic Magazine*, **61**, No. 2, 131-162, numerous illustrations, Washington, February, 1932.

— CAVASINO, Alfonso, "Studio delle grandi calamita." See No. 1567 of this list.

1518. COULOMB, J., "Sur les ondes transversales superficielles (ondes de Love)," *Annales de l'Institut de Physique du Globe*, **9**, 170-186, Paris, 1931. J. C.

1519. COWPLAND, C. C., "Record-Breaking Dynamite Blast Made by Hercules Powder," *The Hercules Mixer*, pp. 88-89, April, 1932.

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— DAY, Arthur L., "Experiences of a Seismologist with 'Seismic Methods'," pp. 42-44 of the report on the program of the general assembly at the annual meeting of the American Geophysical Union, being part of the Symposium on the Application of Geophysics to Ocean Basins and Margins. See No. 1508 of this list.

— DE GOLYER, E., "The Application of Seismic Methods to Submarine Geology," pp. 37-40 of the report on the program of the general assembly at the annual meeting of the American Geophysical Union, being part of the Symposium on the Application of Geophysics to Ocean Basins and Margins. See No. 1508 of this list.

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- (2) DE MIRANDA, Raul, "Tremores de Terra: Estudo macrosismico," Silva Raposo, 6 rua Candido dos Reis, 175 pages, illustrations, Coimbra, 1931.

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— DE SMITT, V. P., "Earthquakes in the North Atlantic as Related to Submarine Cables," pp. 103-109 (5 figures) of the report of the Section of Seismology of the American Geophysical Union in connection with the program of the annual meeting, being part of the Symposium on the Application of Seismology to the Study of Ocean Basins. See No. 1508 of this list.

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The text of a paper presented before Section E., Geology and Geography, American Association for the Advancement of Science, January 1, 1932, New Orleans.

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- EWING, Maurice and LEET, L. Don, "Velocity of Elastic Waves in Granite." See No. 1550 of this list.

- EWING, Maurice and LEET, L. Don, "A Study of Phases on Explosion Records" (abstract only). See No. 1514 of this list.

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1528. FERNER, R. Y., Co., "Seismometer, Wenner Design," Specification sheet giving details of the Wenner seismograph (horizontal component), 4 pages, 2 illustrations, Investment Building, Washington, 1931. E. J. L.

- FIELD, Richard M., "Introduction to the Symposium on the Application of Geophysics to Ocean Basins and Margins," pp. 11-12 of the report on the program of the general assembly at the annual meeting of the American Geophysical Union. See No. 1508 of this list.

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1530. GUTENBERG, B., "Einleitung: Allgemeines über Geophysik," *Handbuch der Geophysik*, 1, Lieferung 1, 1-7, Berlin, 1932.
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Chapter 10 deals with "Geophysical Methods of Investigating Boreholes." McG.-H.
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Deals with seismic sea waves and their registration on the tide gauge as a result of their reflection from the shores of America. R. R. B.
- HECK, N. H., "Seismic Zones as Related to Relief of Ocean-bottom," pp. 21-26 (6 figures) of the report on the program of the general assembly at the annual meeting of the American Geophysical Union, being part of the Symposium on the Application of Geophysics to Ocean Basins and Margins. See No. 1508 of this list.
- HECK, N. H., "Seismology and the Ocean Basins," pp. 91-94 of the report of the Section of Seismology of the American Geophysical Union in connection with the program of the annual meeting, being part of the Symposium on the Application of Seismology to the Study of Ocean Basins. See No. 1508 of this list.
1533. HENCKY, H., "On the Propagation of Elastic Waves in Materials under High Hydrostatic Pressure," *Philosophical Magazine*, No. 90, 14, 254-258, London, August, 1932. W. W. D.
- HESS, Harry Hammond, "Interpretation of Gravity Anomalies and Sounding Profiles Obtained in the West Indies by the International Expedition to the West Indies in 1932," pp. 26-33 (5 figures) of the report on the program of the general assembly at the annual meeting of the American Geophysical Union, being part of the Symposium on the Application of Geophysics to Ocean Basins and Margins. See No. 1508 of this list.

1534. HIGUCHI, Seiichi, "On the Motion of the Lever of the Recording Pin of Omori's Horizontal Pendulum Seismograph at the Time of an Earthquake," *Science Reports, Tohoku Imperial University*, **20**, No. 5, 764-781, Sendai, 1931.

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1535. HILL, Mason L., "Mechanics of Faulting near Santa Barbara, California," *Journal of Geology*, **40**, No. 6, 535-556, 9 figures, Chicago, August-September, 1932.

In his abstract the author states that his paper "places limitations on . . . the reference of seismic epicenters to particular faults."

1536. HOPFNER, F., "Figur der Erde, Dichte und Druck im Erdinnern," *Handbuch der Geophysik*, **1**, Lieferung 1, Abschnitt 3, Chapters 12-17, 139-308, 7 tables, 27 figures, Berlin, 1932.

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1538. IMAMURA, Akitune, "On Crustal Deformations Since 1928 in the Kyoto-Osaka District," *Proceedings of the Imperial Academy*, **8**, No. 6, 251-254, 3 figures, Tokyo, June, 1932.

1539. IMPERIAL EARTHQUAKE INVESTIGATION COUNCIL, "The Contents of the Publications of the Imperial Earthquake Investigation Committee." Special publication of the Imperial Earthquake Investigation Council, 80 pages, Tokyo, 1932.

A note from Prof. A. Imamura, Secretary of the Council, reads, in part, as follows: "The Imperial Earthquake Investigation Committee was abolished in 1925. Since then, the Council have been engaged in settling up the various outstanding matters concerned with the above-mentioned Committee, and have also published a few Reports. Our labours in these respects having ended, and as nothing more will be published unless special reasons warrant it, we have compiled an Index to the whole of the Committee's publications."

The table of contents is as follows:

Publications of the Imperial Earthquake Investigation Committee in Foreign Languages, Nos. 1-26.

Bulletin of the Imperial Earthquake Investigation Committee, Vols. I-XI.

Seismological Notes, Nos. 1-6.

Sinsai Yobô Tyôsakwai Hôkoku (Reports of the Imperial Earthquake Investigation Committee in Japanese Language), Nos. 1-101. (Translation.) A. I.

1540. JONES, A. E., "A Chart of Kilauea Seismicity," *The Volcano Letter*, No. 371, 3 pages, 1 table, 1 chart, Honolulu, February 4, 1932.

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1541. JONES, J. H., "The Diffraction of Elastic Waves at the Boundaries of a Solid Layer," *Proceedings of the Royal Society, Mathematical and Physical Sciences*, Series A, **137**, No. A 832, 325-343, 10 figures, London, August 2, 1932.

An account is given of an experimental investigation into the diffraction of elastic waves at the boundaries of a limestone layer, embedded in a medium possessing lower elastic wave velocities. The author advances explanations for the several different types of presumably diffraction pulses which have been observed at the surface.

— JOSHI, S. S. and BANERJI, S. K., "Disturbance of Pressure at the Bed of a Deep Sea." See No. 1511 of this list.

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— KÖHLER, R., GERECKE, F., MÜLLER, H. K., and RAMSPECK, A., "Seismische Untersuchungen des Geophysikalischen Instituts in Göttingen." See No. 1529 of this list.

1546. KOLDERUP, Carl Fred, "Jordskjelv i Norge 1930 og 1931," *Bergens Museums Årbok 1931, Naturvidenskapelig rekke*, No. 9, 20 pages, 1 figure, 2 maps, with German summary, 1932.

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R. Z.

1547. KUPRADZE, V. and SOBOLEV, S., "On the Propagation of Elastic Waves along the Surface of Separation of Two Media having Different Elastic Properties" (in Russian), *Académie des Sciences de l'Union des Républiques Soviétiques Socialistes, Publications de l'Institut Séismologique*, No. 10, 1-23, Leningrad, June, 1930.

The résumé in French announces an application of the method of Lamb (reported as No. 1250 of these lists); the void being replaced by a compressible fluid "the presence of the second medium changes essentially the character of the propagation."

J. C.

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F. W. L.

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This paper is essentially a study of the constitution of the earth's crust.

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- LITTLEHALES, G. W., "Sounding the Depths of the Ocean for Mapping the Conformation and Topography of the Bottom," pp. 33-37 of the report on the program of the general assembly at the annual meeting of the American Geophysical Union, being part of the Symposium on the Application of Geophysics to Ocean Basins and Margins. See No. 1508 of this list.
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1552. MEINESZ, F. A. Vening, "Relevé gravimétrique maritime de l'archipel Indien—relation entre l'intensité de la pesanteur et l'activité tectonique de l'encorcee terrestre." Publication de la Commission Géodésique Neerlandaise, 6 pages, Delft, 1931. R. R. B.
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- MERRITT, George E., "Applications of Interferometric Tiltmeters in the Problems of Geophysics," pp. 98-101 (5 figures) of the report of the Section of Seismology of the American Geophysical Union in connection with the program of the annual meeting, being part of the Symposium on the Application of Seismology to the Study of Ocean Basins. See No. 1508 of this list.
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1554. MINISTÈRE DE L'INSTRUCTION PUBLIQUE ET DES BEAUX-ARTS, "Enquêtes et documents relatifs à l'enseignement supérieur: CXXVI. Rapports sur les observatoires astronomiques de province et les observatoires en instituts de physique du globe." Reports for the year 1930. Imprimerie Nationale, 145 pages, Paris, 1932.
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A graphical method of determining the magnification of Galitzin seismographs.

H. L.

1556. MÜLLER, Ferdinand, "Zur experimentellen Seismik und deren Anwendung," *Gerlands Beiträge zur Geophysik, Ergänzungshefte für angewandte Geophysik*, 3, Heft 1, 125-136, 6 figures, Leipzig, 1932.

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- MÜLLER, H. K., RAMSPECK, A., KÖHLER, R., and GERECKE, F., "Seismische Untersuchungen des Geophysikalischen Instituts in Göttingen." See No. 1529 of this list.

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J. C.

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The author, in the above short note, indicates the evidence which he has found to support his contention that great earthquakes have a measurable effect on the variation of latitude.

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- NEUMANN, Frank, "Accuracy of Epicenter Determinations," pp. 94-98 of the report of the Section of Seismology of the American Geophysical Union in connection with the program of the annual meeting, being part of the Symposium on the Application of Seismology to the Study of Ocean Basins. See No. 1508 of this list.

- NEUMANN, Frank, "Travel Time Curves of the Santiago Earthquake" (abstract only). See No. 1514 of this list.

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— ODDONE, E., "Studio delle grandi calamita." See No. 1567 of this list.

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W. W. D.

1561. OXFORD UNIVERSITY, "The International Seismological Summary for 1928, January, February, March," 1-100: ". . . for 1928, April, May, June," 101-236: ". . . for 1928, July, August, September," 237-339: Oxford, 1932.

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The publication presents a brief account of the international metric system of weights and measures. Its purpose is to give such information as will adequately answer some of the more simple questions addressed to the bureau on this subject and to set forth a working knowledge of the system. It will be found a handy compendium of relative values as well as a reference to the legal adoption of the various types of metric units in the United States.

1563. PICHT, Johannes, "Beitrag zur Theorie der Ausbreitung seismischer Wellen," *Gerlands Beiträge zur Geophysik, Ergänzungshefte für angewandte Geophysik*, **3**, Heft 1, 1-8, 2 figures, Leipzig, 1932.

A theoretical discussion of the propagation through a layered medium of the seismic waves generated by an explosion.

1564. PICHT, Johannes, "Über neue Integrativen der Askania-Werke A. G.," *Zeitschrift für Instrumentenkunde*, **52**, Heft 7, 289-299, 17 figures, Berlin, July, 1932.

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The writer discusses the movement in Germany toward a standard format for scientific periodicals. There is also an attempt to standardize the abbreviations to be used in bibliographical references and other related matter.

— RAMSPECK, A., KÖHLER, R., GERECKE, F., and MÜLLER, H. K., "Seismische Untersuchungen des Geophysikalischen Instituts in Göttingen." See No. 1529 of this list.

1566. RANKINE, A. O., "Some Aspects of Applied Geophysics," *Nature*, No. 3281, **130**, 421-424, London, September 17, 1932.

The paper makes reference to an earlier publication by the same author for which the bibliographical data are as follows: "Physics in Relation to Oil Finding," *Nature*, No. 3106, **123**, 718-720, 6 figures, London, May 11, 1929. This latter paper deals with the seismic method to the exclusion of other types of geophysical prospecting.

1567. REALE ACCADEMIA NAZIONALE DEI LINCEI, "Studio delle grandi calamita," *Pubblicazioni della Commissione Italiana per Lo, Part II, Memorie Scientifiche et Tecniche*, Reale Accademia Nazionale dei Lincei, Rome, 1931.

The above publication is in two volumes of which the second comprises xvi + 326 pages, together with maps. A lengthy review, signed Howard of Penrith, is given on pages 457-460 of the *Geographical Journal*, 78, No. 5, London, November, 1931. In the second volume the first paper is by Professor Roberto Almagià. It deals with the geographical distribution of landslides in Italy. The next paper is by Professor Emilio Oddone and deals with the frequency of earthquakes of disastrous proportions in the Mediterranean Basin, with a chronological catalogue of such calamities in this area since 1501. Explanatory notes are contributed by Dr. Alfonso Cavasino, together with a chart of the regions most affected. The two final papers in this volume are contributed by Dr. Domenico Romano. They deal with earthquakes in Italy, particularly with the means now being adopted in that country to lessen the loss of life and property attendant on such catastrophes.

1568. REICH, H., "Eigenschaften der Gesteine," *Handbuch der Geophysik*, 6, Lieferung 1, Abschnitt 1, Chapters 1-6, 1-83, 6 figures, 33 tables, Berlin, 1931.

For reference to the *Handbuch der Geophysik*, see No. 332 of these lists.

1569. RICH, John L., "Simple Graphical Method for Determining True Dip from Two Components and for Constructing Contoured Structural Maps from Dip Observations," *Bulletin of the American Association of Petroleum Geologists*, 16, No. 1, 92-94, 2 figures, Tulsa, January, 1932.

1570. RIES, H. and WATSON, T. L., "Elements of Engineering Geology," John Wiley and Sons, Second Edition, 411 pages, 290 figures. Price \$3.75. New York, 1931.

A review, signed J. T. McC., appears in the *Journal of Geology*, 40, No. 3, 287-288 Chicago, April-May, 1932.

- ROBISON, E. C., "Magnification of the Wenner Seismometer" (abstract only). See No. 1514 of this list.

1571. RODÉS, S. J., "Période diurne et annuelle dans la distribution de 1944 tremblements de terre enregistrés par un même sismographe," *Union Géodésique et Géophysique Internationale, Section de Séismologie, Travaux Scientifiques*, Fascicule 7, 54-56, Strasbourg, 1932.

The above is one of the communications presented at the Stockholm meeting of the International Union.

- ROMANO, Domenico, "Studio delle grandi calamita." See No. 1567 of this list.

- ROMBERG, Arnold, "The McComb-Romberg Horizontal Seismometer." See No. 1514 of this list.

1572. ROTHÉ, E., "Les ondes séismiques et leur propagation," Fascicule 12 of *Mémorial des Sciences Physiques*, Gauthier-Villars, 60 pages. Price 15 francs. Paris, 1930.

The publication outlines the classic theory of seismology, together with certain personal views, notably with regard to long waves. A bibliography of 34 numbers (41 articles) is appended.

J. C.

1573. ROTHÉ, E., "Sur la production des maximums dans les inscriptions séismographiques—cas des épacentres océaniques," *Gerlands Beiträge zur Geophysik*, **34**, Köppen-Band III, 102-122, 11 figures, Leipzig, 1931.

