NOMINATION OF MARION L. JACKSON
FOR THE BOUYOUCOS SOIL SCIENCE DISTINGUISHED CAREER AWARD

Marion L. Jackson
F.H. King Professor of Soil Science

Name:	Marion L. Jackson F.H. King Professor of Soil Science
Date of birth:	November 30, 1914
Place of birth:	Reynolds, Nebraska
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1. Degrees received

Degrees:	B.S.	Agriculture	University of Nebraska	1936
	M.S.	Agriculture	Univeristy of Nebraska	1937
	Ph.D.	Soil Science	University of Wisconsin	1939

2. Professional positions held

Post-doctoral Fellow, University of Wisconsin	1939-41
Instructor, University of Wisconsin	1941-42
Assistant Professor, University of Wisconsin	1942-45
Associate Professor, Purdue Agronomy Department	1945-46
Associate Professor, University of Wisconsin	1946-50
Professor, University of Wisconsin	1950-74
Franklin Hiram King Professor of Soil Science, University of Wisconsin	1974-present

QUALIFICATIONS OF MARION L. JACKSON:

1. Educational contributions other than publications

Dr. Jackson has built an outstanding record of accomplishments in research and as an educator. He has enthusiastically shared his wisdom and insight with colleagues and students throughout the world. He has given 38 lectureships and invitational lectures in many U.S. universities and 8 foreign countries. Dr. Jackson has also given numerous invitational lectures at technical meetings and as seminars on university campuses.

2. Teaching, contributions

Dr. Jackson has served as an advisor to 58 Ph.D. and 18 M.S. students. He also directed the programs for 37 postdoctoral and sabbatical students. Many of his former students have developed distinguished careers of their own at major U.S. and foreign universities. Other students created equally distinguished careers at Federal and industrial laboratories.

He has taught courses in "Soil Chemical Analysis", "Soil Physics", and more recently, "Soil Mineral Weathering". His course on soil mineral weathering is internationally recognized for its breadth of application, especially for the relation of soil minerals to soil genesis and the formation of landscapes and the effects of soil mineral composition on human nutrition and health. He has authored two textbooks "Soil Chemical Analysis" and "Soil Chemical Analysis - Advanced Course" which are used throughout the world.

3. Extension and service-type contributions

Dr. Jackson has never held an extension appointment. However, because of his comprehensive knowledge of the mineral and chemical composition of soils and of inorganic chemical reactions in soils, his advice and assistance was often solicited by colleagues in and outside of academia.

4. Membership in honorary, academic and professional societies

Honorary academic societies
- Sigma Xi
- Gamma Sigma Delta

Professional societies
- Soil Science Society of America
- American Society of Agronomy
- American Association for the Advancement of Science
- International Society of Soil Science
- Mineralogical Society of America
- Mineralogical Society (London)
- Clay Minerals Society
- Association Internationale pour l'Etude des Argiles
- Environmental Geochemistry and Health Society

5. Honors and awards received

Fellow, American Society of Agronomy, 1955.
Soil Science Achievement Award, American Society of Agronomy, 1958.
Fellow, Mineralogical Society of America, 1963.
President, Clay Minerals Society, 1966-67.
President, Soil Science Society of America, 1967-68.
Honorary Doctor of Science Degree, University of Nebraska, 1974.
President, Wisconsin Chapter of Sigma Xi, 1974-75.
Franklin Hiram King Professorship of Soil Science, University of Wisconsin-Madison, 1974.
Distinguished Member Award, Clay Mineral Society, 1977.
Distinguished Member Award, Soil Science Society of America, 1983.
Listed in
- Who's Who in the World
- Who's Who in America
- Who's Who in the Midwest
- American Men of Science
- Leaders in American Science
- World Directory of Mineralogists
- National Register of Scientific and Technical Personnel

6. Development or improvement of programs, practices, and products

Dr. Jackson has made outstanding and unique contributions to our present understanding of the mineral and chemical compositions of soils and how the composition of soils affects their use. He was among the first to apply the techniques of X-ray diffraction analysis to soils and was the first to recognize the sequence of mineral formation during soil weathering. His techniques for mineral and chemical analysis of soils are used in laboratories throughout the world.

He has always been quick to recognize the applicability of new research approaches to increase our understanding of soils. This is evidenced by his use of oxygen isotope ratios in quartz grains to serve as a tracer of the global transport of aerosolic dust and to understand the contribution of aerosolic dust to soil formation. More recently, he has shown the correlation between the trace element composition of soils and the incidence of various diseases and human mortality.

