Pioneros en Venezuela

Código Geológico de Venezuela

Otto Renz-Schneider (1906-1992)

Otto Renz, geólogo de mucho mérito, bien conocido por sus excelentes trabajos estratigráficos y paleontológicos, murió el 21 de abril de 1992, en una clínica de Basel, Suiza. Sus amigos y colegas guardarán un buen recuerdo de su modestia y gentileza.

Otto nació el 30 de junio de 1906 en Kaufbeuren, Alemania, país de su madre Helena. Su padre, Carl Renz, fue en este tiempo profesor extraordinario de geología y paleontología en la Universidad de Breslau (Silesia). El era descendiente de una familia de hugonotes que se refugió en 1685, de Montpellier a la región del Rhin, y realizó estudios en Breslau, París, Munich y Zurich.

Con sus padres y su hermano menor Jani, Otto tuvo una juventud muy activa. Desde Lugano y Basel, Suiza al igual que desde Corfú y Atenas en Grecia, organizaban excursiones con carpas y mulas donde la madre se encargaba de las comidas.

Estudió en un colegio privado en Schaffhausen (Suiza) donde obtuvo un diploma de comercio. Posteriormente pasó un año en Londres trabajando como corredor de bolsa. Sin embargo, su amor por las rocas, las flores, animales y su afán de conocer el origen de la vida le hicieron modificar su inicial orientación y cambiar de carrera. Después de un año en el Instituto Minerva en Basel, presenta el exámen federal de reválida tipo C en Zurich el día 22 de septiembre de 1928, matriculándose en la Universidad de Basel. Aparte de las Ciencias de la Tierra se dedicó al estudio de la química, la botánica y con sus compañeros de estudios H. Fichter y W. Brueckner logró conocer la geología de los Alpes y con W. Rothpletz la del Jura.

Durante un semestre estuvo en la Universidad de Bologna donde el profesor Gortani le llamó la atención sobre problemas de la geología en los Apeninos del noreste. Estos problemas los resolvió Otto en su tesis de manera excelente y así desde 1932 hasta 1934 trabajó en la región de Gubbio, la mayor parte del tiempo viajando con su bicicleta, la cual le sirvió tambien para irse de Suiza a Italia. Durante una excursión en abril de 1934 su trabajo fue examinado por los profesores A Bonarelli, A Buxtorf y los doctores M. Reichel y L. Vonderschmitt. En este trabajo y con la ayuda de foraminíferos planctónicos logró fijar el límite Cretácico-Terciario en una sección ininterrumpida de Gubbio El 15 de abril de 1935 obtuvo el título de Doctor en Filosofia. La tesis salió publicada en Eclogae Geol. Helv. 29(1), 1936 y en 1951 fue traducida al italiano.

En los años 60 sus resultados fueron ajustados al rápido avance de la micropaleontología por H. Luterbacher e Isabella Premoli Silva y confirmados por datos magnetoestratigráficos en 1977.

Otros trabajos publicados en 1936 sobre foraminíferos retrabajados en el Terciario tardío cerca del Lago Trasimeno (al norte de Roma) y el descubrimiento de foraminíferos del Cenomaniense y Maestrichtiense en bolsas cretácicas cerca del Lago de Bienne (Suiza), consolidaron su reputación de observador de primera.

El 7 de noviembre de 1936 se casó con Rosa Schneider, y este matrimonio muy feliz, desafortunadamente sin hijos, duró hasta la muerte de ella en la primavera de 1987.