1574. ROTHÉ, E., "Use of a New International Code for the Transmission of Seismic Telegrams," *Union Géodésique et Géophysique Internationale, Section de Séismologie, Travaux Scientifiques*, Fascicule 7, 101-122, Strasbourg, 1932.

The above report, first in English and then in French, outlines the action with regard to the above subject taken at the Stockholm meeting of the International Union.

1575. SCHRADER, J. E., "A Three-Dimensional Vibrograph," *The Physical Review*, **38**, No. 10, pg. 1923, Minneapolis, 1931.

A brief review by W. Ayvazoglou appears on page 543 of *Geophysical Abstracts* No. 40. See No. 1549 of this list.

F. W. L.

1576. SCHÜNEMANN, H., "Die seismische Bodenunruhe zweiter Art in Hamburg und ihre Ursache," *Zeitschrift für Geophysik*, **8**, Heft 5, 216-226, 6 figures, Braunschweig, 1932.

See also No. 1371 of these lists.

E. T.

1577. SCIENCE NEWS LETTER, "Seismographs Set for Spot Records of Coming Quakes," *Science News Letter*, No. 591, **22**, pg. 81, 1 illustration, Washington, August 6, 1932.

This short note announces the setting up of automatic seismographs in various actively seismic sections of the United States. These instruments are set in operation by the first impulse of a local shock and then continue to record the strong motions throughout the duration of the earthquake. They are set up for the purpose of studying the nature of earthquake motion near an epicentre—information vital to the work of engineers endeavouring to construct earthquake-proof buildings.

1578. SCIENCE NEWS LETTER, "Quake in Interior of China May Prove Major Disaster," *Science News Letter*, No. 594, **22**, pg. 132, Washington, August 27, 1932.

The above note directs attention to the earthquake of August 14, 1932.

S. G.

1579. SEE, T. J. J., "The Cause of Earthquakes and Mountain Formation: The Andes, a Great Wall Erected by the Ocean along its own Border," *Scientia*, Series 3, **50**, 281-288, Bologna, November, 1931.

A translation into French, with the title, "La cause des tremblements de terre et de la formation des montagnes: les Andes sont une grande muraille élevée par l'océan le long de son propre bord," is presented on pages 109-116 of the supplement which forms a part of the above-indicated issue of *Scientia*. The translation was made by Marcel Thiers of Paris.

1580. SHAW, H., "Finding Minerals by Physical Methods," *Discovery*, No. 136, **12**, 120-124, 3 illustrations, London, April, 1931.

The above is a presentation in popular form of the geophysical prospecting methods as at present in use. The author has succeeded in making the brief account both interesting and accurately informative.

- SHAW, H., Book Reviews: A review of each of the books reported as Nos. 1506, 1507, and 1509 of this list is given by the above writer on pages 159-160 of *The Mining Magazine*, **47**, No. 3, London, September, 1932.

1581. SHEPARD, Francis P., "Canyons in Ocean Bottom off New England," *Science*, Supplement to No. 1969, **76**, 8-9, New York, September 23, 1932.

A presentation of the same material with the title "'Wild West' Gorges Found in Sea Bottom off New England," appears in *Science News Letter*, No. 599, **22**, 208, 1 map, Washington, October 1, 1932.

- SHEPARD, Francis P., "Landslide Modifications of Submarine Valleys," pp. 226-230 (4 figures) of the report of the Section of Oceanography of the American Geophysical Union in connection with the program of the annual meeting. See No. 1508 of this list.

- SHEPARD, Francis P., "Depth Changes in Sagami Bay after the Great Japanese Earthquake" (abstract only). See No. 1514 of this list.

1582. SIEBERG, A., "Erdbebengeographie," *Handbuch der Geophysik*, **4**, Lieferung 2, 687-1004, illustrated. Subscription price RM 56; ordinary price RM 84. Paper covers. Berlin, 1932.

G. E. S.

See note at end of item No. 843 of these lists and also No. 885.

1583. SMIRNOFF, V. and SOBOLEV, S., "Sur le problème plan des vibrations élastiques," *Comptes rendus*, **194**, No. 17, 1437-1439, Paris, April, 1932.

A second note entitled, "Sur quelques problèmes de vibrations élastiques," appears in the same volume of *Comptes rendus*, No. 21, 1797-1799, Paris, May, 1932. The articles present a new method based on the use of complex variables for the resolution of the problem of elastic vibrations in the case of a plane or a stratum, and some problems for symmetrical axes.

J. C.

- SNELL, F. A. and McCOLLUM, Burton, "Asymmetry of Sound Velocity in Stratified Formations." See No. 1551 of this list.

1584. SOBOLEV, S., "Sur l'équation d'onde pour le cas d'un milieu hétérogène isotrope" (in French), *Académie des Sciences de l'Union des Républiques Soviétiques Socialistes, Publications de l'Institut Séismologique*, No. 2, 163-167, Leningrad, January, 1930. J. C.

1585. SOBOLEV, S., "Wave Equation for the Case of a Heterogeneous Medium" (in Russian), *Académie des Sciences de l'Union des Républiques Soviétiques Socialistes, Publications de l'Institut Séismologique*, No. 6, pp. 1-57, Leningrad, March, 1930. J. C.

1586. SOBOLEV, S., "On the Diffraction of Spherical Elastic Waves Near the Surface of a Sphere" (in Russian), *Académie des Sciences des Républiques Soviétiques Socialistes, Publications de l'Institut Séismologique*, No. 7, 1-13, Leningrad, 1930. F. W. L.

1587. SOBOLEV, S., "On a Limited Problem of the Theory of the Logarithmic Potential and its Application to the Reflection of Plane Elastic Waves" (in Russian), *Académie des Sciences de Républiques Soviétiques Socialistes, Publications de l'Institut Séismologique*, No. 11, 1-16, Leningrad, 1930.

A translation of the author's abstract, made by W. Ayvazoglou, appears on page 426 of *Geophysical Abstracts*, No. 36. See No. 1453 of these lists. F. W. L.

- SOBOLEV, S. and KUPRADZE, V., "On the Propagation of Elastic Waves along the Surface of Separation of Two Media having Different Elastic Properties." See No. 1547 of this list.

- SOBOLEV, S. and SMIRNOFF, V., "Sur le problème plan des vibrations élastiques." See No. 1583 of this list.
- STECHSCHULTE, V. C., S. J., "The Deep-Focus Japanese Earthquake of March 29, 1928" (abstract only). See No. 1514 and No. 1484 of these lists.
1588. STEERS, J. A., "The Unstable Earth," Methuen and Co., xiv + 342 pages, diagrams and maps. Price 15s. London, 1932.
- A review of the above book, signed A. M. D., appears on page 259 of *The Geographical Journal*, 80, No. 3, London, September, 1932. The book is one of Methuen's Geological Series, of which the General Editor was the late Prof. J. W. Gregory.
1589. STETSON, Harlan T., "How Stable is the Earth's Crust," *Scientific American*, 145, 392-394, 7 figures, New York, December, 1931.
1590. STORER, Tracy I., "What is a Publication?" *Science*, No. 1949, 75, 486-487, New York, May 6, 1932.
1591. SYOYAMA, Mituo, "A Method of Laboratory Device to Record the Period of a Pendulum Motion," *Science Reports, Tokyo University, Physical Institute*, 1, No. 12, 145-147, Tokyo, 1931.
- A review in German, signed Schmehl, appears on page 57 of the section devoted to *Geophysikalische Berichte* in the issue of *Zeitschrift für Geophysik*, 8, Heft 3-4, Braunschweig, 1931.
- TABER, Stephen, "The Structure of the Bartlett Trough," pp. 19-21 of the report on the program of the general assembly at the annual meeting of the American Geophysical Union, being part of the Symposium on the Application of Geophysics to Ocean Basins and Margins. See No. 1508 of this list.
- TABER, Stephen, "The Recent Earthquake near Santiago de Cuba" (abstract only). See No. 1514 of this list.
- THOM, W. T., "Seismology and Structural Geology," pp. 102-103 of the report of the Section of Seismology of the American Geophysical Union in connection with the program of the annual meeting, being part of the Symposium on the Application of Seismology to the Study of Ocean Basins. See No. 1508 of this list.
1592. TRACY, H. H., "Welded Joints for Seismic Stresses in a Tall Building," *Engineering News-Record*, 109, No. 11, 312-313, 3 figures, tables, New York, September 15, 1932.
- R. R. B.
1593. TSSHOKHER, V., "Investigation of Equilibrium Conditions of Earthen Masses under the Action of Seismic Forces" (in Russian), *Académie des Sciences des Républiques Soviétiques Socialistes, Publications de l'Institut Séismologique*, No. 5, 1-11, Leningrad, 1930.
- A short review by W. Ayvazoglou appears on page 424 of *Geophysical Abstracts*, No. 36. See No. 1453 of these lists.
- F. W. L.
1594. TYLER, E., "The Damping of Pendulums Immersed in a Viscous Fluid," *Philosophical Magazine*, No. 88, 13, 1099-1128, 21 figures, 7 tables, London, June, 1932. W. W. D.

1595. VESHNIAKOV, N. V., "Seismometric Investigation of Several Bridges in Leningrad" (in Russian), *Académie des Sciences des Républiques Soviétiques Socialistes, Publications de l'Institut Séismologique*, No. 4, 1-20, Leningrad, 1930. F. W. L.
1596. VOLKMANN, W., "Zu Galileis Pendelformel," *Zeitschrift für den physikalischen und chemischen Unterricht*, 45, Heft 1, 25-28, 6 figures, Berlin, January-February, 1932.
1597. WANNER, E., "Die Lage der Thermal- und Mineralquellen der Schweiz und der Ostalpen bezüglich der Erdbebengebiete," *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, 77, 155-158, 3 illustrations, Zürich, 1932.
- WATSON, T. L. and Ries, H., "Elements of Engineering Geology." See No. 1570 of this list.
- WEED, Arthur J., "A Strong-motion Seismograph for Earthquakes with Demonstration Model" (abstract only). See No. 1514 of this list.
- WENNER, Frank, "Response and Memory Characteristic of Seismometers" (abstract only). See No. 1514 of this list.
- WENNER, Frank, "Seismometer, Wenner Design." See No. 1514 of this list.
1598. WILSON, H. A., "The Calculation of the Motion of the Ground from Seismograms," *Physics*, 2, No. 3, 186-199, 22 figures, Menasha, March, 1932.
See also No. 1384 of these lists.
1599. WILSON, John H., "Geophysical Prospecting," reprinted from the *Colorado School of Mines Magazine*, issues of July, August, October, November, and December, 1928, and January, February, April, June, and August, 1929.

The reprints are grouped in two pamphlets of 11 pages each; they are fully illustrated. The subject is dealt with under the headings: Introduction, Pendulum Apparatus, Torsion Balances, Magnetic Methods, Electrical Methods, Seismic Method, Radioactive Methods, Geothermal Methods.

1600. WITTE, H., "Beiträge zur Berechnung der Geschwindigkeit der Raumwellen im Erdinnern," *Nachrichten von der Gesellschaft der Wissenschaften zu Göttingen, Mathematisch-physikalische Klasse*, Weidmannsche Buchhandlung, 43 pages, 10 figures, tables, bibliography. Price RM 3. Berlin, 1932.

The paper is divided into two chapters. The following is a translation of the author's German summary:—

Chapter 1: "The assumption involved in the application of the Herglotz-Wiechert method for directly determining the velocity of body waves in the interior of the earth are here examined in greater detail than formerly. One may consider only a continuous variation of velocity with depth. The velocity may neither vary linearly with decreasing radius nor may the variation exceed a known measure ($dv/dr \leq v/r$). The time-distance curve issuing from the point of zero distance zero time must always be, not only convex to the Δ -axis and differentiable, but must also have continuous (positive) second derivatives (continuous curvature). If among several time-distance curves of the same type of waves there should be one which begins with $\Delta=0$, the others may be reduced to an horizon which may be computed by the Herglotz-Wiechert method on

the basis of the first curve. If none begins at $\Delta=0$, then one may only determine approximately the ratio of the vertex-radii, unless it should be possible in some way to complete the missing part of the time-distance curve."

Chapter 2: "The results obtained on calculating the variation of the velocity of body waves with depth by the Herglotz-Wiechert method based on the *P* and *S* time-distance curves as published by Jeffreys in January, 1931 and January, 1932, are here presented. The curves seem to run smoothly and suggest discontinuities only in the depth ranges 900-1000 km. and 2600-2700 km. The values of Poisson's ratio as given by the computed velocities ratio are shown to a depth of 2700 km."

- WROCKLAGE, H. G., "Installation of McComb-Romberg, Horizontal-component Seismometers at the International Latitude Observatory, Ukiah, California" (abstract only). See No. 1514 of this list.

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The appended initials are those used to indicate, in each case, the items contributed by the respective collaborator.

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- Stechert, G. E., Co.,
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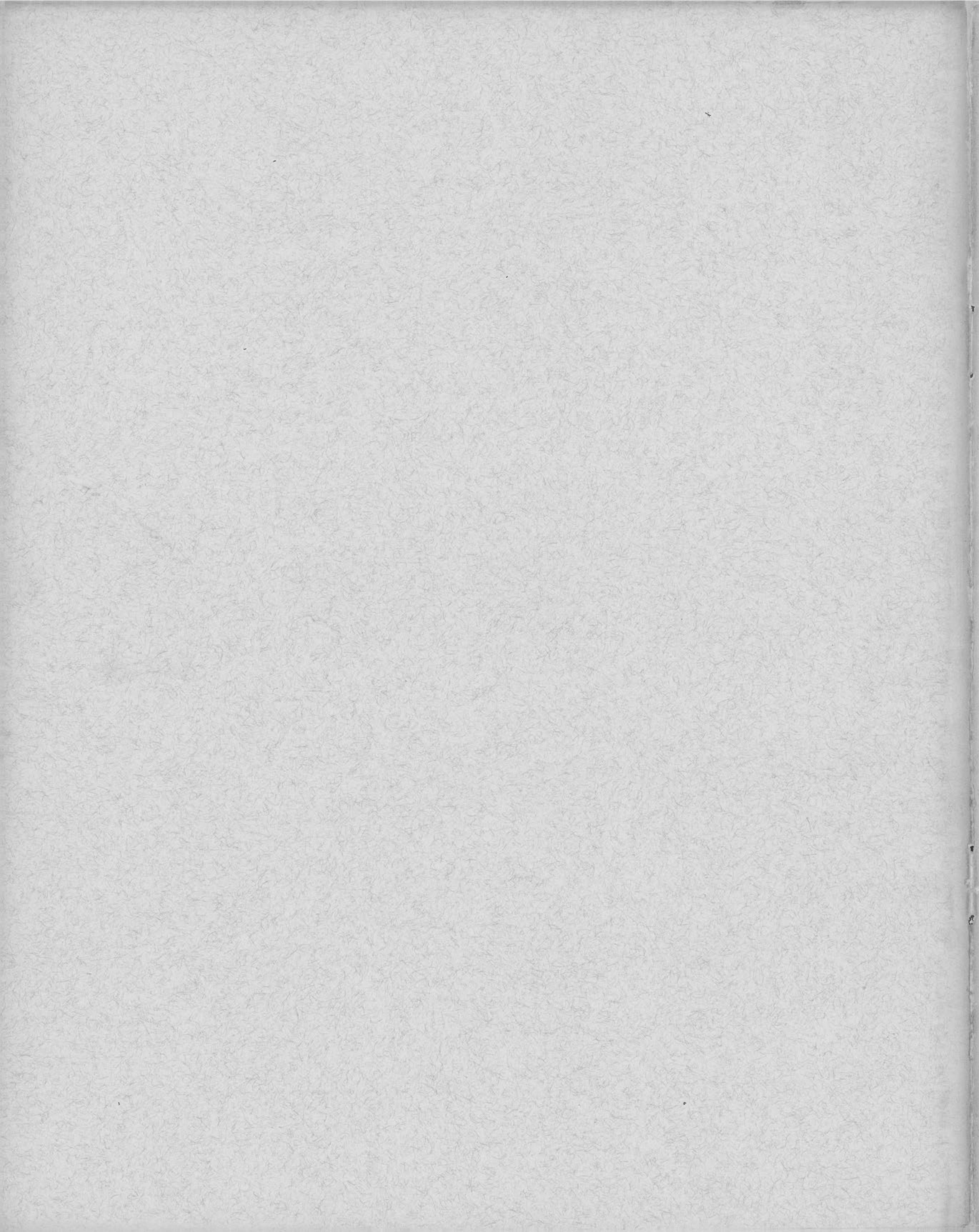
SUBJECT INDEX FOR THE YEAR 1932

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- C4. Cycles, Earthquake: Nos. 1283, 1331, 1332, 1345, 1571.
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See also G1. (Geodesy) and T2. (Tides).
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- D4. Descriptions, General, of Earthquakes other than those in Canada or the United States: Nos. 1237, 1243, 1251, 1255, 1269, 1271, 1295, 1301, 1305, 1309, 1325, 1346, 1367, 1387, 1425(1), 1425(9), 1427, 1484, 1495, 1502(1), 1578.
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- E2. Engineering; Particular Applications to Seismology or of Seismology: Nos. 1225, 1254, 1487, 1531.
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- I1. Instruments; Seismographs and Accessories: Nos. 1206, 1236, 1245, 1285, 1300, 1302, 1307, 1342, 1347, 1358, 1372(5), 1392, 1398, 1401, 1403, 1406, 1425(11), 1445, 1454, 1456(2), 1458, 1464, 1471, 1474, 1479(1), 1497, 1500(1), 1500(3), 1502(3), 1503, 1528, 1534, 1564, 1575, 1596.