7. Other contributions to the soil science profession

Dr. Jackson has been exceptionally active in his service to the soil science profession. He has made many significant contributions of his time and knowledge to professional organizations, review panels, and scientific committees. He has served as a member of site visit teams and of review panels for the National Academy of Sciences, the National Science Foundation, and the National Research Council. He has served as an external examiner of doctoral thesis for five foreign institutions. He has also served on many editorial boards and committees of the Soil Science Society of America, the

International Society of Soil Science, and the Clay Minerals Society. He is a frequent reviewer of National Science Foundation proposals and of manuscripts for numerous professional journals.

8. Service to the Soil Science Society of America

Dr. Jackson has served our professional organization very well. He was vice-president and president from 1966-68. He served as chairman of the soil chemistry division and was active on 12 committees, some of which he also was the chair. He was the liaison representative of the SSSA to the National Academy of Sciences, National Research Council, Division of Earth Sciences. He also served on several liaison committees to the International Soil Science Society and to the Clay Minerals Society. He was a member of the SSSA editorial board for 8 years.

9. Service to the professional outside the society

Dr. Jackson's comprehensive knowledge of soils has made him an invaluable consultant to petroleum and clay mineral industries. His frequent contacts with professionals in these industries were a constant source of new ideas for research and demonstrated the relevance of Dr. Jackson's research.

10. Professional publications

a. Books written

Jackson, M.L. 1956. Soil chemical analysis - advanced course. Published by the author, Dep. of Soil Science, Univ. of Wisconsin, Madison, WI.

Jackson, M.L. 1958. Soil chemical analysis. Prentice-Hall, Inc., Englewood Cliffs, NJ.

Jackson, M.L. 1969. Soil chemical analysis - advanced course (2nd edition). Published by the author, Dep. of Soil Science, Univ. of Wisconsin, Madison, WI.

b. Books edited -- None

c. Other publications edited -- None

d. Technical papers

1. Jackson, M.L. 1936. Glimpses of Nebraska land forms. Alpha Zeta Quarterly 32:9-10.

2. Jackson, M.L., F.A. Hayes, and M.D. Weldon. 1938. Some chemical and morphological relationships between soil profiles of the Rosebud and associated soil series in southeastern Kimball County, Nebraska. Soil Sci. Soc. Am. Proc. 2:437-445.

3. Judd, B.I., and M.L. Jackson. 1939. Natural succession of vegetation on abandoned farm lands in the Rosebud soil area of western Nebraska. J. Am. Soc. Agron. 31:542-557.

4. Jackson, M.L., and M.D. Weldon. 1939. Determination of the weight of water in a soil or subsoil mass in which the moisture content increases with distance from a plant or group of plants. J. Am. Soc. Agron. 31:116-127.

5. Jackson, M.L., and E. Truog. 1940. Influence of grinding soil minerals to near molecular size on their solubility and base exchange properties. Soil Sci. Soc. Am. Proc. 4:136-143.

6. Jackson, M.L. 1941. Clay and colloid content determination of soils using a rapid photoelectric procedure. Soil Sci. Soc. Am. Proc. 5:54-60.

7. Jackson, M.L., and M.N. Hellman. 1942. X-ray diffraction procedure for positive differentiation of montmorillonite from hydrous mica. Soil Sci. Soc. Am. Proc. 6:133-145.

8. Hellman, N.N., D.G. Aldrich, and M.L. Jackson. 1943. Further note on an X-ray diffraction procedure for the positive differentiation of montmorillonite from hydrous mica. Soil Sci. Soc. Am. Proc. 7:194-200.

9. Hellman, N.N., and M.L. Jackson. 1944. Photometric interpretation of X-ray diffraction patterns for quantitative estimation of minerals in clays. Soil Sci. Soc. Am. Proc. 8:135-143.

10. Aldrich, D.G., N.M. Hellman, and M.L. Jackson. 1944. Hydration control of montmorillonite as required for its identification and estimation by X-ray diffraction methods. Soil Sci. 57:215-231.

11. Jackson, M.L., and N.N. Hellman. 1946. Electromagnetic tapper for use in sieve analysis of sands with comparison to other mechanical and hand agitation methods. Soil Sci. Soc. Am. Proc. 10:34-38.

12. Coleman, R., and M.L. Jackson. 1946. Mineral composition of the clay fraction of several Coastal Plain soils of southeastern United States. Soil Sci. Soo. Am. Proc. 10:381-391.

13. Truog, E., O.J. Attoe, and M.L. Jackson. 1946. Fertilizer applications rationalized. Soil Sci. Soc. Am. Proc. 10:219-223.

