

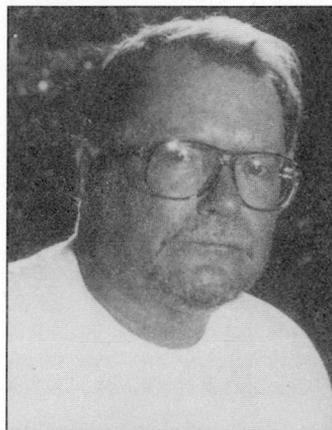
Memorial to Carlos Schubert

1938–1994

THOMAS W. DONNELLY

Dept. of Geological Sciences, State University of New York, Binghamton, NY 13902-6000

Friends of Carlos Schubert Paetow were shocked and saddened upon hearing of his death in Caracas, Venezuela, on July 22, 1994, following an aneurism and a mesenteric stroke. Carlos, a longtime Fellow of the Geological Society of America, was one of the dominant figures of Venezuelan geology, specializing in his later years in neotectonics and in Quaternary geology. His untimely passing leaves a large void in Latin American—and in Quaternary—geology. His publications were voluminous and spanned a wide range of topics, but dominantly centered in Venezuelan studies.



Carlos was born in Hamburg, Germany, on October 9, 1938, and went to Caracas as an infant. He had a youthful interest in many subjects, but not especially in geology. His decision to pursue this field was the result of parental advice that geology and chemistry were the major fields of the future. Because he was uncomfortable with chemistry, he chose geology. Undoubtedly one of his important inspirations was the German explorer Alexander von Humboldt. Indeed, one of Carlos's most prized possessions was his German 1815 edition of Humboldt's *Travels*. In much of Carlos's later work we can find a thread linking him to the founder of South American earth science.

When he completed his high school studies in Caracas in 1957, he faced the problem that Pérez Jiménez, the president of Venezuela, had closed all Venezuelan universities. Fortunately, Carlos was awarded a scholarship from the Shell Oil Company to attend the University of Arizona, where he received his bachelor's degree in geology in 1961. Now completely dedicated to geological studies, he left Arizona not only with a diploma, but also with a certificate naming him an honorary Citizen of Tucson. Carlos always maintained a strong affection for Arizona and the Southwest in general, and in the last year of his life visited the state with his wife.

In 1961 he went to Rice University, receiving his master's degree in 1963 with a thesis based on grain-size distribution in fluvial sedimentology. He returned to Venezuela in 1963 to work for Shell and to undertake field work for his Ph.D. dissertation at Rice. His topic, "The Geology of the Barinitas - Santo Domingo region, southeastern Venezuelan Andes" (1967; published 1969), introduced him to a mountain range that was to become his favorite area and the focus of most of his studies throughout his career. Completing a field-based mapping project similar to those that have shaped the careers of most geologists, Carlos quickly developed a consuming interest in an especially challenging part of geological studies: the geology of the Quaternary.

Following the completion of his doctoral studies, Carlos worked as a geologist for the Ministerio de Minas e Hidrocarburos in Caracas. One of his first assignments was the mapping of the Araya Peninsula as a part of a regional mapping project then underway in the ministry. This study was a field-based mapping project similar in scope to his Andean dissertation; it resulted in a publication on the general geology (1972) and another on the metamorphic rocks (1971) of this part of eastern Venezuela.

After Carlos obtained his Ph.D. degree at Rice, he felt it necessary to become registered with the Colegio de Ingenieros de Venezuela. This certification is called "revalida," which has no exact equivalent in the United States, but is parallel to being professionally licensed. To accomplish this he had to defend a geological study before a local body of examiners. He chose for this purpose his Araya Peninsula mapping study rather than his earlier Andean dissertation. Although he later produced a few additional field-based bedrock mapping studies, notably on the Venezuelan offshore islands, his interests now became firmly directed toward Quaternary studies.

His Quaternary studies took two directions: neotectonics and glacial history. The discovery of offset moraines along the Boconó fault influenced him strongly, and he continued to study the neotectonics of this fault system throughout his career. His discovery of an offset moraine next to the parking lot of a popular Andean resort remains an especially popular and accessible neotectonic feature for touring geologists. In order to pursue neotectonic studies, Carlos had to develop several new skills. To study the ongoing movements of the Boconó fault, he installed a set of concrete monuments for subsequent precise surveying, a project undertaken in collaboration with Heinz Henneberg and Raul Estévez. Their project was first published in 1975 (Schubert and Henneberg) and was included in 1988 in the GPS study of recent tectonic movements around the Caribbean. In addition to the Boconó studies, Carlos also investigated neotectonic activity of several other parts of the southern Caribbean boundary, including El Pilar fault, Morón fault, the Cariaco Basin, and pull-apart basins along the Boconó fault. Following yet another approach to neotectonic mapping, he participated as a shipboard scientist in the 1990 cruise of the RV *Washington* to the Cariaco Basin.