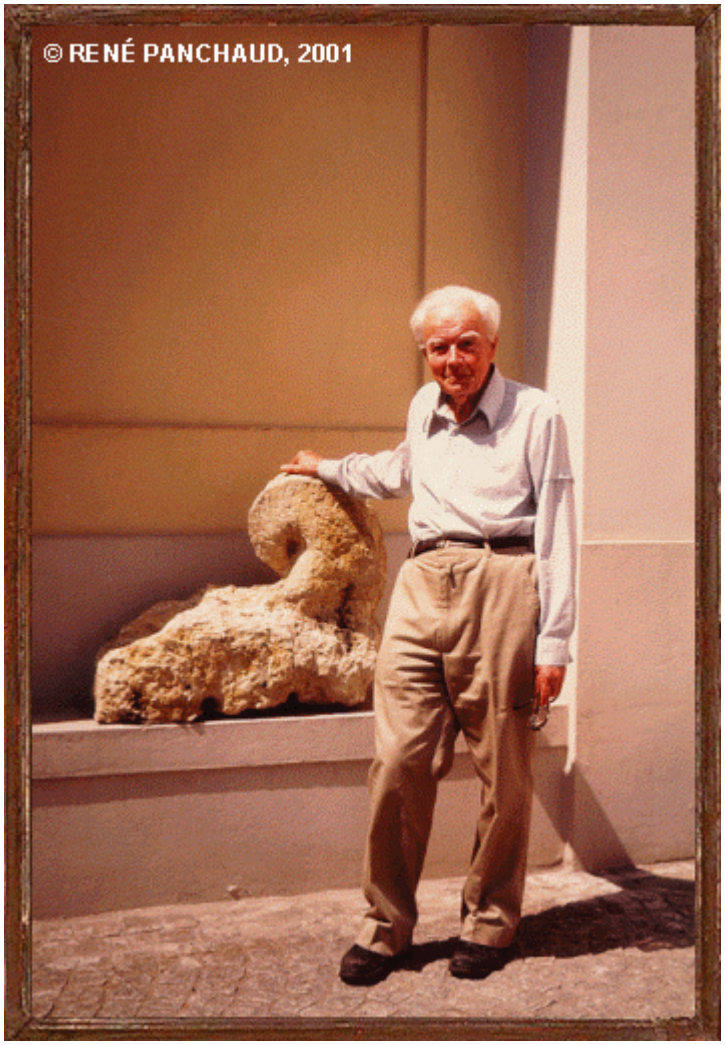
En octubre de 1937 empezó a trabajar en Venezuela con el Grupo Royal Dutch-Shell donde permaneció hasta octubre de 1940. Después de una breve estadía en La Haya fue enviado a Colombia. Allí bajo la supervisión de D. Truempy, encontró un campo de actividades muy a su gusto, en Los llanos y en el Valle del Magdalena. De mala gana salió de Colombia en diciembre de 1941, poco antes del ataque japonés a Pearl Harbor, para viajar vía Brisbane y Jakarta a Balkipapan con su esposa quien se quedó en Jakarta. Apenas llegado allá fue enviado a Pladju (Sumatra) por la amenaza japonesa. Cuando los japoneses invaden este lugar, Otto se refugia en una plantación de té en las montañas de Balisan cuyos propietarios eran suizos. Poco tiempo después los japoneses lo encuentran y es forzado a volver a Pladju para trabajar en la administración japonesa. Gracias a la intervención del profesor Hanzawa a quien Otto conoció en Basel, pudo llegar a Bandung después de un viaje difícil donde se reunió con su esposa. En este lugar estudió, junto con H. Kopper, el desarrollo de foraminíferos grandes.

Después de Hiroshima, en agosto de 1945, el matrimonio Renz pudo regresar a Suiza para unas vacaciones de recreo. Otto aprovechó su tiempo libre para publicar junto con su padre un estudio sobre fósiles de la isla de Chios.

A finales de 1945 Otto Renz viajó a Venezuela, país que el consideraba su segunda patria, y donde produjo trabajos estratigráficos de gran importancia, especialmente del Cretácico. Vivía en Caracas, pero la mayor parte del tiempo tenía su residencia en Maracaibo. La compañía Shell le autorizó presentar sus trabajos, como participante en el Congreso Internacional de Geología en Ciudad de México.

En 1954 y 1957 la casa matriz en La Haya le encargó emprender trabajos de reconocimiento en Grecia y España y al final de su carrera con la Shell, pudo investigar rocas de los mares profundos cerca de Puerto Rico y Jamaica. Después de su jubilación, dictó algunos cursos en la Escuela de Geología y Minas de la Universidad Central de Venezuela en Caracas.