14. Wilson, H.F., and M.L. Jackson. 1946. Electrostatic effects produced in dust clouds. Agric. Chem. 1,6:32, 33, 35, 49, 61-62.

15. Wilson, H.F., and M.L. Jackson. 1946. Effect of mineral composition and particle size in dispersants on toxicity of Rotenone dusts. J. Econ. Ent. 39:290-295.

16. Jackson, M.L., and S.C. Chang. 1947. Anhydrous ammonia retention by soils as influenced by depth of application, soil texture, moisture content, pH value, and-tilth. J. Am. Soc. Agron. 39: 623-633.

17. Fried, M.I., and M.L. Jackson. 1947. Sulfur collection in precipitation by means of an all-weather non-corrosive rain and snow gauge. Science 106:19-20.

18. Jackson, M.L., W.Z. Mackie, and R.P. Pennington. 1947. Electron microscope applications in soils research. Soil Sci. Soc. Am. Proc. 11:57-63.

19. White, J.L., and M.L. Jackson. 1947. Glycerol solvation of soil clays for X-ray diffraction analysis. Soil Sci. Soc. Am. Proc. 11:150-154.

20. Jackson, M.L., S.A. Tyler, A.L. Willis, G.A. Bourbeau, and R.P. Pennington. 1948. Weathering sequence of clay-size minerals in soils and sediments: I. Fundamental generalizations. J. Phys. Coll. Chem. 52:1237-1260.

21. Tanner, C.B., and M.L. Jackson. 1948. Nomographs of sedimentation times for soil particles under gravity or centrifugal acceleration. Soil Sci. Soc. Am. Proc. 12:60-65.

22. Mackie, W.Z., B. Chatterjee, and M.L. Jackson. 1948. Mineral crystal forms in soils observed in the electron microscope: I. Single-component clays and synthetic mixtures. Soil Sci. Soc. Am. Proc. 12:176-179.

23. Jackson, M.L., C.E. Evans, O.J. Attoe, J.L. Huber, and J.C. Kaudy. 1948. Soil fertility level in relation to mineral and botanical composition of forage. Soil Sci. Soc. Am. Proc. 12:282-288.

24. Willis, A.L., R.P. Pennington, and M.L. Jackson. 1948. Mineral standards for quantitative X-ray diffraction analysis of soil clays: I. Abridgement of component percentage series based on weathering sequence. Soil Sci. Soc. Am. Proc. 12:400-406.

25. Pennington, R.P., and M.L. Jackson. 1948. Segregation of the clay minerals of polycomponent soil clays. Soil Sci. Soc. Am. Proc. 12:452-457.

26. Jackson, M.L., R.P. Pennington, and W.Z. Mackie. 1949. Crystal chemistry of soils: I. The fundamental structural groups and families of silicate minerals. Soil Sci. Soc. Am. Proc. 13: 139-145.

27. Jeffries, C.D., and M.L. Jackson. 1949. Mineralogical analysis of soils. Soil Sci. 67:57-73.

28. Cole, C.V., and M.L. Jackson. 1949. Colloidal dihydroxy dihydrogen phosphates of aluminum and iron with crystalline character established by electron and X-ray diffraction. J. Phys. Coll. Chem. 54:128-142.

29. Jackson, M.L., L.D. Whittig,.and R.P. Pennington. 1950. Segregation procedure for the mineralogical analysis of soils. Soil Sci. Soc. Am. Proc. 14:77-81.

30. Coleman, N.T., M.L. Jackson, and A. Mehlich. 1950. Mineral composition of the clay fraction: II. Of several coastal plain, piedemont, and mountain soils of North Carolina. Soil Sci. Soc. Am. Proc. 14:81-85.

31. Jackson, M.L., C.A.. Black, R.H. Bray, W.T. McGeorge, S.S. Obenshain, and E. Winters. 1950. Report of the terminology committee: Definition of soil phosphorus terms. Soil Sci. Soc. Am. Proc. 14:401-404.

32. Menzel, R.G., and M.L. Jackson. 1950. Sorption of copper from acid systems by kaolinite and montmorillonite. Trans..4th Congr. Int. Soc. Soil Sci. 1:125-128.

33. Wilson, H.F., and M.L. Jackson. 1951. Electrostatic effects produced in dust clouds made with finely ground minerals of various composition. Trans. Wis. Acad. Sci. 40:261-283.

34. Cole, C.V., and M.L. Jackson. 1951. Solubility equilibrium constant of dihydroxy aluminum dihydrogen phosphate relating to a mechanism of phosphate fixation in soils. Soil Sci. Soc. Am. Proc. 15:84-89.