The major professional turning point in Carlos's career was his appointment in 1970 to IVIC (Instituto Venezolano de Investigaciones Científicas), the governmental research organization of the country. He was located in the Centro de Ecología of IVIC, and served as its head or sub-head several times. In this position he was able to devote his full attention to Quaternary studies and to work with many Venezuelan graduate students pursuing studies in the general area of Quaternary geology.

His first paper on glacial history (1970) was published shortly after his dissertation. This work continued throughout his career and culminated in a book, *El Cuaternario de la Cordillera de Mérida, Andes Venezolanos*, co-authored with Leonel Vivas, and published the year before his death. Carlos had a major interest in late Wisconsin and Holocene climate in the Andes, and, more generally, in northern South America. Becoming interested in pollen studies, he collaborated on several occasions with Maria Lea Salgado-Labouriau, a Brazilian palynologist who spent several years at IVIC working in Carlos's laboratory. Carlos also participated in important multidisciplinary studies of Holocene climate in northern Venezuela, analyzing a 7.5 meter sediment core taken from Lake Valencia (Bradbury et al., 1981).

The bulk of Carlos's later work centered on the Glacial-age environment of the Mérida Andes, including periglacial environments as well as glacial positions determined by morainal series. His work extended to moraines showing glacial advances during the Holocene, including the Little Ice Age of medieval times, using volcanic ash for correlation and successfully obtaining several radiocarbon ages for individual moraines. Carlos's work on the glacial environment of the northern Andes has provided vital data for the more general problem of a reconstruction of Earth's climate during the late glacial maximum, in which data concerning the climate of low-latitude regions has always been very difficult to obtain.

In addition to his Andean studies, Carlos was very interested in coastal studies, including the historical shrinking in size of Aves Island, a very small Venezuelan possession on the Aves Ridge; U-series dating of coastal limestones to measure uplift; and bedrock studies of the smaller Venezuelan offshore islands. He was also very interested in the geomorphology of the

Venezuelan shield, participating in a landmark study with Henry Briceño (Briceño et al., 1990). This study documented the karstian origin of this spectacular Proterozoic sandstone terrain and demonstrated its denudation by dominantly chemical processes. Carlos won the Clemente González de Juana Prize of the Sociedad Venezolana de Geología in 1991 for his participation in this study. He was posthumously awarded the prize for a second time in 1994 in honor of his book on the Quaternary of the Andes. He was also awarded a Profesor Honorario de Ciencias by the Universidad de los Andes in 1993 for his many Andean studies.

Carlos was a member of countless committees and counsels, mainly dealing with the advancement of sciences in Venezuela and earth-science studies in Latin America. He also served on the editorial committees of many international journals, mostly on Quaternary studies, as well as *Acta Científica Venezolana*. He was always vitally interested in general scientific education and in the presentation of science to the public. In addition to his book on the Quaternary of the Andes cited above, he wrote two books for a more general audience: *Los Terremotos en Venezuela y su Origen* (1984) and *La Gran Sabana* (1989, written with Otto Huber).

Probably his most prestigious award was a Lorenzo Mendoza Fleury prize of the Fundación Polar (a foundation established by Venezuela's leading brewery, Cervecería Polar) in 1991. This prize is awarded biennially to five prominent Venezuelan scientists; Carlos is the first and only earth scientist to have been awarded this honor. The published citation does not (but apparently the verbal citation did) include the well-known fact that Carlos had been for years one of Polar's most faithful customers. This citation mingles an assessment of the impact of his scientific works with a description of his weekend retreat in the coastal village of Choroni, where he relaxed with his wife and several beloved cats, and where, in the remodeled garage, he wrote many of his papers. It was at their home in Choroni that Carlos, never fond of the bustle of Caracas, was able to relax. This home also became well known to many visiting geologists who sought him out for extended conversations on a variety of geological topics.

Carlos is survived by Erika Wagner, a childhood companion and later his wife of many years, who is an anthropologist also at IVIC. Their fields of specialization were complementary, and they were able to pursue numerous field projects together. Their mutual support and affection were palpable, and we extend our most sincere condolences to Erika on her loss.