- I2. Insurance and Earthquakes: No. 1316.
- I3. Isostasy and Gravity; Papers of Interest to Seismologists: Nos. 1328, 1431, 1448, 1450, 1472, 1479(2), 1500(2), 1508, 1543, 1552.
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- M4. Microseisms: Nos. 1237, 1323, 1371, 1414, 1425(5), 1425(8), 1425(10), 1426, 1444, 1446, 1452(1), 1452(2), 1511, 1576.
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- P5. Prediction of Earthquakes: Nos. 1267, 1377.
- See also C4. (Cycles).
- R1. Records, Evaluation of Earthquake: Nos. 1266, 1268, 1302, 1384, 1462, 1504, 1534, 1556, 1573, 1598.
- See also T4. (Time-Distance Curves) and W1. (Wave Study).
- R2. Reports, Seismological; Regular Series: Nos. 1212, 1264, 1270, 1293, 1298, 1307, 1362, 1386, 1390, 1425, 1501, 1561.
- See also C1. (Catalogues).
- R2.1 Reviews of Various Phases of Seismology: Nos. 1211, 1272, 1320, 1341, 1354, 1364, 1410, 1530.
- R3. Rotation Period of the Earth, Variations Therein; Wandering of the Pole; Variation of Latitude: No. 1558.
- S1. Scales, Earthquake: Nos. 1372(1), 1394, 1402.
- S2. Seismicity of Particular Regions: Nos. 1204, 1256, 1267, 1291, 1292, 1326, 1408, 1411, 1499, 1501, 1502(2), 1521.
- See also C1. (Catalogues), D3. and D4. (Descriptions of Particular Earthquakes), O4. (Origins), and R2. (Reports).

- S3. Seismic Prospecting: Nos. 1208, 1209, 1228, 1229, 1257, 1258, 1277, 1302, 1307, 1310, 1356, 1359, 1372(2), 1424, 1429, 1458, 1469(1), 1469(2), 1469(3), 1506, 1507, 1508, 1509, 1519, 1522, 1524, 1531, 1541, 1550, 1551, 1556, 1560, 1566, 1580, 1599.
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- T2. Tidal Loading; Its Effects; Sea-Level, Pressure Changes, etc.: Nos. 1388, 1443.
- T4. Time-Distance Curves, Tables, etc.: Nos. 1215, 1220, 1236, 1248, 1261, 1262, 1280, 1295, 1296, 1310, 1312, 1315, 1318, 1327, 1343, 1348, 1351, 1352, 1366, 1367, 1393, 1399, 1400, 1428, 1429, 1436, 1438, 1455, 1456(1), 1484, 1494, 1495, 1550, 1551.
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CANADA

HON. THOMAS G. MURPHY, *Minister*

H. H. ROWATT, *Deputy Minister*

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Dominion Observatory
OTTAWA

R. MELDRUM STEWART, *Director*

Vol. X

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No. 17

JANUARY, FEBRUARY, MARCH, 1933

BY

ERNEST A. HODGSON

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While engaged in seismic prospecting in Texas and Louisiana, the author observed rhythmic earth tremors which were caused by heavy reciprocating machinery. These vibrations, long since the subject of study in machine technique, are here discussed from the standpoint of the mining industry, since the chief phase of the investigation is the depth to which the vibrations penetrate.

It was found that the depth of penetration is much greater than had been anticipated. The discontinuity at the contact of the coal and the tertiary deposits was found to distinctly affect the propagation of the tremors.

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any depth greater than about 80 kilometers or 50 miles. But the support is not proof, nor is any theory of the earth to be absolutely demonstrated. As usual in the leading questions of science, we are pragmatists and search for the theory that works best. The thin-crust theory appears to work best. Yet the chief reason for putting it in the foreground is the fact that it can guide to fruitful research in the future. As never before, the geologist realizes the meaning of the ancient maxim 'deep calleth unto deep,' the need of seeking in the shells and core of the earth explanation for the dramatic changes registered in its relief and visible rocks."

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The first bases the location, partly on arrival times, partly on macroseismic data. The second is based wholly on the microseismic observations. Each yields a value for the velocity of the longitudinal wave in the sub-continental layer. Neither can be used to determine the time at the origin.

It is to be observed that the Geiger method does *not* determine time at the origin although it has regularly been applied as though it does. This point is further discussed in the paper by the same author, reported as No. 1627 of this list.

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The paper presents the data fixing the epicentral time and position of the above earthquake. The depth of focus is found to be 12 km. The Mohorovičić discontinuity, so called, is shown to lie at a depth of only 16 km. in Japan. The velocity of the compressional wave above that discontinuity has the unusually high average value of 6.3 km./sec., the velocity for the same wave below the discontinuity being 7.75 km./sec. The determination of epicentral time permits the author to fix the axis of abscissæ for the *P*-curve which he deduced from the data of the same earthquake and reported in an earlier paper in the same *Bulletin* (No. 1327 of these lists). The *P*-curve, so adjusted, is published in mimeographed form (see No. 1628 of this list). The velocity of the compressional wave about the inner edge of the mantle at its contact with the core was found to be 12.4 km./sec., but the data supporting this deduction, though quite well defined, are meagre.

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"When an earthquake focus is abnormally deep, phases additional to those associated with normal earthquakes are produced by reflexions at points comparatively near the epicentre . . . the surface waves are feebly developed . . . the preliminary phases are comparatively prominent.

"Most of the records examined show these characteristics remarkably well . . . The focal depth has been estimated as 300 km. below the earth's surface.

"The time-distance observations of the phases have been compared with the calculated curves based on the Zoeppritz-Turner tables . . . and with Jeffrey's revised tables . . .

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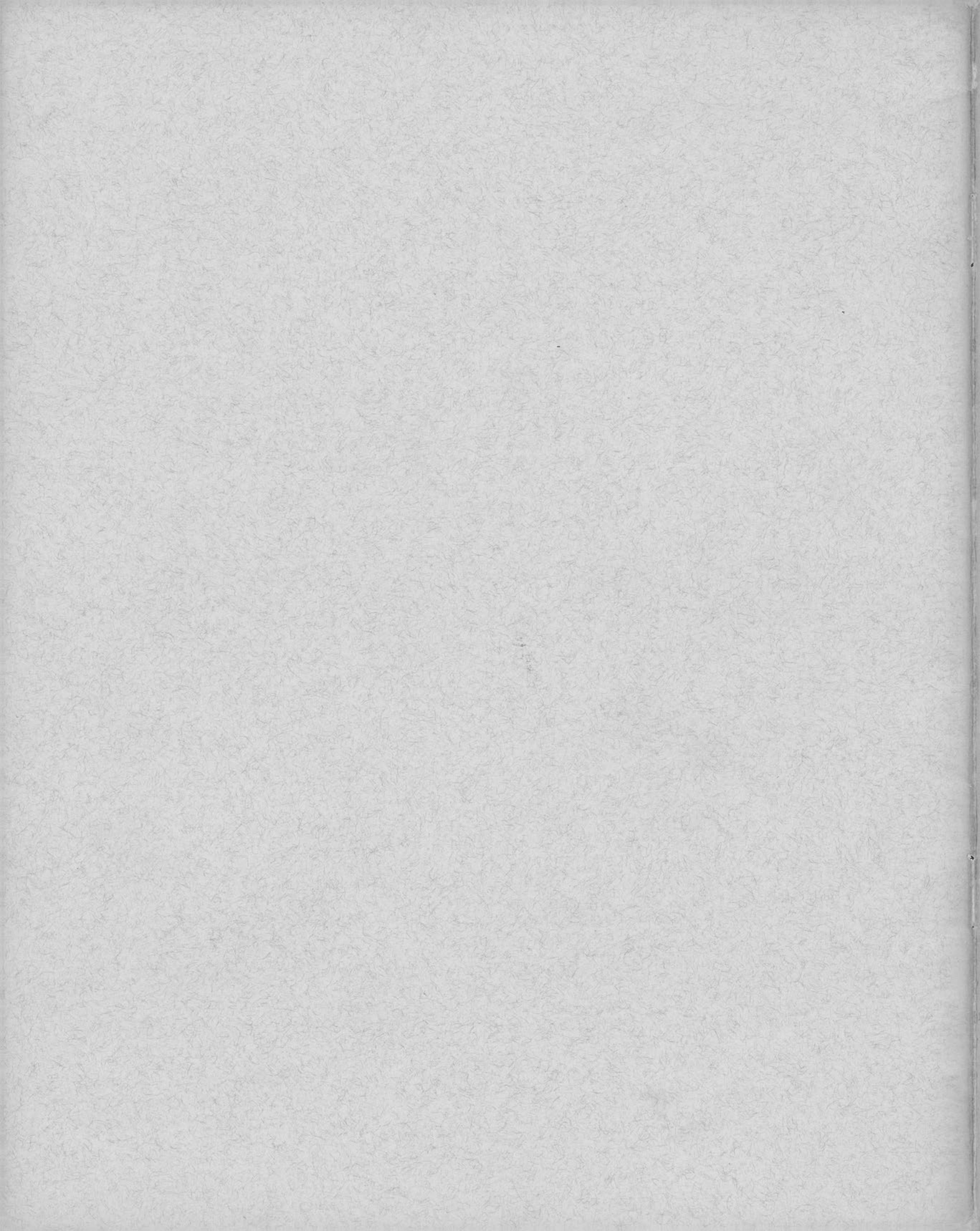
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It is interesting to compare the above estimated loss with the estimate made by the late John R. Freeman as to the total loss due to earthquake damage in the United States and Canada during the past 100 years (1932). The figures are given on page 663 of his "Earthquake Damage and Earthquake Insurance," (see No. 1316 of these lists) as \$40,000,000. Yet we have here an earthquake, which is relatively unimportant as an earth tremor, but which occurred in a region where poor construction was prevalent and which resulted in damage greater than that caused by all earthquakes which have preceded it in the United States and Canada! Surely this is a most important example of the fact that earthquakes are becoming of increasing economic importance as our relatively unimportant but actively seismic regions are being built up. The fact that well-constructed buildings suffered almost no loss even at Long Beach, the centre of the disturbance, is also most suggestive. E. A. H.

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J. F. S.

1721. FERRAR, H. T., "The Murchison (N.Z.) Earthquake, 1929," *The Geological Magazine*, No. 789, **67**, 132-134, London, March, 1930. J. B. M.

1722. FUJIWHARA, S., "On the Mechanism of North Izu Earthquake," *Geophysical Magazine*, **5**, No. 2, 171-172, 1 figure, 2 plates, Tokyo, September, 1932. T. O.

- GABRIEL, V. Gavrilovich and SLICHTER, L. B., "Studies in Reflected Seismic Waves: Part I." See No. 1787 of this list.

1723. GEBELEIN, H., "Störungen von Pendeluhren durch Bodenerschütterungen," *Astronomische Nachrichten*, No. 5931, **248**, 33-42, 1 figure, Hamburg, February 15, 1933.

- GÉNAUX, L. and BRAZIER, C. E., "Quelques remarques concernant le séisme du 2 mars 1933." See No. 1711 of this list.

1724. GEOFFROY, P. and CHARRIN, P., "Études géologiques et prospections minières par les méthodes géophysiques," *Bulletin du Service de la Carte Géologique de l'Algérie*, Series 4, Géophysique, No. 1, 346 pages, 103 figures, Algiers, 1932.

A review of this book, criticizing the seismological side of the above treatise, appears on pages 444-445 of the *Bulletin of the American Association of Petroleum Geologists*, **17**, No. 4, Tulsa, April, 1933. The review is signed by L. Y. Faust of the Geophysical Research Corporation.

1725. GHERZI, E., S.J., "Nota su una onda lunga, all'inizio delle onde P e delle onde S," *Atti della Pontificia Accademia delle Scienze Nuovi Lincei*, **85**, 389-392, Rome, 1932.

1726. GLENNIE, E. A., "Gravity Anomalies and the Structure of the Earth's Crust." Survey of India, Professional Paper No. 27, 1-35, 7 charts. Price one rupee and eight annas or two shillings and six pence. Dehra Dun, 1932.

The introduction reads: For three years preceding this report an attempt was made to "derive a gravity anomaly (in India) which would show a satisfactory correlation with superficial geological conditions, a correlation which the usual Hayford gravity anomalies had almost entirely failed to show. . . . The conclusions reached are completely opposed to the Pratt system of isostasy and only to a limited extent favourable to isostasy on the Airy system. Indeed the general appearance of isostatic conditions, which has so captivated the scientific world, appears to be mainly due to a somewhat fortuitous concomitance of circumstances. It is desirable to emphasize this point strongly since India is the birthplace of the theory of isostasy and it is widely believed that the theory of isostasy is supported by gravity and deflection results in India. This is not the case."

In his preface the author states: "The views expressed in this paper are mine and do not necessarily represent the accepted opinion of the Survey of India."

— GLOVER, P. W., "Tables for Facilitating the Solution of Wiechert's Equation." See No. 1769 of this list.

1727. GREEN, Norman B., "Reinforced Concrete in the Long Beach Earthquake," *Engineering News-Record*, **110**, No. 18, 560-562, 2 illustrations, New York, May 4, 1933.

The author, who is a consulting engineer of San Francisco, concludes that: "damage, although slight, revealed some weaknesses that can be remedied; beneficial bracing effect of concrete walls is notable."

Attention may here be drawn to two short unsigned notes in the same issue of the *Engineering News-Record*, pp. 569-570: "School Building in California to be Regulated by the State," and "Masonry Code at Long Beach Revised by Inspector's Order."

1728. GUTENBERG, B., "Structure of the Earth's Crust as Derived from Seismograms," *Bulletin of the Geological Society of America*, **43**, No. 1, 236-237, Washington, 1932.