35. Menzel, R.G., and M.L. Jackson. 1951. Mechanism of sorption of hydroxy cupric ion by clays. Soil Sci. Soc. Am. Proc. 15:122-124.

36. Menzel, R.G., and M.L. Jackson. 1951. Determination of copper and zinc in soils or plants--polarographic determination in the same solution. Anal. Chem. 23:1861-1863.

37. Jackson, M.L., Y. Hseung, R.B. Corey, E.J. Evans, and R.C. Vanden Heuvel. 1952. Weathering sequence of clay-size minerals in soils and sediments: II. Chemical weathering of layer silicates. Soil Sci. Soc. Am. Proc. 16:3-6.

38. Hseung, Y., and M.L. Jackson. 1952. Mineral composition of the clay fraction: III. Of some main soil groups of China. Soil Sci. Soc. Am. Proc. 16:294-297.

39. Massey, H.F., and M.L. Jackson. 1952. Selective erosion of soil fertility constituents. Soil Sci. Soc. Am. Proc. 16:353-356.

40. Evans, E.J., and M.L. Jackson. 1952. Chemical determination of sorbed water and structural hydroxyl in colloidal minerals of soils and sediments. Soil Sci. Soc. Am. Proc.. 16:364-368.

41. Jackson, M.L. 1952. Soil organic carbon determination with Fisher induction carbon apparatus. Soil Sci. Soc. Am. Proc. 16: 370-371.

42. Tamura, T., and M.L. Jackson. 1953. Structural and energy relations in the formation of iron and aluminum oxides, hydroxides, and silicates. Science 117:381-383.

43. Corey, R.B., and M.L. J ackson. 1953. Silicate analysis by a rapid semimicrochemical system. Anal. Chem. 25:624-628.

44. Tamura, T., M.L. Jackson, and G.D. Sherman. 1953. Mineral content of low humic, humic, and hydrol humic Latosols of Hawaii. Soil Sci. Soc. Am. Proc. 17:343-346.

45. Aguilera, N.H., and M.L. Jackson. 1953. Iron oxide removal from soils and clays. Soil Sci. Soc. Am. Proc. 17:359-364.

46. Aguilera, N.H., and M.L. Jackson. 1954. Iron oxide removal from soils and clays. Soil Sci. Soc. Am. Proc. 18:223, 350.

47. Jackson, M.L., and G.D. Sherman. 1953. Chemical weathering of minerals in soils. Adv. Agron. 5:219-318.

48. Massey, H.F., M.L. Jackson, and O.E. Hays. 1953. Fertility erosion on two Wisconsin soils. Agron. J. 45:543-547.

49. Kittrick, J.A., and M.L. Jackson. 1954. Electron microscope observations of the formation of aluminum phosphate crystals with kaolinite as a source of aluminum. Science 120:508-509.

50. Jackson, M.L., L.D. Whittig,.R.C. Vanden Heuvel, A. Kaufman, and B.E. Brown. 1954. Some analysis of soil montmorin, vermiculite, mica, chlorite, and interstratified layer silicates. p. 218-240. In Clays and clay minerals, Natl. Acad. Sci., Natl. Res. Counc. Pub. no. 327.

51. Kittrick, J.A., and M.L. Jackson. 1955. Rate of phosphate reaction with soil minerals and electron microscope observations on the reaction mechanism. Soil Sci. Soc. Am. Proc. 19:292-295.

52. Kittrick, J.A., and M.L. Jackson. 1955. Common ion effect on phosphate solubility. Soil Sci. 79:415-421.

53. Tamura, T., M.L. Jackson, and G.D. Sherman. 1955. Mineral content of a Latosolic brown forest soil and a humic ferruginous Latosol of Hawaii. Soil Sci. Soc. Am. Proc. 19:435-439.

54. Kittrick, J.A., and M.L. Jackson. 1955. Application of solubility product principles of the variscite-kaolinite system. soil Sci. Soc. Am. Proc. 19:455-457.

55. Whittig, L.D., and M.L. Jackson. 1955. Interstratified layer silicates in some soils of northern Wisconsin. P. 322-336. In 7F Clays and clay minerals, Natl. Acad. Sci., Natl. Res. Counc. Pub. no. 395.

56. Fine, L.O., F.C. Bauer, A.C.. Caldwell, D.L. Grunes, H.R. Haise, L.E. Haley, F.L. Hammers, R.F. Holt, A. Hustrulid, M.L. Jackson, A. Kaufman, F.E. Koehler, L.F. Marriott, J.L. Nelson, A.J. Ohlrogge, and R.H. Yamaga. 1955. The influence of nitrogen and potassium on the variability of fertilizer phosphorus. South Dakota Agric. Exp. Stn.-Bull. 453 (North Central Region Pub. no. 67).