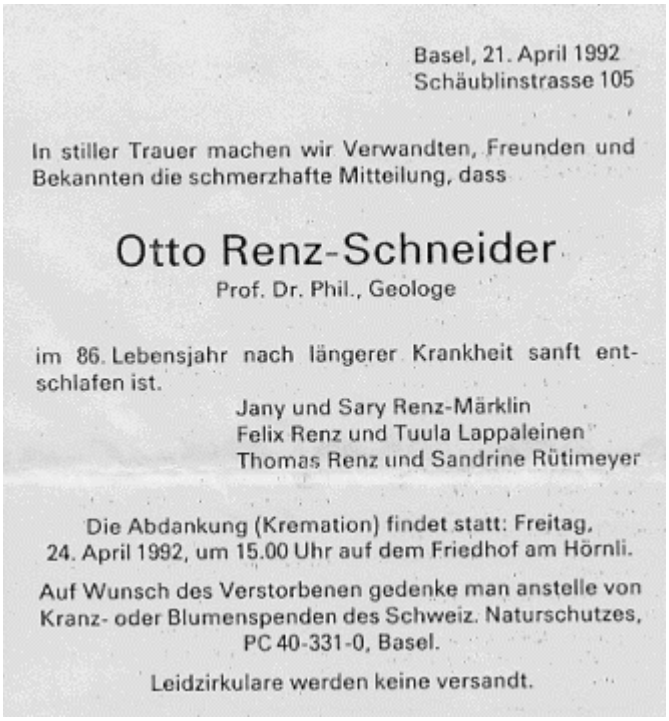
En febrero de 1961, el matrimonio Renz volvió a Suiza, donde se establecieron en su hermosa casa en Basel, cerca de su hermano Jani. Otto encontró un nuevo lugar de trabajo en el Museo de Historia Natural de Basel donde se esforzó como colaborador voluntario, dedicándose sobre todo a la estratigrafía del Cretácico del Jura de los cantones Vaud y Neuchatel. Junto con geólogos del Museo, ejecuta excavaciones en gran escala y las ricas faunas de ammonites son descritas por él, siguiendo los métodos del profesor Schindewolf.



En 1979 y 1980, aceptando una invitación del Dr. Hans Krause de MARAVEN, Otto pudo de nuevo visitar a Venezuela y llevarse abundantes ammonites al museo donde los identificó. El resultado de este trabajo fue un libro financiado por MARAVEN, S.A., con el título *"The Cretaceous ammonites of Venezuela"*, el cual constituye la culminación de sus labores como científico.

Otro aspecto de sus estudios en el museo fueron investigaciones sobre restos de cefalópodos, de núcleos del Deep Sea Drilling Program (DSDP). Sus determinaciones de ápticos demuestran nuevamente su gran capacidad como experto al servicio de la geología global.

La muerte de su esposa conmovió profundamente a Otto. Los daños psíquicos y físicos a consecuencia de esta tragedia hicieron necesario su traslado a una clínica donde fue muy apreciado como paciente amable y bondadoso.



Basel, 21. April 1992
Schäublinstrasse 105

In stiller Trauer machen wir Verwandten, Freunden und Bekannten die schmerzhafte Mitteilung, dass

Otto Renz-Schneider
Prof. Dr. Phil., Geologe

im 86. Lebensjahr nach längerer Krankheit sanft entschlafen ist.

Jany und Sary Renz-Märklin
Felix Renz und Tuula Lappaleinen
Thomas Renz und Sandrine Rütimeyer

Die Abdankung (Kremation) findet statt: Freitag, 24. April 1992, um 15.00 Uhr auf dem Friedhof am Hörnli.

Auf Wunsch des Verstorbenen gedenke man anstelle von Kranz- oder Blumenspenden des Schweiz. Naturschutzes, PC 40-331-0, Basel.

Leidzirkulare werden keine versandt.

Su legado científico incluye más de 60 publicaciones, de ellas 19 versan sobre la geología de Venezuela.

* Con adiciones de J. A. RODRÍGUEZ y F. URBANI.

Agradecimientos

El material fotográfico e ilustrativo que figura en este documento ha sido amablemente concedido por el Sr. René Panchaud, Jefe de Colecciones y Secretario del Departamento de Geología del Naturhistorisches Museum de Basilea, Suiza. La correspondencia electrónica mantenida con este notable científico ha enriquecido de especial manera las investigaciones sobre la vida y obra del Dr. Otto Renz-Schneider.