This paper was presented at the thirteenth annual meeting of the Cordilleran Section of the Geological Society of America, held at Pasadena, Cal., March 6-7, 1931. The abstract of the paper, published in the *Bulletin* of the society mentioned, reads as follows: "The waves starting from the epicentre of an earthquake follow different paths through the interior of the earth. If we have a certain number of diagrams from the neighbourhood of an epicentre we can calculate the velocities of the waves in the different layers, the thickness of these layers and their elastic constants. By comparing these values with those found in laboratories we can make some statements on the material of the different layers of the earth's crust. Results for different regions of the earth are given."

F. W. L.

— HANSELL, J. M. and BRANNER, George C., "Earthquake Risks in Arkansas." See No. 1710 of this list.

1729. HAYATA, Koti, "Note on the Destructive Earthquake of Hyuga-nada on November 2nd., 1931," *Geophysical Magazine*, **6**, No. 4, 363-369, 3 figures, Tokyo, March, 1932.

T. O.

1730. (1) HECK, N. H., "Structural Hazard of Earthquakes Measured by New Instruments," *Engineering News-Record*, **109**, No. 10, 288-289, 3 figures, New York, September 8, 1932.

(2) HECK, N. H., "Strong-motion Records of Long Beach Earthquake," *Ibid.*, **110**, No. 14, 442-443, 1 figure, New York, April 6, 1933.

The first of the above papers reports the construction and placement of strong-motion seismographs to record earthquake motions close to the epicentre for the information of engineers. The second paper reports the records obtained from the Long Beach earthquake of March 10, 1933. See also an editorial on page 444 of the issue indicated in the second reference.

1731. HEILAND, C. A., "Announcement of the Series of Publications of the Department of Geophysics at the Colorado School of Mines," *Quarterly of the Colorado School of Mines*, **27**, No. 3, 5-9, Golden, July, 1932.

C. A. H.

1732. HEILAND, C. A., "Einige neuere Anwendungen der Geophysik bei Talsperren-und Grundwasser-Problemen," *Geologische Rundschau*, **23a**, Salomon-Calvi-Festschrift, 279-303, Berlin, 1932.

Pages 296-298 are devoted to the subject "Seismische Refraktionsmethoden." The paper is No. 44 of the *Publication Series of the Department of Geophysics of the Colorado School of Mines*.

C. A. H.

1733. HEILAND, C. A., "Geophysical Methods of Prospecting: Foundation of Methods and Results of Their Application in the United States" (in Russian). State Scientific and Technical Publishing Office, 161 pages, 93 figures. Price 3.25 roubles. Moscow-Leningrad, 1932.

A translation into Russian of the book "Geophysical Methods of Prospecting: Principles and Recent Successes," with adaptation of some parts of the original (see No. 125 of these lists): In addition, a translation into Russian of the paper by John J. Jakosky, "Inductive Method of Geophysical Prospecting." N. V. R.

1734. (1) HIDAOKA, Koji, "Tidal Oscillations in a Rectangular Basin of Variable Depth (Second Paper) (Problems of Water Oscillations in Various Types of Basins and Canals—Part VI)," *Geophysical Magazine*, 5, No. 3, 265-271, Tokyo, December, 1932.

T. O.

- (2) HIDAOKA, Koji, "A Practical Method of Integrating Chrystal's Seiche Equation," *Ibid.*, 5, No. 3, 273-281, 1 figure, Tokyo, December, 1932. T. O.

- (3) HIDAOKA, Koji, "Theory of Uninodal Longitudinal Seiche in Lake Yamanaka," *Ibid.*, 5, No. 3, 283-291, 4 figures, 3 tables, Tokyo, December, 1932. T. O.

1735. HILLER, W. H., "Seismische Berichte der Württembergischen Erdbebenwarten, 1932," *Meteorolog-geophysikalische Abteilung des Württembergischen Statistischen Landesamts*, Parts I-III, 1-62, Stuttgart, January, 1933.

In addition to the reports of the records obtained at Württemberg an account is given of a method of improving the time marks on the seismograms and also a report on the registration of S-waves at distances greater than 10,000 km. W. H. H.

1736. (1) HONDA, H., "On the Initial Motion and the Types of the Seismograms of the North Idu and the Ito Earthquakes," *Geophysical Magazine*, 4, No. 3, 185-213, 17 figures, 8 tables, Tokyo, December, 1931. T. O.

- (2) HONDA, H., "On the Types of the Seismograms and the Mechanism of Deep Earthquakes," *Ibid.*, 5, No. 4, 301-324, 12 figures, 10 tables, Tokyo, December, 1932.

An appendix on pages 325-326 presents a note by the same author with the title: "The Mechanism of Shallow Earthquakes and the Stress in the Upper Layer of the Earth Crust." The original paper with this title was reported as No. 1630 of these lists. T. O.

- (3) HONDA, H., "A Note on the Anomaly of the Velocity of the Seismic Waves," *Ibid.*, 6, No. 2, 189-192, 5 figures, 2 tables, Tokyo, March, 1932. T. O.

1737. HUBER, Walter L., "Long Beach Earthquake Emphasizes Known Facts," *Engineering News-Record*, 110, No. 15, 474-475, 5 illustrations, New York, April 13, 1933.

The article shows that the damage caused by the above-mentioned earthquake was confined almost wholly to structures of faulty design lacking unity and strength. W. W. D.

1738. IMAMURA, Akitune, "On Crustal Deformation in West-central Kii Peninsula," *Proceedings of the Imperial Academy*, 9, No. 2, 39-42, 4 figures, Tokyo, February, 1933.

1739. IMAMURA, Akitune, "On Crustal Deformations Preceding Earthquakes," *Japanese Journal of Astronomy and Geophysics*, 10, No. 2, 81-92, 4 figures, Tokyo, 1933. A. I.

The paper is a brief but comprehensive review of the subject indicated, as studied in Japan. The historical data given are particularly interesting in that records of tilts associated with great earthquakes are extant for most of the great shocks which have occurred in Japan for hundreds of years. The author stresses the desirability of making studies of preseismic tilts in as many active areas as possible.

1740. ISIKAWA, T., "Sound and Seismic Waves Produced by the Eruptions of Mount Asama," *Geophysical Magazine*, 6, No. 2, 193-206, 8 figures, 2 tables, 1 plate, Tokyo, March, 1932. T. O.
- JEFFREYS, Harold, "Further Revision of Seismological Tables." See No. 1769 of this list.
1741. JONGMANS, W. J. and VAN WATERSCHOOT VAN DER GRACHT, W. A. J. M., "Enkele voorloopige beschouwingen omtrent oorzaak en beteekenis van de in November 1932 in Nederland waargenomen aardbevingen (Some Preliminary Considerations as to Cause and Significance of the Earthquakes which have been Observed in November, 1932, in the Netherlands)," *Jaarverslag over 1931 van het Geologisch Bureau voor het Nederlandsche Mijngedebied* (Annual Report of the Geological Bureau), 51-53, Heerlen, South Limburg, 1931.
The authors consider the earthquake to be only a result of the normal (vertical ?) movement of the underground. J. F. S.
1742. KATO, Yosio, "Seismic and Volcanic Activities and Changes in the Earth's Magnetic Field," *Japanese Journal of Astronomy and Geophysics*, 10, No. 2, 249-262, 13 figures, Tokyo, 1933.
1743. KEMMERLING, G. L. L., "De aardbeving van Maos op 9-10 September 1916 (The Earthquake of Maos on September 9-10, 1916)," *Jaarboek van het Mijnwesen, Verhandelingen*, 45, No. 2, 11-24, Batavia, 1916.
An abstract appeared in *Geologisches Zentralblatt*, No. 502, 24, 177, Berlin, 1919-20.
A paper by the same author and on the same subject was published in *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, 77, 168-171, Weltevreden, isle of Java, 1918, of which an abstract was published on page 416 of *Geologisches Zentralblatt*, No. 1299, 25, Berlin, 1920. J. F. S.
1744. KOCH, H. W. and ZELLER, W., "Zur Theorie der Schwingungsmesser," *Zeitschrift für Instrumentenkunde*, 53, Heft 2, 64-70, Berlin, February, 1933.
An abstract by F. K. Harris appears on page 235 of the *Review of Scientific Instruments*, 4, No. 4, New York, April, 1933.
1745. KODAIRA, Y., "Investigation of the Method of Obtaining the Depth of the Seismic Focus and of the Velocities of Seismic Waves from the Observed Data (First Part)," *Geophysical Magazine*, 5, No. 2, 97-121, Tokyo, September, 1932. T. O.
1746. KOENUMA, K., "On the Surface Waves of the Sea," *Geophysical Magazine*, 5, No. 3, 245-263, 3 figures, Tokyo, December, 1932. T. O.
1747. (1) KUNITOMI, S. I., "Note on the Dzungaria Earthquake of August 10, 1931," *Geophysical Magazine*, 4, No. 3, 225-229, 3 figures, Tokyo, December, 1931. T. O.
(2) KUNITOMI, S. I., "Propagation of Seismic Wave in Japan: Abstract of Seventh Report," *Ibid.*, 6, No. 2, 207-211, 3 figures, Tokyo, March, 1932. T. O.
1748. LAKE, Philip, "Gutenberg's Fliesstheorie; a Theory of Continental Spreading," *The Geological Magazine*, No. 825, 70, 116-121, 1 figure, London, March, 1933.
The author reviews the theory put forward by Gutenberg in his articles in *Beiträge zur Geophysik*, 16, 239-247, and 18, 281-291 (reported as Nos. 522 and 737, respectively, of the old series of this *Bibliography*) to take the place of the theories of Wegener and Köppen. His object is "simply to introduce to the notice of English geologists the suggestions of a well-known geophysicist."
1749. LAMP, Irwin E., "Oil Industry Preparing Fine Exhibit for World's Fair," *The Pure Oil News*, 15, No. 10, 10-11, 3 figures, Chicago, March, 1933. C. A. H.

1750. LANDSBERG, H., "Zur Seismizität des Mainzer Beckens und seiner Randgebirge," *Gerlands Beiträge zur Geophysik*, **38**, Heft 2, 167-171, 2 figures, 1 table, bibliography, Leipzig, 1933.

The author's summary reads: "The earthquakes of Gross-Gerau from 1869 to 1871 were followed by a second seismic period lasting from February to August, 1871. The 119 shocks of this period, the focus of which was situated at the border of the Odenwald, show a diurnal variation with a maximum during the night. Based on 109 isoseist-maps of earthquakes from the Mayence district, the Taunus, and the Odenwald, a map was constructed showing the seismic structure of this country." H. L.

- LARSEN, Palmer, "Index to Geophysical Abstracts No. 33 to No. 44." See No. 1751 of this list.

1751. LEE, Frederick W., "Geophysical Abstracts." United States Bureau of Mines: No. 45, 680-729, January; No. 46, 730-756, February; No. 47, 757-782, March; No. 48, 783-805, April; Washington, 1933.

No. 45 contains an index to Nos. 33-44, compiled by Palmer Larsen. F. W. L.

1752. LEE, S. P., "Note on the Earthquake of August 10, 1931," *Seismological Bulletin of the Chiufeng Seismic Station*, **2**, Nos. 3 and 4, 51-60, 4 figures, Peiping, September, December, 1932.

The note presents the local macroseismic data, the details of the method by which the epicentre was determined from the microseismic reports, and discusses the probable depth of focus and the geological significance of the earthquake. *The Seismological Bulletin from Chiufeng* is issued by the Geological Survey of China. Beginning with Volume 3, it will appear in two semi-annual printed instalments, the monthly reports being issued in mimeographed form.

1753. LEROLLAND, Paul and SORIN, Pierre, "Sur une nouvelle méthode de détermination des modules d'élasticité," *Comptes rendus*, **196**, No. 8, 536-538, Paris, February 20, 1933.

1754. LETTAU, Heinz, "Freie Schwingungen (Seiches) des Kurischen Haffes," *Schriften der Physikalisch-ökonomischen Gesellschaft zu Königsberg i. Pr.*, **67**, Heft 3-4, 63-73, 6 figures, Königsberg, 1932.

1755. LINDGREN, Waldemar, *et al.*, "Annotated Bibliography of Economic Geology for 1932," Vol. 5, No. 1, 1-228, Washington, January, 1933.

The *Bibliography* is prepared under the auspices of the National Research Council, U.S.A. It is published by the Economic Publishing Co., Urbana, Ill. Subscription price \$5.00 per year, \$3.00 per single issue. Annotations to be sent to Waldemar Lindgren, Massachusetts Institute of Technology, Cambridge, Mass. Subscriptions to be sent to the publishers.

Following a list of the journals consulted (in itself a valuable reference) the above issue reports a total of 1309 entries arranged under subject headings. A very complete index is provided. Geophysical prospecting papers appear in the range Nos. 1144 to 1309 inclusive.

1756. LOOS, P. A., "Beitrag zur Erklärung der argentinisch-chilenischen Erdbeben zwischen 27 und 33° südlicher Breite: Teil I," *Gerlands Beiträge zur Geophysik*, **38**, Heft 3-4, 321-338, Leipzig, 1933. W. W. D.

1757. MACELWANE, James B., S.J., "Earthquakes—What Are They?" *Scientific Monthly*, **36**, No. 8, 457-460, New York, May, 1933.

The above reports the text of a radio talk presented by Dr. Macelwane under the auspices of Science Service, on April 28, 1933.

1758. MARTIN, H., "Die Genauigkeit von Pendelkontakten und der Einfluss des Steigrades einer Pendeluhr auf die Schwingungsdauer des Pendels," *Zeitschrift für Geophysik*, **9**, Heft 1-2, 83-87, 3 figures, Braunschweig, 1933. A. S.

— MAURAIN, Ch., "Le séisme du 2 mars 1933." See No. 1711 of this list.

1759. MEINESZ, F. A. V., "Gravity in the Atlantic Area," *Proceedings of the Koninklijke Akademie van Wetenschappen te Amsterdam*, **35**, No. 9, 1143-1149, Amsterdam, 1932.

The paper reports the observations made on the gravity anomalies in the Atlantic in the summer of 1932, by means of the Meinesz pendulum apparatus mounted in a submarine. A short review appears in *Science Abstracts*, Section A, Physics, **36**, No. 423, Item 979, pg. 243, London, March, 1933.

1760. MEISSER, O., "Das logarithmische Dekrement von Pendeln," *Zeitschrift für Geophysik*, **9**, Heft 1-2, 88-90, 1 figure, Braunschweig, 1933. A. S.

1761. MOTHES, H., "Zu den Bemerkungen von W. C. Salm über die Arbeit von H. Mothes über die Bestimmung der Eisdicke am Hintereisferner," *Gerlands Beiträge zur Geophysik, Ergänzungshefte für Angewandte Geophysik*, **3**, Heft 2, 211-216, Leipzig, 1933.

The above presents a reply to comments by Salm regarding the work reported by Mothes in a previous article listed as No. 464 in this *Bibliography*. The paper by Salm is reported in this issue as No. 1780. The discussion deals with the possibility of determining, among the many reflections received from the ice by the seismic method of determining the thickness of the glacier, that reflection which proceeds from the ice-rock contact.

1762. NAGAOKA, Hantaro, "Fluctuations in Secular Variation of the Rotation of the Earth and Volcanic Eruptions," *Proceedings of the Imperial Academy*, **9**, No. 2, 35-38, Tokyo, February, 1933.

1763. NAKANO, H., "Some Problems Concerning the Propagations of the Disturbances in and on Semi-infinite Elastic Solid," *Geophysical Magazine*, **2**, No. 4, 189-348, 18 figures, 24 tables, Tokyo, February, 1930. T. O.

1764. NAVARRO NEUMANN, M. Ma. S., S.J., "Notas sismológicas y volcanológicas (primer semestre de 1932)," *Ibérica*, No. 960, 8 pages in reprint, 8 illustrations, Barcelona, January 21, 1933. N. N.