SELECTED BIBLIOGRAPHY OF C. SCHUBERT

- 1969 Geologic structure of a part of the Barinas mountain front, Venezuelan Andes: *Geological Society of America Bulletin*, v. 80, p. 443-458.
- 1970 (and Sifontes, R.S.) Boconó fault, Venezuelan Andes: Evidence of postglacial movement: *Science*, v. 170, p. 66-69.
- Glaciation of the Sierra de Santo Domingo, Venezuelan Andes: *Quaternaria*, v. 13, p. 225-246.
- 1971 Metamorphic rocks of the Araya Peninsula, eastern Venezuela: *Geologische Rundschau*, v. 60, p. 1571-1600.
- 1972 Geología de la península de Araya, Estado Sucre: *Boletín de Geología, Publicación Especial*, vo. 5, no. 3, p. 1823-1886.
- (with Wagner, E.) Prehispanic workshop of serpentinite artifacts, Venezuelan Andes, and possible raw material source: *Science*, v. 175, p. 560-561.
- 1974 (and Valastro, S.) Late Pleistocene glaciation of Páramo de La Culata, north-central Venezuelan Andes: *Geologische Rundschau*, v. 63, p. 517-538.
- (with Santamaria, F.) Geochemistry and geochronology of the southern Caribbean-northern Venezuela plate boundary: *Geological Society of America Bulletin*, v. 85, p. 1085-1098.
- Late Pleistocene Mérida glaciation, Venezuelan Andes: *Boreas*, v. 3, p. 147-152.

- 1975 (and Hennenberg, H.) Geological and geodetic investigations on the movement along the Boconó fault, Venezuelan Andes: *Tectonophysics*, v. 29, p. 199-207.
- 1976 Evidence of former glaciation of the Sierra de Périja, western Venezuela: *Erdkunde*, v. 30, p. 222-224.
- 1978 (and Szabo, B.J.) Uranium-series ages of Pleistocene marine deposits in the islands of Curaçao and La Blanquilla, Caribbean Sea: *Geologie en Mijnbouw*, v. 57, p. 325-332.
- 1979 El Pilar fault zone, northeastern Venezuela: *Brief review: Tectonophysics*, v. 52, p. 447-455.
- 1980 Late Cenozoic pull-apart basins, Boconó fault zone, Venezuelan Andes: *Journal of Structural Geology*, v. 2, p. 463-468.
- Contribution to the paleolimnology of Lake Valencia: *Catena*, v. 7, p. 275-292.
- 1981 Are the Venezuelan fault systems part of the southern Caribbean late boundary?: *Geologische Rundschau*, v. 70, p. 542-551.
- (with Bradbury, J. P., Leyden, B., Salgado-Labouriau, M., Lewis, W. M., Frey, D. G., Whitehead, D. R., and Weibezahn, F.) Late Quaternary environmental history of Lake Valencia, Venezuela: *Science*, v. 214, p. 1299-1305.
- 1982 Neotectonics of the Boconó fault, western Venezuela: *Tectonophysics*, v. 85, p. 205-220.
- Origin of the Cariaco basin, southern Caribbean Sea: *Marine Geology*, v. 47, p. 345-360.
- 1984 Basin formation along the Boconó-Morón-El Pilar fault system, Venezuela: *Journal of Geophysical Research*, v. 89, p. 5711-5718.
- *Los Terremotos en Venezuela y su Origen: Caracas, Cuadernos Lagoven 39, 72 p.* (English version published in 1990.)
- 1985 (and Fritz, P.) Radiocarbon ages of peat, Guayana highlands (Venezuela): Some climatic implications: *Naturwissenschaften*, v. 72, p. 427-429.
- 1986 (with Hennenberg, H.) Geodetic networks along the Caribbean - South American plate boundary: *Tectonophysics*, v. 130, p. 77-94.
- 1989 (and Huber, F.) *La Gran Sabana: Caracas, Cuadernos Lagoven, 107 p.* (English version published in 1990.)
- 1990 (with Briceño, H., and Paolini, J.) Tablemountain geology and surficial geochemistry: Chimantá Massif, Venezuelan Guayana shield: *Journal of South American Earth Sciences*, v. 3, p. 179-194.
- 1992 (and Estévez, R., and Hennenberg, H.) The Boconó fault, western Venezuela: *Annales Tectonicae*, v. 6 (suppl.), p. 238-260.
- Emile Rod, la controversia sobre las grandes fallas de rumbo y el paradigma de la tectónica de placas en Venezuela: *Una vision personal: QUIPU*, v. 9, no. 3, p. 349-381.
- 1993 (and Vivas, L.) El Cuaternario de la Cordillera de Mérida, Andes Venezolanos: Mérida, Universidad de lo Andes y Fundación Polar, 345 p.