57. DeMumbrum, L.E., and M.L. Jackson. 1956. Copper and zinc exchange from dilute neutral solutions by soil colloidal electrolytes. Soil Sci. 81:353-357.

58. Kittrick, J.A., and M.L. Jackson. 1956. Electron-microscope observations of the reaction of phosphate with minerals, leading to a unified theory of phosphate fixation of soils. J. Soil Sci. 7:81-89.

59. Jackson, M.L. 1956. Instruments in soils and waters. J. Agric. Food Chem. 4:602-605.

60. DeMumbrum, L.E., and M.L. Jackson. 1956. Infrared absorption evidence on exchange reaction mechanism of copper and zinc with layer silicate clays and peats. Soil Sci. Soc. Am. Proc. 20: 334-337.

61. Swindale, L.D., and M.L. Jackson. 1956. Genetic processes in some residual podzolized soils of New Zealand. Trans. 6th Congr. Int. Soc Soil Sci. 5:233-239.

62. Schmehl, W.R., and M.L. Jackson. 1956. Interstratification of layer silicates in two soil clays. p. 423-428. In Clays and clay minerals, Natl. Acad. Sci., Natl. Res. Counc. Pub. no. 456.

63. Whittig, L.D., and M.L. Jackson. 1956. Mineral content and distribution as indexes of weathering in the Omiga and Ahmeek soils of northern Wisconsin. P. 362-371. In Clays and clay minerals, Natl. Acad. Sci., Natl. Res. Counc. Pub. no. 456.

64. Chang, S.C., and M.L. Jackson. 1956. Removal of phosphorus from hydrogen peroxide by kaolinite. Science 124:1209.

65. Jackson, M.L. 1956. Soil chemistry. p. 866-868. In G.L. Clark (ed.) Encyclopedia of chemistry. Reinhold Publ. Co., New York, NY.

66. Chang, S.C., and M.L. Jackson. 1957. Solubility product of iron phosphate. Soil Sci. Soc. Am. Proc. 21:265-269.

67. Chang, S.C., and M.L. Jackson. 1957. Fractionation of soil phosphorus. Soil Sci. 84:133-144.

68. Schmehl, W.R., and M.L. Jackson. 1957. Mineralogical analyses of soil clays from Colorado surface soils. Soil Sci. Soc. Am. Proc. 21:373-380.

69. DeMumbrum, L.E., and M.L. Jackson. 1957. Formation of basic cations of copper, zinc, iron and aluminum. Soil Sci. Soc. Am. Proc. 21:662.

70. Chang, S.C., and M.L. Jackson. 1958. Soil phosphorus fractions in some representative soils. J. Soil Sci. 9:109-119.

71. Sawhney, B.L., and M.L. Jackson. 1958. Soil montmorillonite formulas. Soil Sci. Soc. Am. Proc. 22:115-118.

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73. Jackson, M.L. 1958. Application of radioisotopes in the study of soils. Ministerio de Minas y Petroleos, Lab. Quimico Nacional, Bogoto, Columbia, Bull. no. 4:26-55. (In Spanish).

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80. Hashimoto, I., and M.L. Jackson. 1960. Rapid dissolution of allophane and kaolinite-halloysite after dehydration. p. 102-113. In 7th Conf. Clays and Clay Minerals, Pergamon Press, New York, NY.

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e. Non-technical papers

Jackson, M.L. 1952. How to get those top yields of corn. Hoard's Dairyman 97:321, 344-345.

f. Invited lectures, seminars and symposia presentations

Papers given at scientific meetings:

1. Frequency Distribution of Clay Minerals in Major Great Soil Groups as Related to the Factors of Soil Formation. August 1957, National Clay Conference, Berkeley, CA.

2. Aluminum Bonding in Soils: A Unifying Principle in Soil Science. August 1962, Soil Science Society of America, Cornell Univ., Ithaca, NY.

3. Interlayering of expansible layer silicates in soils by chemical weathering. August 1962, Clay Minerals Society, Ottawa, Ontario, Canada

4. Weathering of Primary and Secondary Minerals in Soils. August 1968, International Society of Soil Science, Adelaide, Australia.

5. Geomorphological Relationships of Tropospherically-derived Quartz in soils of the Hawaiian Islands. November 1968, Soil Science Society of America, Crop Science Society of America, New Orleans, LA.