1765. (1) NILSSON, Gerhard, "Die Temperaturen im Weltraume," 8 pages, Stockholm, 1932.

G. N.

- (2) NILSSON, Gerhard, "Der Bau des Universums," 16 pages, Stockholm, 1933.

G. N.

The above booklets (5" x 7") are copyrighted and appear to have been printed privately.

1766. NISHKIAN, L. H., "High Seismic Factors in Recent Earthquake," *Engineering News-Record*, **110**, No. 15, 476, New York, April 13, 1933.

Rough calculations on damaged tension members in some structures indicate possible horizontal acceleration of 0.2 g. or more (Long Beach earthquake of March 10, 1933). W. W. D.

1767. NOLKE, Friedrich, "Kritische Rechtfertigung der Kontraktionshypothese," *Gerlands Beiträge zur Geophysik*, **38**, Heft 2, 172-194, Leipzig, 1933.

The author's abstract reads: "The chief objections against the hypothesis of contraction are treated and it becomes evident that they have no conclusive power as they are based on suppositions which either are not confirmed by the observations or are of another nature."

1768. NOTO, Hisashi, "Some Experiments on Earth Current (II)," *Japanese Journal of Astronomy and Geophysics*, **10**, No. 2, 263-303, Tokyo, 1933.

The concluding section states in part: "The probable existence of some relation between the earth potential gradient and the occurrence of earthquakes may be inferred from our present investigation, though the elucidation of the real nature of the relation is left for future investigations."

1769. OBSERVATORY, "Geophysical Discussion," *The Observatory*, No. 707, **56**, 123-125, London, April, 1933.

The note reports the discussion at a meeting on Friday, February 24, 1933, at the rooms of the Royal Astronomical Society. Dr. H. Jeffreys discussed the corrections which he is finding for the *P*-tables. An account was given of a paper by Mr. P. W. Glover on "Tables for Facilitating the Solution of Wiechert's Equation." This equation gives the relation between the statical and dynamical magnifications of a seismograph. Dr. R. Stonely dealt with "The Crustal Warping Hypothesis." It was a discussion of a recent paper by Major E. A. Glennie (reported as No. 1726 of these lists).

1770. OKA, Y., "Note on the Lake Tazawa Earthquake of January 9, 1931," *Geophysical Magazine*, **6**, No. 2, 213-222, 7 figures, 1 plate, Tokyo, March, 1932. T.O.

1771. OXFORD UNIVERSITY, "International Seismological Summary, January, February, March, 1929," pages 1-126, Oxford, 1933.

1772. PAPE, Paul F., "Earthquake Design for Bank Buildings," *Engineering News-Record*, **110**, No. 15, 457-460, 4 illustrations, New York, April 13, 1933.

An article on the application of modern earthquake proof design in constructing four new branches of the Mitsui Bank in Japan. W. W. D.

1773. (1) PASTOR, A. Rey, "El periodo sísmico de 'La Canal de Berdún' (Pirineos) 1923-1925," Publication of the Seismological Station of Toledo, 70 pages, bibliography, numerous illustrations and tables, Toledo, 1931. A. R. P.

- (2) PASTOR, A. Rey, "El Servicio Sismológico Español," *A Terra*, Nos. 1, 2, and 3, 12 pages in reprint, 1 map, 4 illustrations, Toledo, 1931-2. A. R. P.

- (3) PASTOR, A. Rey, "Vulcanismo dos Açôres," *Ibid.*, No. 4, 5 pages in reprint, 2 figures, Toledo, 1932. A. R. P.

- (4) PASTOR, A. Rey, "El Sismo de la Sierra de Lúcar (Granada-Almería)," 17 pages in reprint from *Ibérica*, 11 figures, tables, Toledo, 1933. A. R. P.

1774. PIRSON, Sylvain, "Study of an Adjustable Wave-filter Suitable for the Reception of Reflected Seismic Waves," *Colorado School of Mines Quarterly*, **27**, No. 3, 42-64, 21 figures, 6 tables, bibliography, Golden, July, 1932. C. A. H.

1775. PORUSH, W., "Earthquake Stresses in Rigid Building Frames," *Bulletin of the Seismological Society of America*, **23**, No. 1, 1-12, 3 figures, 3 tables, Stanford, January, 1933.

1776. RAMIREZ, J. Emilio, S.J., "Earthquake History of Colombia," *Bulletin of the Seismological Society of America*, **23**, No. 1, 13-22, 1 figure, bibliography, Stanford, January, 1933.

1777. RICHARDS, T. C., "On the Elastic Constants of Rocks, with a Seismic Application," *The Proceedings of the Physical Society*, No. 246, **45**, Part I, 70-81, 9 figures, 3 tables, London, January 1, 1933.

The author's abstract reads: "The results of a geophysical survey by means of the seismic method over a large oil-bearing limestone structure in southwest Persia indicate that the limestone possesses a higher elastic velocity at its lower boundary than

at its upper. Specimens of the limestone at different depths obtained by coring do not give the same elastic constants when measured by a simple optical method, and the bearing of this result on the practical seismic observation is discussed."

1778. ROTHÉ, E., "Annuaire de l'Institut de Physique du Globe, 1930; deuxième partie—Séismologie," University of Strasbourg, Faculty of Sciences, 101 pages, 1931.

The publication reports the registered earthquakes of 1930 for each of the nine French stations: Strasbourg, Parc Saint-Maur, Alger-Bouzareah, Besançon, Puy-de-Dôme, Marseille, Bagnères-de-Bigorre, Grenoble, and Le Mans. The man-felt earthquakes of France for the same year are reported in tabular form and described in accompanying text.

1779. SAGISAKA, K., "On the Motion of the Seismic Origin of the North Idu Earthquake," *Geophysical Magazine*, 6, No. 3, 223-238, 7 figures, 4 tables, Tokyo, March, 1932.

T. O.

1780. SALM, W. C., "Zu der Arbeit von H. Mothes über die Bestimmung der Eisdicke am Hinter-eisferner," *Gerlands Beiträge zur Geophysik, Ergänzungshefte für Angewandte Geophysik* 2, 401-408, 2 figures, Leipzig, 1932.

For the reply of Mothes to the above criticism by Salm, see No. 1761 of this list.

1781. SCIENCE, "Effects of Earthquakes on Waters of the Earth," *Science*, No. 2001, 77, 9 (Supplement), New York, May 5, 1933.

The short note reports a paper on this subject presented by Captain N. H. Heck, before the American Geophysical Union at their Washington meeting, April 27-29, 1933.

1782. (1) SCIENCE NEWS LETTER, "Scientists, Not Surprised by Earthquakes, Expect Others," *Science News Letter*, No. 623, 23, 163-164, Washington, March 18, 1933.

In addition to describing the Long Beach earthquake of March 10, there is a short account of the new strong-motion accelerometers which are being set up in the seismic areas of California by the United States Government and which registered the Long Beach shock, thus furnishing data of value to engineers.

A map of California, indicating the geological "faults" on which earthquakes have occurred or may be expected to occur, is given on page 188 of *Science News Letter*, No. 624, 23, Washington, March 25, 1933. The map was prepared by H. O. Wood, of the Carnegie Institution of Washington.

- (2) SCIENCE NEWS LETTER, "Death-dealing Quake Was Not a Major Disturbance," *Ibid.*, No. 629, 23, 267 and 269, Washington, April 29, 1933.

A short note on the intensity of the Long Beach earthquake of March 10, 1933.

W. W. D.

- (3) SCIENCE NEWS LETTER, "Alaska Earthquake 'Seen' with Telescope," *Ibid.*, No. 630, 23, 275, Washington, May 6, 1933.

The slow regular oscillations of the level bubble of the telescope at the International Latitude Observatory at Gaithersburg, Md., on the evening of April 26, 1933, were found to have been caused by the earth waves from the Alaska earthquake, of which the epicentre lay about 4,000 miles distant.

1783. (1) SELLARDS, E. H., "The Wortham-Mexia, Texas, Earthquake," *University of Texas, Contributions to Geology, 1932*, Bulletin No. 3201, 105-112, Austin, 1933.

The earthquake had a maximum intensity of V in the Rossi-Forel Scale and was felt within a radius of only fifteen or twenty miles from the origin. It originated along the line of the Wortham-Mexia faults.

- (2) SELLARDS, E. H., "The Valentine, Texas, Earthquake," *Ibid.*, pp. 113-138, Austin, 1933.

The maximum intensity was VIII in the Rossi-Forel Scale and a few buildings were slightly damaged. The shock was felt for a distance of five hundred miles from the origin in a northeasterly direction but, in other directions, the shock was not felt at a distance of more than three hundred miles.

S. T.

1784. SHRADER, J. E., "The Tri-dimensional Vibrograph," *Journal of the Franklin Institute*, **215**, No. 4, 455-469, 17 figures, Philadelphia, April, 1933.
1785. SIEBERG, A., "Zur Mechanik tektonischer Vorgänge," *Zeitschrift der Deutschen Geologischen Gesellschaft*, **84**, Heft 9, 673-676, Berlin, 1932. A. S.
1786. SIEBERG, A., "Beziehungen zwischen Erdbebenforschung und Geologie," *Zeitschrift der Deutschen Geologischen Gesellschaft*, **84**, Heft 9, 737-740, Berlin, 1932. A. S.
1787. SLICHTER, L. B. and GABRIEL, V. Gavrilovich, "Studies in Reflected Seismic Waves: Part I. Some Computations of the Reflection of Seismic Waves at Solid Boundaries," *Gerlands Beiträge zur Geophysik*, **38**, 228-238, 8 figures, Leipzig, 1933.

The authors' abstract reads: "In the first part of this paper, the reflected and refracted seismic waves are computed at three boundaries, chosen to approximate the transitions which are supposed to occur in the upper crust of the earth. In the second part, the influence of an assumed layered crust in contributing to the oscillatory character of the *P* and *S* phases of seismograph records is examined. In many cases the contributions to the surface motion from secondary waves produced by internal reflections in the crust are noteworthy and tend to produce a motion of irregular oscillatory type. Of these secondaries, more than a dozen attain significant amplitudes at parts of the epicentral range. The relative amplitudes of their surface motions and their arrival times are plotted as functions of epicentral distance."

L. B. S.

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W. W. D.

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1795. VAN DIJK, G., "De Aardbevingen in Noord-Brabant van November 1932," *Hemel en Dampkring*, **31**, 5 pages in reprint, De Bilt, January, 1933. G. v. D.
- VAN WATERSCHOOT VAN DER GRACHT, W. A. J. M. and JONGMANS, W. J., "Some Preliminary Considerations as to Cause and Significance of the Earthquakes which have been Observed in November, 1932, in the Netherlands." See No. 1741 of this list.
1796. VISSER, S. W., "Vulkanische Verschijnselen en Aardbevingen in den Oost-Indischen Archipel, waargenomen gedurende het Jaar 1931," *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, **92**, No. 2, 48 pages, Batavia, 1932.
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The sub-heading of the above article reads: A suggested deduction based on a controlling maximum ground velocity for all periods in a given disturbance. W. W. D.
1800. WILLIS, Bailey, "Studies in Comparative Seismology," *Carnegie Institution of Washington, Year Book No. 31*, 372-377, Washington, 1932.
- ZELLER, W. and KOCH, H. W., "Zur Theorie der Schwingungsmesser." See No. 1744 of this list.

Erratum:

Item No. 1695, reporting the *International Seismological Summary* for October, November, December, 1932, was inadvertently entered in the name of Dr. Whipple, who wrote the introduction to that particular issue. It should have been entered in the name of Oxford University, as is done with Nos. 1561 and 1771, reporting issues published since the death of Prof. H. H. Turner. The work in connection with the *Summary* is all done at the University Observatory, Oxford.

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The initials appended to various items throughout the *Bibliography* indicate, in each case, the contribution by the respective collaborator.

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Vol. X

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No. 19

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The bulletin contains the theses of some of the papers read before the above-mentioned session held in Leningrad, 2-8 September, 1931. Among the foreign scientists present were Prof. E. Rothé, Prof. G. Angenheister, Prof. A. Born, and Prof. H. Stille. The bulletin contains also the thematic plan of the Seismological Institute for 1932, which was submitted for discussion by the session.

N.V.R.

1802. AGAMENNONE, G., "Considerazioni sopra gli ipocentri sismici dei Colli Laziali," *Rendiconti della Real Accademia Nazionale dei Lincei, Classe di Scienze fisiche, matematiche e naturali*, 17, Semi-fascicolo 9, 725-729, Rome, May, 1933.

G.A.

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The author states that this mathematical treatment of Love-waves has been developed to explain certain aspects of these waves as due to the fault at which they were generated.

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The author stresses the need for having a large volume of observational material before deductions may profitably be made therefrom by statistical methods.

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This section of the *Handbuch*, published by Gebrüder Borntraeger, is priced (unbound) at RM 69. The price for this section, if the entire *Handbuch* is subscribed for, is RM 46. A review, in German, appears on pages 171-172, *Zeitschrift für Geophysik*, 9, Heft 3, Braunschweig, 1933.

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The paper deals with the causes of volcanism and earthquakes, the distribution of epicentra of earthquakes, and the relation between earthquakes and the movements of the ridges of the islands.

J.F.S.

— BUCKINGHAM, F. and FRITH, J., "Vibration in Technics." See No. 1817 of this list.

1807. BUSS, E. T., "Beitrag zur Berechnung von konstanten der Galitzinschen aperiodischen Seismographen" (in Russian), Academy of Sciences of the U.S.S.R., *Publications of the Seismological Institute*, No. 8, 1-11, Leningrad, 1930.

The author compiles special tables permitting a very quick calculation of constants of Galitzin's aperiodic seismographs, thus regulating their values according to the magnitude desired during the observation then in progress. N.V.R.

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This book is a revision, completely rewritten, of the author's "Igneous Rocks and their Origin". Some of the principle features of the new book, among those indicated by the publishers, may be listed as follows:

(1) The author has taken pains to present the mass of objective facts and the theoretical deductions so as to permit the work to be used as a textbook on igneous geology, while also serving to describe, for more advanced students, a general theory of the earth's eruptivity; (2) New emphasis has been placed on the various methods of diagnosing the earth-shells in depth, and on the problem represented by the radioactivity of rocks; (3) Recent discoveries bearing on the theory of mountain making have enforced new ideas concerning the modes by which molten rock has risen into and through the earth's crust; (4) The book bears the general thesis that an acceptable explanation of igneous rocks should be consciously related to a general "theory of the earth", that is, to the best available idea of its internal constitution and store of energy. This theory is tested by systematic reference to observed results of the planet's eruptivity. McG-H.

1809. DAVISON, Charles, "The 42-minute Period in the Frequency of After-shocks," *Bulletin of the Seismological Society of America*, 23, No. 2, 57-79, Stanford, April, 1933.

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On March 28, 1931, the Federal Board of Standardization issued an intensity scale obligatory for all the constructions undertaken after April 1, 1931. The scale is but that of Mercalli-Cancani with some modifications in the text and completed by some data in conformity with construction types in use in seismic regions of the U.S.S.R. N.V.R.

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A translation into Russian of the English book entitled "Vibration in Engineering." N.V.R.

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See also No. 1723 of these lists.

1819. GEOPHYSICAL ABSTRACTS. The following patents of interest to seismologists are listed on pages 851-853 of *Geophysical Abstracts*, No. 50 (reported as No. 1838 of this list):

McCOLLUM, Burton, U.S. No. 1,899,970, issued March 7, 1933, "Seismic Exploration of Geologic Formations."

HAYES, Harvey C., U.S. No. 1,900,015, issued March 7, 1933, "Method and Apparatus for Sound Ranging."

STANDARD OIL DEVELOPMENT Co., Canada No. 328,707, issued December 20, 1932, "Geophysical Exploration Method." F.W.L.