6. Training of Soil Scientists. 1974, American Society of Agronomy Meetings, Chicago, IL.

7. Forty Years in Clay Mineralogy. 1977, Clay Minerals Socie ty Meeting, Kingston, Jamaica. (In response to the receipt of "Distinguished Member" Award of the Society.

8. Short Range Order in Ferrialuminosilicates: Amorphous and Binary, Ternary, Quaternary, and Quinary Phyllosilicate Mixtures. 1978, Clay Minerals Society Meeting, Bloomington, IN.

9. The Role of Clay Minerals in the Environmental Sciences. 1981, International Clay Conference, Bologna, Pavia, Italy.

Lectureships:

10. Tennessee Valley Authority, U.S. government, Wilson Dam, AL: Member, Panel of Consultants, Oct. 9-11, 1957 and Nov. 4-7, 1958. Lecturer, Symposium on Chemistry of Soil Phosphate, Jan. 27-29, 1960.

11. Cornell University, Ithaca, NY: Visiting Professor of Soil Science, Feb. 8 to Mar. 2F, 1959; Soil Science Society lecturer, Aug. 21, 1962.

12. Oak Ridge National Laboratory, Health-Physics Division, Oak Ridge, TN: Lecturer, Apr. 14, 1960.

13. University of Florida, Gainesville, FL, Department of Soils: Visiting Lecturer, Apr. 18-19, 1960; June 11-15, 1974.

14. North Carolina State College, Raleigh, NC: Visiting Lecturer, Oct. 16-22, 1960, and Sigma Xi lecturer, Oct. 20, 1960.

15. University of California: Clay Minerals Committee Lecturer (Berkeley), June 23-24, 1960; Kearney Lecturer, Dec. 8, 1960 to Jan. 7, 1961; Visiting Lecturer (Davis), Aug. 16-19, 1965 and May 17, 1966, (Riverside), Aug. 29-30, 1965.

16. Oregon State University, Corvallis, OR, Department of Soil Science: Visiting Lecturer, June 28 to July 1, 1960. USA-Japan NSF-sponsored seminar on amorphous materials, Aug. 6-10, 1976.

17. South Dakota State College, Brookings, SD, Department of Agronomy: Visiting Lecturer, Apr. 30 to May 4, 1962.

18. Virginia Polytechnic Institute, Blacksburg, VA, Department of Agronomy in cooperation with 13 southeastern states: Lecturer for NSF Advanced Science Seminar on Soil Clay Mineralogy, July 2-27, 1962.

19. Oklahoma State University, Stillwater, OK, Department of Agronomy: Visiting Lecturer, Nov. 28-29,1962; Sigma Xi Lecturer, Nov. 28, 1962.

20. Miami University, Oxford, OH: NSF-sponsored Visiting Lecturer program of American Society of Agronomy, Feb. 17-18, 1964. Phi Sigma Lecturer, Feb. 18, 1964.

21. Canadian Department of Agriculture, Ottawa, Ontario: Visiting Scientist and Lecturer, May 7-8, 1964.

22. University of Hawaii, Honolulu, HI, Department of Agronomy and Soil Science: Visiting Lecturer, May 4-5, 1966; Clay Mineral Society, 1968; Aug. 1982.

23. Negev Institute for Arid Zone Research, Beersheva Israel: Visiting Lecturer, June 17-19, 1966. Technion (Israel Institute of Technology), Haifa, June 26, 1966. Soil Science Departments and Weizmann Institute, Rehovot: Visiting Lecturer, June 29, 1966.

24. University of Aberdeen, Aberdeen, Scotland: Representative for ISSS, Div. II and IV, Soils Conference, address opening session, respond for the delegates to welcoming address by Lord Provost of Aberdeen, address closing session on behalf of the delegates, Sept. 5-10, 1966.

25. Georgia Institute of Technology, Atlanta, GA, Division of Earth Science, Department of Ceramic Technology: Visiting Lecturer, Dec. 6, 1966.

26. Aristotelian University, Thessaloniki, Greece, Department of Soil Science: Visiting Lecturer, June 13-15, 1966.

27. University of Texas, Austin, TX, Department of Earth Sciences: Visiting Lecturer, Feb. 16 to mar. 4, 1967.

28. University of Adelaide, Adelaide, Australia: Vice-Chairman, Soil Chemistry Commission (Comm. II, ISSS) and Invited Speaker to joint session of Soil Chemistry, Soil Genesis, and Soil Mineralogy Commissions, 9th Congress, Aug. 6-15, 1968.