1820. GOLD, S., "The Earthquakes of October, 1931, in the Solomon Islands," *Journal of the Royal Astronomical Society of Canada*, 26, No. 7, 291-295, 2 figures, Toronto, September, 1932.

The material upon which this paper is based was furnished in large part by Dr. J. Svensen of Ovi Harbour, Guadalcanal.

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— HAYES, Harvey C., "Method and Apparatus for Sound Ranging." Patent. See No. 1819 of this list.

1823. HECK, N. H., "The Seismicity of the United States," *Matériaux pour l'Étude des Calamités* No. 29, 1-22, 1 map, Geneva, 1933.

The author discusses the seismicity by sections as follows: New England and New York Section; Eastern Section; Central Section; Western Mountain Section; Pacific Coast Section. Subdivision of these sections into a total of thirty-seven regions permits of thorough analysis. The generalizations are presented in the Conclusions. A review in French follows the paper itself.

1824. HEILAND, C. A., "Über die seismische Reflexions-methode," *Gerlands Beiträge zur Geophysik, Ergänzungshefte für Angewandte Geophysik*, 3, Heft 3, 282-336, 9 figures, bibliography, Leipzig, 1933.

The author discusses the advantages of the reflection method over the refraction method. The characteristics of the reflected phases are outlined. Particular problems arising in the application of the reflection methods are dealt with in detail. The geological possibilities and limitations of the method are reviewed, with special reference to its application to the northern German plain. The equipment now available for such work is described and a list is given of the United States patents covering such equipment.

W.W.D.

— HORNER, A. C. and WAILES, C. D., Jr., "Earthquake Damage Analysed by Long Beach Officials."

See No. 1891 of this list.

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1826. IMBO, Giuseppe, "Riassunto delle osservazioni meteorologiche e sismiche eseguite nel Real Osservatorio Geofisico di Catania durante l'anno 1931," *Atti della Accademia Gioenia di Scienze Naturali in Catania*, Series 5a, 19, Fascicolo 1, Memoria IV, 1-6, Catania, 1932.

In 1931, a total of ninety-five earthquakes were registered, of which ten were associated with the seismic period from March 20 to August 12 in the east Aetna region. The bibliography gives references to other seismological publications by the same author.

R.Z.

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The authors have determined the above-mentioned limits by experimenting with persons seated on shaking platforms.

1829. IVERSKOY, P. N., "Lectures in Geophysics" (in Russian). State Publishing Office, 568 pages, Moscow-Leningrad, 1930.

The book is practically the only Russian text in Geophysics. Chapter IV, "Seismic Phenomena," deals with seismology and contains general information on earthquakes, principles of the theory of elasticity and their application to the study of the propagation of seismic waves, the theory of instruments, and so on. The chapter ends with an extensive bibliography of seismology. In addition, the *Lectures* examine the properties of the earth, its origin, its magnetic and electric fields, as well as atmospheric magnetism and electricity. Chapters X to XIII were written jointly by the above author and A. M. Troitzk. They deal with the thermal state of the atmosphere and soil and the dynamics of the atmosphere.

N.V.R.

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The above is No. 9 of the series "Über Erdbebenwellen." The paper by Witte, reported as No. 1600 of these lists, is No. 8 of the series. For a list of the earlier papers see No. 1393 of these lists.

1831. KARATYGIN, P. M., "Average-speed Method in Seismic Prospecting" (in Russian), *Transactions of the United Geological and Prospecting Service of the U.S.S.R., No. 213, 9-13, Leningrad, 1932.*

The method is to be used in calculating depths in seismic prospecting on the basis of average speed and is applied particularly to a three-layer structure in which the speed in the upper layer is less than that in the third but greater than that in the second. The reduction has been tested with known conditions and found to yield correct results. The author's summary is quoted on page 812 of *Geophysical Abstracts, No. 49.* See No. 1838 of this list.

F.W.L.

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A paper by the same author, entitled "De aardbeving van Bali dato 21 Januari 1917" appeared in *Natuurkundig Tijdschrift voor Nederlandsch-Indië, 77, 172-179, Weltevreden (Isle of Java), 1918.*

J.F.S.

1833. KISHINOUE, Fuyuhiko, "Measurement of a Land-creep in Wakayama Prefecture," *Bulletin of the Earthquake Research Institute, 11, Part 1, 38-45, 10 figures, Tokyo, March, 1933.*

1834. KOCH, H. W. and ZELLER, W., "Die Genauigkeit von seismographischen Messungen nichtstationärer Vorgänge," *Zeitschrift für technische Physik, 14, No. 4, 162-165, Leipzig, 1933.*

W.H.H.

1835. KOMOROWICZ, Maurice von, "De aedbevingen in de residentie Menado op 14 Maart 1913" (The Earthquakes in the Residentie of Menado on March 14, 1913), *Jaarboek van het Mijneven: Verhandelingen, 42, 39-50, Batavia, 1913.*

J.F.S.

1836. KUNITOMI, S. I. and SHINOHARA, S., "The Diurnal Variation of Seismic Frequency in the Kwanto District," *Geophysical Magazine, 7, No. 1, 31-35, Tokyo, April, 1933.*

W.W.D.

1837. LANDSBERG, H., "Beitrag zum Thema: Seismische Bodenunruhe," *Zeitschrift für Geophysik*, 9, Heft 3, 156-161, 5 figures, bibliography, Braunschweig, 1933.

1838. LEE, Frederick W., "Geophysical Abstracts," United States Bureau of Mines: No. 49, 806-828, May; No. 50, 829-855, June; Washington, 1933. F.W.L.

1839. LIFSHTZ, Samuel, "Acoustics of Buildings and Their Prevention from Vibration and Noise" (in Russian). State Scientific and Technical Publishing Office, 236 pages, 121 figures. Price 3 roubles. Moscow-Leningrad, 1931.

Chapter VII (187-234) deals with the question of protecting buildings from vibration. It discusses: (1) sensibly-felt vibrations; (2) instruments for measuring vibrations; (3) vibrations in buildings; (4) vibrations in towers; (5) the problem of insulation. N.V.R.

— Loos, P. A., "Las posibles causas del terremoto Sudmendocino del 30 de Mayo de 1929." See No. 1840 (2) of this list.

1840. LÚNKENHEIMER, Federico,

(1) "Resultados sismométricos del año 1927," *Publication of Observatorio Astronómico de la Universidad Nacional de La Plata, Contribuciones Geofísicas*, Tomo III, No. 3, 157-238, La Plata, September, 1931.

(2) "El terremoto Sudmendocino del 30 de Mayo de 1929," *Ibid.*, No. 2, 85-156, 12 plates, La Plata, September, 1930.

On pages 143-154 of the last-listed article appears an appendix by P. A. Loos, entitled: "Las posibles causas del terremoto Sudmendocino del 30 de Mayo de 1929". W.W.D.

1841. MACELWANE, James B., S.J., "A Preliminary Table of Observed Travel Times of Earthquake Waves for Distances between 10° and 180° Applicable Only to Normal Earthquakes," A mimeographed set of ten pages, issued from the Geophysical Laboratory, Saint Louis University, June, 1933.

The above tables are based on the readings obtained by Hodgson for the Tango earthquake; those obtained by Dahm for the Hawke Bay earthquake, and those obtained by Wood for the Long Beach earthquake. The author has amended the mimeographed set of tables which he issued in April, 1933, based on the readings for the first two earthquakes mentioned above, to conform to the requirements of the readings for the Long Beach earthquake, which have since become available. These later readings supply data for a section of the curves for which readings from the records of the other earthquakes were lacking.

1842. MALINOVSKI, N. V., "Submarine Eruptions in the Caspian Sea" (in Russian with a brief summary in German), *Transcaucasian Regional Magazine*, Series A, Natural History, 1, 192-202, 3 figures, Tiflis, 1930.

The author describes two submarine eruptions (May 1, 1927 and November 7, 1928) on the Kuman bank (Baku archipelago) which caused the formation of an island. During the former, the seismic station Baku recorded 41 shocks (April 30-May 7, 1927). N.V.R.

— MASUDA, K., WADATI, K., and SAGISAKA, K., "On the Travel Time of Earthquake Waves: Part I." See No. 1890 of this list.

- McCOLLUM, Burton, "Seismic Exploration of Geologic Formations." Patent. See No. 1819 of this list.
1843. MEINESZ, F. A. Vening, "The Mechanism of Mountain Formation in Geosynclinal Belts," Proceedings: *Koninklijke Akademie van Wetenschappen te Amsterdam*, 36, No. 4, 372-377, Amsterdam, 1933.
1844. MICHAEL, Wilhelm, "Die Erde, gebremst, beschleunigt, abgelenkt,—erlebt Erdbeben, Taifune, Tornados, usw.," *Zeitschrift für Geophysik*, 9, Heft 3, 165-167, 4 figures, Braunschweig, 1933.
1845. MIGLIORINI, Elio, "Bibliografia geografica della regione Italiana," *Bollettino della Real Società Geografica Italiana*, Series 6, 9, No. 12, 819-962, Rome, December, 1932.
- On pages 853-857 are given the data regarding twenty-four Italian publications on earthquakes. R.Z.
1846. (1) MONTOULIEU, E. I., "Sismologia mundial en 1931 y notas sobre el terremoto de Santiago de Cuba de Febrero 3 de 1932," *Revista de la Sociedad Cubano de Ingenieros*, 25, No. 1, 196-252, 1933.
- Brief discussion of causes of earthquakes, their registration on seismographs and of the phenomena accompanying strong shocks; followed by a list of earthquakes registered in 1931 and a brief note on the earthquake of Santiago de Cuba, February 3, 1932. S.T.
1846. (2) MONTOULIEU, E. I., "Informe de la comision nombrada para el estudio del terremoto de Santiago de Cuba de Febrero de 1932," *Ibid.*, No. 1, 1-79, 1933.
- Following the earthquake at Santiago de Cuba, February 3, 1932, a commission was appointed by the Society of Cuban Engineers to study the earthquake. The first section of the report, which covers the geographical, geological, and seismological aspects of the disturbance, was written by Sr. Montoulieu. Other aspects of the earthquake written by different members of the commission will appear in succeeding numbers of the *Revista*. S.T.
1847. (1) MULLER, J. J. A., "De verplaatsing van eenige triangulatiepilaren in de residentie Tapanoeli, Sumatra" (The Dislocation of some Triangulation Pillars in the Residentie of Tapanoeli, Isle of Sumatra), *Verhandelingen van den Koninklijke Akademie van Wetenschappen*, 1^o Sectie, 3, No. 2, 1-26, Amsterdam, 1895. J.F.S.
1847. (2) MULLER, J. J. A., "Nota betreffende de verplaatsing van eenige triangulatiepilaren in de residentie Tapanoeli, tengevolge van de aardbeving van 17 Mei 1892" (Remarks concerning the Dislocation of some Triangulation Pillars in the Residentie of Tapanoeli, Isle of Sumatra, Caused by the Earthquake of May 17, 1892), *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, 54, 299-307, Batavia and The Hague, 1895. J.F.S.
1847. (3) MULLER, J. J. A., "Door meting bepaalde horizontale bodembeweging op Sumatra" (An horizontal Earth Movement on the Isle of Sumatra, as Ascertained by Measurements), *Tijdschrift van het Koninklijk Nederlandsch Aardrijksk Genootschap*, Second Series, 33, 582-584, Leiden, 1916.

The report of a lecture and the following discussion.

J.F.S.

1848. MUSHKETOFF, D. T., "The Irpinian Earthquake in Italy on July 23, 1930" (in Russian), *Academy of Sciences of the U.S.S.R., Publications of the Seismological Institute*, No. 14, 1-21, 17 figures, Leningrad, 1931.

The paper is accompanied by a summary in Italian with the title: "Il terremoto Irpino del 23 luglio 1930". The author, who visited the region of the earthquake, gives a general description of the destruction and of the geological conditions of the region. Using Oldham's terminology, the author is led to the conclusion that the earthquake is "episeismic" in character, having a very shallow hypocentre. N.V.R.

1849. NAGAOKA, Hantaro, "Variation in the Effective Rigidity of the Earth," *Proceedings of the Imperial Academy*, 9, No. 4, 166-169, Tokyo, April, 1933. W.W.D.

1850. NAGAOKA, Hantaro, "Volcanic Eruptions, Earthquakes, and Pole-shift" (second communication), *Proceedings of the Imperial Academy*, 9, No. 4, 170-173, 2 figures, Tokyo, April, 1933. W.W.D.

1851. NAGAOKA, Hantaro, "Ellipsoidal Geoid and the Distribution of Seismic Centres and Volcanoes" (first communication), *Proceedings of the Imperial Academy*, 9, No. 5, 207-210, 1 map, Tokyo, May, 1933.

1852. NAKANO, Masito, "Die Seiches in gekoppeltes System formenden Buchten," *Geophysical Magazine*, 5, No. 2, 163-170, 3 figures, Tokyo, September, 1932. T.O.

1853. NAKANO, Masito, "Possibility of Excitation of Secondary Undulations in Bays by Tidal or Oceanic Currents," *Proceedings of the Imperial Academy*, 9, No. 4, 152-155, 4 figures, Tokyo, April, 1933. W.W.D.

1854. NATURE. The following short notes of interest to seismologists have appeared recently in *Nature*, London, 1933:

- (1) "Hydraulic Seismographs," No. 3311, 131, 547.
- (2) "Earthquakes in the Holy Land: a Correction," No. 3311, 131, 550.
- (3) "California Earthquake of March 10," No. 3315, 131, 686-687.
- (4) "Alaskan Earthquake of April 26," No. 3318, 131, 757.
- (5) "Geophysical Prospecting," No. 3318, 131, 791.
- (6) "Thickness of Greenland Ice," No. 3318, 131, 807.
- (7) "Earthquakes of Northern Africa," No. 3318, 131, 807.
- (8) "Distribution and Frequency of Earthquakes in Italy," No. 3322, 132, 32.
- (9) "Sea-waves of the Japanese Earthquake of March 2, 1933," No. 3323, 132, 58.

The item last above is covered also in the note referred to in No. 1870 of this list. W.W.D.

1855. NAVARETE, Julio Bustos, "Étude séismologique du Chili," *Union Géodésique et Géophysique Internationale, Section de Séismologie*, Series B, Monographies, Fascicule No. 4, 3-40, Strasbourg, 1933.

1856. NAZAREVSKY, N. V., "The Earthquake in Hermab (May 1, 1929)," *Bulletin de la Société des Naturalistes de Moscou*, Geological Section, New Series, 40, 113-123, 5 figures, 2 plates, Moscow, 1932.

The paper is in Russian with an abstract in English. It deals with the earthquake of the above-mentioned date in the mountain range of Coppet-Dag on the Persia-Turkey border. It was of intensity 9 to 10 in the Rossi-Forel scale. Many changes in ground water resulted, some sources drying up or diminishing, others increasing. The epicentre was found to lie in Persia. R.Z.

1857. NIKIFOROFF, P. M., "Earthcrust and Deformation Therein" (in Russian). State Scientific and Technical Publishing Office, 12 pages. Price 20 cop. Moscow-Leningrad, 1931.

A report by the Director of the Seismological Institute delivered before the extraordinary session of the Academy of Sciences of the U.S.S.R. in Moscow, June 21-27, 1931. N.V.R.

1858. NOPCSA, Franz Baron, "Beziehungen zwischen Luftdruckänderungen und Erdbeben in südeuropäischen, und zwar besonders italienischen Erdbebengebieten," *Gerlands Beiträge zur Geophysik*, 39, Heft 1, 37-57, 1 map, Leipzig, 1933.

The author's abstract reads: "Studying the relationship of earthquake frequency and the changes of air pressure of the two foregoing days it was discovered that, in Italy and on the borders of the Adriatic Sea in some epicentral regions, earthquakes are more numerous when the barometric pressure rises for two days; in other ones, however, when it falls. These two types of epicentra are not dispersed irregularly but arranged in what is called *isoesthetic* regions. In some cases the origin of these regions is due to tectonic movements (overthrust and continental drift); more frequently, however, to the disturbance of isostasy by erosion and sedimentation. Details are visible on the map." W.W.D.

1859. NOTO, Hisashi, "Some Studies on Antenna—Earth Current (I)," *Proceedings of the Physico-Mathematical Society of Japan*, Third Series, 15, No. 3, 135-147, 9 figures, 2 tables, Tokyo, March, 1933.

In the concluding summary, the following appears, "The relation between electric disturbance and the occurrence of earthquakes seems to exist in some measure".

W.W.D.

1860. NUMEROV, B. V., "Application of Geophysical Methods of Prospecting in the Oil Fields in America" (in Russian), *Bulletin of the Geological and Prospecting Service in U.S.S.R.*, No. 11-12, 16-29, Moscow-Leningrad, 1930.

A very interesting report on geophysical work carried out in America during prospecting for oil, as observed by the author during his visit to America (1929-XI-7 to 1930-III-27). Besides a general review, the paper describes the application of geophysical methods in Pennsylvania, Oklahoma and Arkansas, East and West Texas, and California, giving some numerical data referring to parties and the cost of the work. He also dwells upon the value of aero-photo-survey work for prospecting. Finally, he proposes a scheme for a general plan of prospecting for U.S.S.R. (The above reference is furnished by E. A. Koridalin.) N.V.R.

- OOTUKA, Minoru and ISHIMOTO, Mishio, "Détermination de la limite perceptible des secousses." See No. 1828 of this list.

1861. ORDONEZ, Ezequiel, "Seismic Activity in Mexico during June, 1932," *Bulletin of the Seismological Society of America*, 23, No. 2, 80-82, Stanford, April, 1933.

1862. PAFFENHOLZ, K. M., "On the Earthquake of April 27, 1931, in Ordubat and Gherussi Districts, Transcaucasia—Armenia and Azerbaidjan S.S.R." (in Russian), *Bulletin of the Geological and Prospecting Service of U.S.S.R.*, 50, No. 60, 1-3, 1 figure, 1 map, Leningrad, 1931.

The author suggests that the earthquake was caused by block movements of Eocene masses trending northeast. N.V.R.

1863. PONTOPPIDAN, H., "Verslag over de aardbeving op 26 Juni 1914 in de residentie Benkoelen" (Report on the Earthquake on June 26, 1914, in the *Residentie Benkoelen*, Isle of Sumatra), *Jaarboek van het Mijnwezen in Nederlandsch Oost-Indië, Verhandelingen*, 43, 78-85, Batavia, 1914.

In a postscript appearing on pages 86-89, S. Snuyf deals with: "De meest geteisterde plaateen in verband met de terreinformatie" (The Most Devastated Places in Connection with the Character of the Soil). J.F.S.

1864. RAMSPECK, A., "Versuche über Boden- und Gebäudeschwingungen," *Zeitschrift für Geophysik*, 9, Heft 1-2, 44-59, 12 figures, Braunschweig, 1933.

The above is No. 9 of the series: *Seismische Untersuchungen des Geophysikalischen Instituts in Göttingen*. The author shows how the amplitude of the oscillation of a building, caused by the oscillation of the ground, can be calculated for the amplitude and period of the latter, if the function of the magnification of the particular building is known. This magnification is to be obtained experimentally by methods outlined by the author.

1865. REPETTI, William C., S.J., "Philippine Earthquakes: Marine Epicenters, 1920-1929," *Publications of the Manila Observatory*, 3, No. 9, 199-203, with chart, Manila, 1931.

This paper is one of a series comprised in the Report of the Subcommittee on Physical and Chemical Oceanography of the Philippine Islands to the International Committee on Oceanography of the Fifth Pacific Science Congress. See further reference to this report in No. 1872 of this list.

1866. ROTHÉ, E., "Migration des épicentres," *Union Géodésique et Géophysique Internationale, Section de Séismologie*, Series B, Monographies, Fascicule No. 4, 41-73, 1 plate, Strasbourg, 1933.

The study is made with respect to the region of Chili for the years 1913 to 1930.

1867. ROTHÉ, E., "Projet d'ordre du jour; Association de Séismologie de l'Union Géodésique et Géophysique Internationale: Cinquième conférence réunie à Lisbonne le 17 septembre 1933," Annexe I, 1-15, Strasbourg, 1933.

A total of 43 items, papers or subjects for discussion, appear in the program of the Lisbon meeting, for the attention of the Section of Seismology of the International Geodetic and Geophysical Union.

1868. RUTTEN, L. M. R., "Voordrachten over de geologie van Nederlandsch Oost-Indië" (Lectures on the Geology of Dutch East-India), J. B. Wolters, x + 839 pages. Price Fl. 15. Copenhagen and The Hague, 1927

This book contains some general and local remarks on earthquakes and, besides, the following chapters devoted specially to seismology: "Earthquakes in Dutch East-India," 171-182, figures 57-60; "The Seismicity of Borneo," 300-303, figure 86; "The Seismicity of Sumatra—Recent Fractures," 468-469; "Earthquakes in the Minahassa—Their Tectonic Origin," page 588.

The same author published recently the book entitled: "De geologie van Nederlandsch Indië (The Geology of Dutch East-India), N.V.v.h.W.P. van Stockum and Zoon, 218 pages. Price Fl. 2.75 (unbound), Fl. 3.75 (bound). The Hague, 1932.

Chapter V (145-179) deals with: Recent Geological Forces in the Archipelago; Upheavals and Subsidences; Bradyseisms; The Velocity of Denudation; Earthquakes; Volcanism. It contains also some communications on the geographical distribution and the origin of earthquakes. J.F.S.

— SAGISAKA, K., MASUDA, K., and WADATI, K., "On the Travel Time of Earthquake Waves: Part I." See No. 1890 of this list.

1869. SALVATORI, Henry, "Correlation of Reflection Seismograph Records in California," *Bulletin of the American Association of Petroleum Geologists*, 17, No. 3, 257-268, Tulsa, 1933.

Reflection records in California cannot always be correlated on the basis of character, interval, etc. In those areas where the reflecting strata are not persistent or are subject to lateral changes in physical character a knowledge of the slope of the strata is essential for the proper interpretation of the records. A brief outline of a method for determining the dip of a reflecting surface is presented and the manner in which this method may be utilized to aid in the correlation of records is indicated. The major areas of California offering possibilities for reflection work are classified according to their general groups, and typical reflection records secured in an area of each group are reproduced and discussed. (Author's abstract.) F.W.L.

1870. SCIENCE NEWS LETTER, "Prediction of Tidal Wave Forestalls Harbour Damage," *Science News Letter*, No. 633, 23, 335, Washington, May 27, 1933.

An account of the precautions taken at Hawaii after reports had been received of a severe earthquake in Japan. Seismologists A. E. Jones at the Kilauea Observatory and R. V. Woods at Kona issued warnings predicting the time of arrival of the tidal waves at the various harbours to within six minutes. At Kona the maximum wave was about seventeen feet. The note concludes with the remark: "Had it not been for the scientific research investigations carried on by the Hawaiian Volcano Research Association with the co-operation of the United States Geological Survey, serious damage might have occurred."

1871. SEIDLITZ, W. VON, "Der Bau der Erde und die Bewegungen ihrer Oberfläche." Julius Springer, 152 pages. RM 4.80. Berlin, 1933. F.W.L.

1872. SELGA, Miguel, S.J., "The Deeps of the Philippines," *Publications of the Manila Observatory*, 3, No. 8, 189-195, with chart, Manila, 1931.

This is one of a series of papers published by the Manila Observatory as a contribution to the work of the Standing Committee on Oceanography of the Fifth Pacific Science Congress made by the Subcommittee on Physical and Chemical Oceanography of the Philippine Islands. Other papers by the same author of some interest in the field of seismology are: "Historical Notes on the Oceanography of the Philippines," *Ibid.*, No. 1, 7-33; and "Variation of the Temperature of the Sea with Depth in the Philippines," *Ibid.*, No. 4, 143-153. See also No. 1865 of this list.

— SHINOHARA, S. and KUNITOMI, S. I., "The Diurnal Variation of Seismic Frequency in the Kwanto District." See No. 1836 of this list.

1873. SIEBERG, A., "Erdbebenforschung und ihre Verwertung für Technik, Bergbau und Geologie." Gustav Fischer, 144 pages, 52 figures, bibliography. Price (card cover) RM 3.2. Jena, 1933.

This publication is a separate printing from the *Handwörterbuch der Naturwissenschaften* issued by the same publishers. It is in convenient pocket size (5" x 7"), printed on good paper and well illustrated. The text is divided into three main sections: "Geologie und Physik der Erdbeben"; "Erdbebeninstrumente und ihre Verwendung"; and "Geographie der Erdbeben".

— SNUYF, S., "De meest geteisterde plaateen in verband met de terreinformatie" (The Most Devastated Places in Connection with the Character of the Soil). See No. 1863 of this list.

1874. SOKOLOV, P. T.,

(1) "On the Deduction of the Equation of a Horizontal Seismograph" (in Russian), *Transactions of the United Geological and Prospecting Service of U.S.S.R.*, No. 213, 1-8, Leningrad, 1932.

(2) "Contribution to the Problem of Interpretation of the Results of Seismic Surveying for the Case of One Contact" (in Russian), *Ibid.*, No. 213, 20-26, Leningrad, 1932.

(3) "Experimental Application of Artificially Generated Elastic Waves to Problems of Geological Prospecting" (in Russian), *Ibid.*, No. 214, 1-30, Leningrad, 1932.

Abstracts of these papers appear on pages 809-811 of *Geophysical Abstracts*, No. 49. See No. 1838 of this list.

F.W.L.

1875. SPACEK, Josef, "Les tremblements de terre dans la région frontière Silésie-Moravie," *Union Géodésique et Géophysique Internationale, Section de Séismologie*, Series B, Monographies, Fascicule No. 4, 74-90, 7 illustrations, Strasbourg, 1933.

— STANDARD OIL DEVELOPMENT Co., "Geophysical Exploration Method." Patent. See No. 1819 of this list.

1876. STEHN, Ch., "De aardbeving van Maos op 15 Mei 1923" (The Earthquake of Maos on May 15, 1923), *Vulkanologische en Seismologische Mededeelingen van den Dienst van den Mijnbouw in Nederlandsch-Indië*, No. 8, 22-28, Weltevreden, Isle of Java, 1925.

J.F.S.

1877. SVERDRUP, H. U., "Vereinfachtes verfahren zur Berechnung der Druck- und Massenverteilung im Meere," *Geofysiske Publikasjoner, utgitt av det Norske Videnskaps-Akademi i Oslo*, 10, No. 1, 3-9, Oslo, 1933.

1878. TAKAHASI, Ryutaro, "Tilt of the Earth's Crust Observed at the Asama Volcano," *Bulletin of the Earthquake Research Institute*, 11, Part 1, 25-37, 2 figures, Tokyo, March, 1933.

1879. TAMS, E., "Grundzüge der physikalischen Verhältnisse der festen Erde; Erster Teil." Gebrüder Borntraeger, 184 pages, illustrations. Price RM 14. Berlin, 1933.

This volume is one of the series on the geology of the earth being prepared under the editorship of Prof. E. Krenkel of Leipzig. It discusses

(1) the size and shape of the earth and the horizontal and vertical distribution of its surface features;

(2) the constitution of the earth as a whole;

(3) the constitution of the outer portion of the earth;

(4) thermal relations of the earth and its age;

(5) gravity distribution upon the earth and the mass arrangement of its outer part.

F.W.L.

1880. TAMS, E., "Einige Korrelationen zwischen seismischer Bodenunruhe in Hamburg und der Brandung in West-und Nordeuropa," *Zeitschrift für Geophysik*, 9, Heft 1-2, 23-31, 2 figures, Braunschweig, 1933. E.T.
- The correlations made were for the microseisms in Hamburg and the surf on the Scottish-Irish coast, the Norwegian coast, the coast of Jutland, and the German-Baltic sea coast, the period being for the 22 days of strong microseisms (January-February, 1932.) The author finds that the correlation is established for the microseisms at Hamburg and the surf on the coast of Norway.
1881. (1) TAVERNE, N. J. M., "De waarde van tromometerwaarnemingen" (The Value of Tromometer Observations), *De Mijningenieur*, 5, No. 11, 187-190, Weltevreden (Isle of Java), November, 1924.
- The Omori tromometer, which since February, 1924, had been placed on the Merapi, Java, registered at first exclusively tectonic earthquakes. But, in September, 1924, a typical volcanic disturbance was recorded, an exception formally announced by the above publication. J.F.S.
1881. (2) TAVERNE, N. J. M., "De aardbevingen van Wonosobo op 12 Nov. en 2 Dec. 1924" (The Earthquake of Wonosobo, Isle of Java, on November 12 and December 2, 1924), *Vulkanologische en Seismologische Mededeelingen van den Dienst van den Mijnbouw in Nederlandsch-Indië*, No. 8, 1-21, Weltevreden, 1925. J.F.S.
1882. TERADA, Torahiko, "Result of the Precise Levelling along the Pacific Coast from Koti to Kagosima, 1932," *Proceedings of the Imperial Academy*, 9, No. 4, 159-162, 4 figures, Tokyo, April, 1933. W.W.D.
1883. TIMOSHENKO, S., "Vibration Problems in Engineering." State Scientific and Technical Office, 344 pages, 168 figures. Price 3.70 roubles. Moscow-Leningrad, 1931.
- The above is a translation into Russian of the book published in English to which reference was made in No. 892 of these lists. N.V.R.
1884. TROMP, S. W., "Het mechanisme en de oorzaken der gebergtevorming" (The Mechanics and the Conditions of the Origin of Mountains—Mountain-building). Martinus Nijhoff, 137 pages. Price Fl. 5. Gravenhage (The Hague), 1933.
- Chapter III deals with: "Bijdrage voor de verklaring van het probleem der orogenese" (Contribution to the Explanation of the Problem of Mountain-building), pages 92-124.
- It discusses first: "De oorzaken van gebergtevorming en die van haar nevenverschijnselen" (The Conditions of the Origin of Mountains and Those of Annexed Phenomena), pages 92-117.
- Then follows: "De aardbevingswetten" (The Seismological Laws), pages 107-109. This presents an outline of the various forces causing earthquakes. J.F.S.
1885. VAN DIJK, G., "Seismische Registreringen te Heerlen: 1 Mei 1931-30 April 1932; en 20-28 November 1932," *Jaarverslag van het Geologisch Bureau te Heerlen over 1931 (1932)*, 47-50, 1933. G.V.D.
1886. VAN ORSTRAND, C. E., "Some Comments on the Measurement and Interpretation of Deep Earth Temperatures," *Gerlands Beiträge zur Geophysik, Ergänzungshefte für angewandte Geophysik*, 3, Heft 3, 261-281, 14 figures, Leipzig, 1933.

The author's abstract reads, "A brief description is given of the apparatus used by the U.S. Geological Survey and the American Petroleum Institute in conducting recent geothermal surveys. As a result of tests in 700 wells located chiefly in producing oil fields, instances have been found in which the isothermal surfaces rise in passing over salt domes, faults, sand lenses, and structures of large and small closure. In central Oklahoma, there is, in addition to the local variations, a regional variation that seems to be determined largely by the depth to the granite."

1887. VAN WATERSCHOOT VAN DER GRACHT, W. A. J. M.,

(1) "Waar komen de aardbevingen vandaan" (The Origin of Earthquakes), *Nieuwe Rotterdamsche Courant*, December 3, 1932.