29. University of Melbourne, Parkville, Victoria, Australia: Collaborator, Aug. 16-18, 1968.

30. Purdue University West.Lafayette, IN: Visiting Lecturer, Department of Agronomy, Apr. 7, 1969; Mar. 25, 1983.

31. Ueno Park, Tokyo, Japan: International Clay Conference, AIPEA, Conference Session Chairman, Sept. 5-10, 1969.

32. Kyushu University, Fukuoka, Japan: Panelist in International Seminar on Amorphous Clays (joint Japan-USA, NSF sponsored), Sept. 1519, 1969; Invited Speaker, Kyushu Section, Soil Science Society of Japan, Sept. 19, 1969.

33. Ohio State University, Columbus, OH: Visiting Lecturer, Department of Agronomy and Society of Sigma Xi, Apr. 5-8, 1971; Wooster, OH, Experiment Station, Apr. 9, 1971.

34. U.S. National Center for Atmospheric Research, Boulder, CO: Visiting Lecturer, June 22-24, 1971; June 19, 1973.

35. University of Washington, Seattle, WA: Distinguished Visiting Professor, Quaternary Research Center and College of Forest Resources, Mar. 26 to June 8, 1973; Apr. 18-21, 1978.

36. Texas A&M University, College Station, TX, Department of Soil and Crop Sciences: Visiting Lecturer, Feb. 4-6, 1974.

37. Washington State University, Pullman, WA: Visiting Lecturer, Mar. 23, 1973; Mar. 26, 1976.

38. New Zealand Soil Bureau, Wellington, N.Z.: Panelist, Aug. 26, 1968, ISSS; Lincoln College, Christchurch (South Island field study) Feb. 1-10, 1981; Massey Univ., Conference on "Variable Charge", Feb. 11-18, 1981.

39. University of Nebraska, Department of Agronomy and Graduate School, Lincoln, NE: Lecturer, Apr. 3-7, 1961. On occasion of receipt of honorary degree, Doctor of Science; Lecture “Desert dust in the central Pacific Ocean and Hawaii,” May 9-11, 1974; Lecturer “Trace element depletion in soils and human health consequences,” May 28, 1982.

40. U.S. National Oceanographic and Atmospheric Administration, Environmental Research Laboratories, Boulder, CO: Co-author on "Aerosols and Climate" monograph, Feb. 8-9, 1982.

41. Engelhardt Mineral and Chemical Co., Edison, NJ: Lecture "Kaolinite, origin, properties and impurities", Feb. 23-24, 1982.

42. University of Saskatchewan, Saskatoon, Sask., Toxicology Center: Lecture "Trace element depletion in soils and human health consequences", Mar. 22-24, 1982. Institue of Pedologgy: Lecture "Oxygen isotopes in quartz as an indicator Of provenance of dust: A global model", Mar. 25-2.8, 1982.

43. Iowa State University, Ames, IA, Department of Agronomy: Lecture "Trace element depletion in soils and human health consequences", May 26, 1982.

44. People's Republic of China: Guest of National Academia of Sinica, Guangzhou (Canton), Shanghai, Nanjing (Nanking), and Beijing (Peking), Lecturer "Clay mineral adsorption-desorption effects on environment and health", Aug. 17 to Sept. 6, 1982.

45. University of Minnesota, Minneapolis, MN, Department of Geology and Geophysics: Lecture "Oxygen isotopes in quartz as an indicator of provenance of dust: A global model", Feb. 24, 1983.

46. University of Minnesota, St. Paul, MN, Department of Soil Science: Lecture "Trace element depletion in soils and human health consequences", Feb. 25, 1983.

47. University of South Florida, Tampa, FL, Departments of Chemistry and Geology: Visiting Lecturer, Mar. 8-9, 1984.

g. Other presentations
None

EVALUATION:

The distinguished research career that Dr. Marion L. Jackson has developed has had a greater impact on the science of soil mineralogy than that of any other researcher. His discoveries have led to major breakthroughs in our knowledge of mineral weathering, soil formation, and the geochemistry of soils. The concepts of clay mineral formation in soils and the application of X-ray diffraction to their study were in their infancy when Dr. Jackson started his career. Dr. Jackson was always at the frontier of his research area and his early major contributions on the concept of a weathering stability sequence of clay-sized minerals in soils was an early indicator of the achievements that were to follow.

His professional interests have expanded to include: quantitative determination of soil mineralogy; silicate crystal chemistry; the geochemistry of transformation of minerals by weathering processes; the retention by soil minerals of radioactive isotopes that may be released in the nuclear fuel cycle; the oxygen isotope ratios of silicates by which the provenance of silts in sedments and soils can'be traced through glacial, fluvial, and eolian transport; and the influence of the element composition of soils on human health and mortality.

His concepts of the weathering sequence of clay-sized minerals in soils unified earlier but fragmented ' theories of weathering processes under various climates, vegetations, and geomorphic sites. His research showed that the solute composition of the soil matrix solution was determined by the climate, vegetation, and geomorphic site and not by an equilibrium with the minerals present in the soil. The compostion of the soil solution then determines the nature of the minerals forming or formed in the soil in accordance with their values of their free energies of formation. His unifing concepts of weathering have received world-wide atttention, and they have been incorporated into modern soil classification and principles of pedogenic research.

Dr. Jackson's interests in the interactions of potassium, aluminum, hydrogen, and other ions with soils led to his hypothesis of the wedgeshaped configuration formed by the edges of the XY cleavage planes of vermiculite and mica. This led to an.explanation of the capability of these minerals to fix ammonium, potassium, and cesium ions. One practical result of this discovery was the rapid increase in corn yields in Wisconsin during the early 19501s. His views on the role of exchangeable hydrated aluminum ion resolved a long standing controversy about the source of soil acidity.

The wide interests and keen intuition shown by Dr. Jackson enables him to quickly see the interrelationships between phenomena in pedology and related fields. This quality is best shown by his leadership in interdisciplinary investigations of the origin of eolian mineral particles in soils. The breakthrough in this research was his recognition that the oxygen isotop6 ratio in the quartz grains of aerosolic dust could be used as a marker or tracer. This research evolved from his formation of an international consortium for interinstitutional cooperation in the advancement of learning which coordinated the research of several universities.

Several results of this research are of special significance. While aerosolic dust consists mainly of quartz, mica, vermiculite, chlorite, calcite, and kaolinite, the oxygen isotopic ratio of the quartz grains are resistant to change and are a function of the temperature at which the quartz crystals formed. He showed that the quartz and mica of Hawaiian surface soils and Pacific pelagic sediments are mainly of aerosolic origin derived from dusts of arid lands of the continents. He also showed that dust from the Sahara is transported to the Caribbean Islands and the south eastern part of the United States. The isotope, ^{137}Cs, released by nuclear tests in the atmosphere was shown to be fixed by vermiculite in the aerosolic dust and transported globally. In cooperation with the National Center for Atmospheric Research, his research continued to trace the world wide distribution of aerosolic dust, which also has important implications in determining weather phenomena.

Using the same techinques, Dr. Jackson showed that the quartz in the fine silt of shales, silt-stones, loess, and till were a composite of quartz from low temperature origins (cherts and overgrowths) and quartz from high temperature igneous and metamorphic rocks. He found that the proportions of the mixture varied from Southern to Northern Hemispheres as a consequence that the continents in the Northern hemisphere traversed the equatorial zones during Post-Precambrian times according to present theories of continental drift.

Dr. Jackson realized that many of the macroscopic physical and chemical properties of soils were determined by the microscopic properties of the clay minerals. He turned to electron microscopy as a technique to probe the surface properties of the clays. His studies of platinum-carbon replicas of micas and vermiculites by electron microscopy showed the presence of sesquioxide coatings on micaceous vermiculite and their relationship to the stability of soil structure and the permeability of soils. High resolution transmission electron microscopy on epoxy-mounted clay samples that were prepared by ultramicrotomy showed the presence of fine occlusions of mica in kaolinite. This finding explained the ability of supposedly pure samples of kaolinite to fix Cs. Other studies of Dr. Jackson demonstrated the role that minor defects in crystal structure, such as fission particle tracks, played in the solution chemistry of clay minerals.

His interests recently have evolved into the potential relationship between the element composition of soils and human nutrition and its impact on human health and mortality. In cooperation with medical researchers, Dr. Jackson has shown a high correlation between selenium concentrations in blood and heart death rates in China, and its relation to selenium in soil. His unbridled curiosity is leading him in similar investigations in the United States.

The broad reach of his research interests has had significant impacts on many different scientific disciplines. As testimony to the impact that he has made, an analysis of the Science Citation Index for the years 1982-84 inclusive showed that he had over 900 citations in more than 200 different journals and monographs.

In summary, Dr. Jackson has been a pioneer in developing our understanding of the mineral and chemical behavior of soils. He always emphasized basic research with the thought that his new-found knowledge could be applied or could

explain some previously misunderstood phenomena. It is a tribute to his research style to recognize how many of our current concepts of soil mineralogy and pedology are attributed to Dr. Jackson's efforts. This exemplary record and his generous service to several scientific societies make Dr. Marion L. Jackson eminently qualified for the Bouyoucos Soil Science Distinguished Career Award.