(2) "De aardbevingen in ons land" (The Earthquakes in the Netherlands), *Algemeen Handelsblad*, Amsterdam, December 2, 1932.

(3) "Aardbeving in Nederland" (An Earthquake in the Netherlands), *Tijdschrift voor het Onderwijs in de Aardrijkskunde*, 10, No. 11-12, 254-256, Haarlem, December, 1932.

These articles contain some general remarks as to the deeper geology of the Netherlands and present communications on the earthquake of November 20, 1932 (epicentre northeast of the province of North-Brabant). J.F.S.

1888. VASILIEV, M. V., "New Method of Seismic Interpretation" (in Russian), *Transactions of the United Geological and Prospecting Service of U.S.S.R.*, No. 213, 14-19, Leningrad, 1932. F.W.L.

1889. VERBEEK, R. D. M., "Kort verslag over de aardan zeebeving op Ceram den 30sten September 1899" (A Concise Report on the Earthquake and Seaquake on the island of Ceram, September 30, 1899), *Natuurkundig Tijdschrift voor Nederlandsch-Indië*, 60, 219-228, Weltvreden, Isle of Java, and Amsterdam, 1901. J.F.S.

1890. WADATI, K., SAGISAKA, K., and MASUDA, K., "On the Travel Time of Earthquake Waves: Part I," *Geophysical Magazine*, 7, No. 1, 87-99, Tokyo, April, 1933.

Part II of the same paper, written by K. Wadati alone, appears on pages 101-111 of the same issue of the magazine. W.W.D.

1891. WAILES, C. D., Jr. and HORNER, A. C., "Earthquake Damage Analyzed by Long Beach Officials," *Engineering News-Record*, 110, No. 21, 684-686, New York, May 25, 1933.

Damage is classified into five groups, separating old structures from those erected under the 1930 code. Basic code changes suggested for security are offered together with those desirable for future building. A short editorial on the above article entitled: "Design Integrity," appears on page 694 of the same issue. W.W.D.

1892. WHIPPLE, F. J. W. *et al.*, "Seismological Investigations," *Thirty-seventh Report of the Committee on Seismology, British Association for the Advancement of Science, Report of York Meeting (1932)*, 257-262, London, 1933.

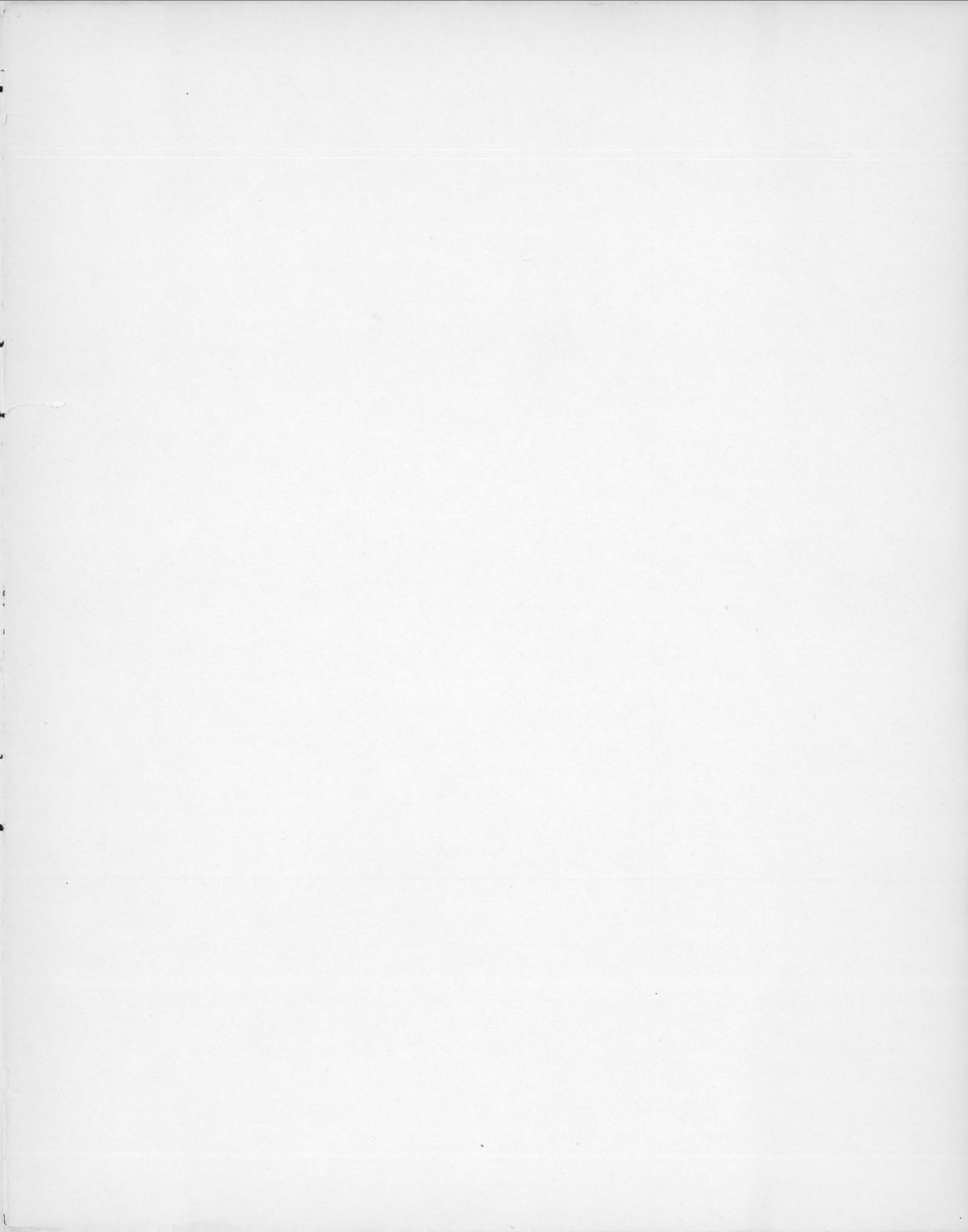
The report deals with general conditions with regard to the Committee and then with the following specific subjects: "The International Seismological Summary and the Revised Seismological Tables," "Seismographs," "British Earthquakes," "Deep Focus Earthquakes," "High Focus Earthquakes," "The Surface Layers," "Microseisms," "Membership and Accounts."

1893. (1) WICHMANN, E. C. A., "De statistiek der aardbevingen in den N. I. Archipel" (The Statistics of the Earthquakes in the Dutch East Indian Archipelago), *Handelingen Nederlandsch Natuur- en Geneeskundig Congres*, 5, 493-498, Haarlem, 1895.
The above deals with two questions, viz., which statistical, seismological investigations have been made in the Dutch East Indian Archipelago and what results may nowadays be deduced from these statistical data.
1893. (2) WICHMANN, E. C. A., "Die Erdbeben des Indischen Archipels bis zum Jahre 1857," *Verhandelingen van den Koninklijke Akademie van Wetenschappen*, 2^{de} Sectie, 20, No. 4, 1-193, Amsterdam, 1918.
The above is in the nature of a chronological review.
1893. (3) WICHMANN, E. C. A., "Die Erdbeben des Indischen Archipels von 1858 bis 1877," *Ibid.*, 22, No. 5, 1-209, Amsterdam, 1922.
A chronological review. J.F.S.
1894. WOOD, Harry O., "Preliminary Report on the Long Beach Earthquake of March 10, 1933," *Bulletin of the Seismological Society of America*, 23, No. 2, 43-56, 23 illustrations, Stanford, April, 1933.
1895. YAMAGUTI, Seiti, "On Time and Space Distribution of Earthquakes," *Bulletin of the Earthquake Research Institute*, 11, Part 1, 46-68, 14 figures, Tokyo, March, 1933.
1896. YOSIYAMA, Ryoti, "Elastic Waves from a Point in an Isotropic Heterogeneous Sphere, Part 1," *Bulletin of the Earthquake Research Institute*, 11, Part 1, 1-13, 4 figures, Tokyo, March, 1933.
- ZELLER, W. and KOCH, H. W., "Die Genauigkeit von seismographischen Messungen nichtstationärer Vorgänge." See No. 1834 of this list.
1897. ZISMAN, W. A., "The Elastic Constants of Rocks and Their Relation to Seismic Wave Speeds," *Physical Review*, 43, No. 6, 501-502, New York, March 15, 1933.
The above is an abstract only of a paper presented at the Cambridge Meeting (February 4, 1933), of the New England Section of the American Physical Society. It reports investigations of the discrepancies found between the elastic constants of rocks determined statically and those found by applying the theory of elastic waves to the seismically observed speeds of propagation.
1898. ZISMAN, W. A., "An Improved Apparatus for the Measurement of Poisson's Ratio," *The Review of Scientific Instruments*, 4, No. 6, 342-344, 4 figures, Lancaster, Pa., June, 1933.
In concluding the article the author states that, "This instrument was designed in order to carry out a part of an extensive program of geophysical research sponsored by the Committee on Geophysics of Harvard University."
1899. ZUNTURIDI, J. G., "On the Problem of Secular Movements of the Earth Crust in Transcaucasia" (in Russian with a summary in German), *Transcaucasian Regional Magazine*, Series A, Natural History, 1, 203-211, Tiflis, 1930.
The author describes two cases of secular earth crust movements: positive (sinking) in the district of Poti and negative (upheaval) in that of Tiflis. In the former case the values of sinking for 25 years (1904-1929) in two cases proved to be 27.7 cm. and 10.7 cm. N.V.R.
1900. ZWART, W., "Aardschuivingen naar aanleiding van de aardbeving bij Wonosobo" (Earth Movements in Consequence of the Earthquake near Wonosobo, Java), *Tectona*, 18, 413-421, Buitenzorg (Isle of Java), 1925. J.F.S.

LIST OF COLLABORATORS

The initials appended to various items throughout the *Bibliography* indicate, in each case, the contributions by the respective collaborator.

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- (5) ČŠOCHER, V. (W. Zschocher; V. Tsshokher), "Sur les conditions d'équilibre de masses de terre sous l'action des forces séismiques" (in Russian with *résumé* in French), 11 pages, 2 figures, 1930. (1593)
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- ADAMS, L. H., "Velocities of Wave-transmission in Rocks" (Abstract). See pages 286-287 of No. 1908 of this list.
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- In designing a seismograph to measure strong motion it is important not to confine attention merely to the maximum acceleration or displacement of the earth motion; these are not sufficient to determine how much a building will be damaged. The fundamental problem is to measure the amount of motion associated with the periods to which the buildings respond. These periods are in the range from three-tenths of a second to three seconds. For this purpose a seismograph with a natural period of one second would be better than an instrument of either the accelerometer or displacement-meter type (Author's abstract).

- BLAKE, A., "Constants of the Wenner Seismograph" (Abstract). See pages 335-336 of No. 1908 of this list.
- BLAKE, A. and McCOMB, H. E., "Analysis of Rates of Rotation of Recording-drums." See pages 324-329 (2 figures, 3 tables) of No. 1908 of this list.
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- This multigraphed edition reports the Proceedings of the 1933 Joint Meeting of the Eastern Section of the Seismological Society of America with the Section of Seismology of the American Geophysical Union, Washington, April 27, 28, and 29, 1933. In addition to the minutes and general information regarding the meeting, a total of 39 papers are presented in full or in summary form. These are reported in this list under the authors' names, making reference to the above publication by means of its serial number in the *Bibliography*.
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- BRODIE, A., "The Hawke's Bay Earthquake of 3rd February, 1931." See No. 1967 of this list.
- BYERLY, Perry and SPARKS, Neil R., "The First Preliminary Waves of the California Earthquake of June 6, 1932." See pages 254-256 (1 figure) of No. 1908 of this list.
- CALLAGHAN, Eugene and GIANELLA, Vincent P., "The Cedar Mountain, Nevada, Earthquake of December 20, 1932." See pages 257-260 (3 illustrations) of No. 1908 of this list.
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- CARDER, Dean S., "The Travel-times of the *P*- and *S*-waves from Mexican Earthquakes." See pages 322-324 (1 figure, 1 table) of No. 1908 of this list.
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The paper presents an interesting discussion of the use of the word "throw" in connection with a geological fault. The author illustrates his argument with photographs of faults in the Aberystwyth grits.

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1913. CLEMENTS, Thomas, "Notes on the Fall of Columns during the Long Beach Earthquake," *Science*, No. 2014, 78, 100-101, 1 figure, New York, August 4, 1933.
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- DAVIS, Watson, "Proposed New Earthquake-code." See page 336 of No. 1908 of this list.
- DELANEY, John P., S.J., "Wood-Anderson Installation at Buffalo" (Abstract). See page 312 of No. 1908 of this list.
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- A lengthy abstract appears on page 464 of the *Geographical Journal*, 81, No. 5, London, May, 1933. It reads, in part, as follows: "...Among the more properly geophysical studies, grouped in the fifth part, are two memoirs on the theory of terrestrial isostasy. Two more papers may be linked with these: 'Elastic Theory of Tectonic Dislocations and Its Geophysical Applications,' and 'Theory of Waves Propagated on the Flat Surface of an Elastic Body and Its Application to Seismogram Analysis.' Though the method in these studies is a mathematical one, the conclusions and applications are no less interesting to the geographer. Let us remember also that lucid article 'What is the Earth?' which, though published in 1907, still remains a clear summary of our knowledge of the internal condition of our globe."
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- A discussion of the Long Beach earthquake of March 10, 1933. F.W.L.
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- The author writes: "Because the earthquake originated along a structural line on which are a series of the world's more productive oil fields, and because the faulting which produced it also produced these reservoirs, a description of the structure may be of interest."
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1919. ENGINEERING NEWS-RECORD, "A Law for Earthquake Safety," *Engineering News-Record*, **110**, No. 22, 721, New York, June 1, 1933.

A short editorial reporting a law passed by the California legislature requiring certain safety factors in buildings. Some criticism of the law is offered.

In the same issue, under the title "News of the Week," is another short article dealing with the same subject (p. 722). W.W.D.

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The writer discusses the probable nature of a disturbance observed and photographed from a plane above the Sierra Nevada on November 29, 1929.

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The Tables for P , PR_1 , PR_2 , PR_3 , S , SR_1 , SR_2 , SR_3 , and $S-P$, as obtained solely from Hodgson's study of the Tango earthquake, have been smoothed and entered at intervals of tenths of degrees of arcual distance for the purpose of preserving in discrete form these time-distance values for a single earthquake of well-determined epicentre and hypocentral time. The times given refer to epicentral time, which in this case is about two seconds later than hypocentral time.

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To investigate tilting and changes in level in the United States and Canada, results from the records of tide gauges of different stations were analyzed. In the Great Lakes region all results indicate a tilting of the land upward in a northerly direction, by about 10 cm. per 100 km. per century. Along the Pacific Coast a small rising of the land is indicated at the north, whereas in California the changes in height seem to be negative, but small and irregular. Along the Atlantic Coast of Canada the changes are small and within the limits of error nearly everywhere, but south of Portland (Me.) sinking prevails clearly. It is very probable that the tilt in the Great Lakes region is due to forces which tend to restore isostatic equilibrium disturbed by the melting of ice after the Ice Age (Author's abstract).

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- HECK, N. H., "Review of Seismology in the United States." See pages 318-321 of No. 1908 of this list.

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High accelerations in the Long Beach earthquake are shown by strong-motion accelerograph records at three stations in southern California.

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W.H.

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- INADA, S. and SUZUKI, J., "Abnormal Earth Current Accompanied by the Earthquakes." See No. 1980 of this list.
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A review by K. Jung appears on page 1582 of *Physikalische Berichte*, **14**, Heft 19, Braunschweig, 1933.
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The initials appended to various items throughout the *Bibliography* indicate, in each case, the contribution by the respective collaborator.

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