Se desea igualmente agradecer al Dr. Hans Hess del Naturhistorisches Museum de Basilea, Suiza por efectuar el contacto con el Sr. René Panchaud al transmitirle nuestro más deseoso interés por quien fuera desde 1962 colaborador voluntario en el Departamento de Geología de la institución antes mencionada, dedicándose principalmente en la sistemática de ammonites cretácicos.

Bull. Ver. schweiz. Petroleum-Geol. u. -Ing., Vol. 59, Nr. 134, Juni 1992 - S. 49-52

Dr. Otto Renz
1906-1992

OTTO RENZ anlässlich seines 80. Geburtstags, Photo R. PANCHAUD

Am 21. April starb der für die Stratigraphie hochverdiente Geologe Otto RENZ in der Leimenklinik in Basel, wo er die letzten vier Jahre verbracht hatte. Seine Bescheidenheit und sein liebenswürdiger Umgang werden seinen Freunden und Bekannten in bester Erinnerung bleiben. Er war seit 1946 Mitglied der VSP und hat von 1967 bis 1977 unser Bulletin redigiert.

Otto wurde am 30.Juni 1906 in Kaufbeuren, der Heimat seiner Mutter Helena geb. LAUBMANN geboren. Sein Vater, Carl RENZ war damals a.o.Prof. der Geologie und Paläontologie an der Universität Breslau. Er entstammte einer Hugenottenfamilie, die 1685 von Montpellier an den Oberrhein geflüchtet war und hatte in Breslau, Paris, München und Zürich studiert. Angeregt von F. FRECH hat er, als Privatgelehrter, das Mesozoikum des Mittelmeerraumes, besonders Griechenlands erforscht. Mit seinen Eltern und dem jüngeren Bruder Jani hat Otto eine bewegte Jugend verlebt. Von Corfu, Athen, Lugano oder Basel aus wurden expeditionsartige Reisen mit Zelten und Maultieren in die Berge Griechenlands organisiert, wobei ihre Mutter für Wirtschaft und für den Unterricht der Söhne besorgt war. Nach dem Besuch einer Privatschule in Schaffhausen hat Otto eine Handelsmatur abgelegt. Ein Jahr verbrachte er hierauf bei einem Stockbroker in London.

Doch hat seine Liebe zu Steinen, Blumen und Tieren und die Neugier, das Leben der Vorzeit näher kennenzulernen, ihn einen andern Lebensweg einschlagen lassen. Nach einem Jahr am Institut Minerva in Basel erwarb er am 22.9. 1928 in Zürich das eidgenössische Maturitätsdiplom «C» und bezog anschliessend die Universität Basel. Neben den Erdwissenschaften vertiefte er sich in das Studium der Chemie und der Botanik und mit seinen Studienkollegen H .FICHTER und W. BRÜCKNER hat er die Alpen- und mit W. ROTHPLETZ die Jurageologie kennengelernt.

Anlässlich eines Auslandssemesters an der Universität Bologna wurde er durch Prof. M. GORTANI auf Probleme in der Geologie des nordöstlichen Apennins aufmerks gemacht, die er mit seiner Dissertation in trefflicher Weise löste. Von 1932 bis 34 arbeitete er im Gebiet von Gubbio, meist unterwegs mit dem Fahrrad,das ihm auch zur Anreise nach Italien diente. Im April 1934 wurde seine Arbeit von Prof. A. BONARELLI, Prof. A. BUXTORF und den Drs. REICHEL und VONDERSCHMITT auf einer Exkursion begutachtet. Mit Hilfe von pelagischen Foraminiferen war es ihm gelungen die Kreide-Tertiär-Grenze in einer ununterbrochenen Schichtfolge festzulegen. Die Dissertation erschien 1936 in den Eclogae und wurde 1951 in italienischer Sprache nachgedruckt. Seine Resultate sind in den 60-er Jahren durch H. LUTERBACHER und I. PREMOLI SILVA den Fortschritten der Mikropaläontologie angepasst und 1977 durch magnetostratigraphische Ergebnisse bestätigt worden. Eine Arbeit über aufgearbeitete Foraminiferen im Jungtertiär am Trasimenischen See und die Entdeckung von Cenoman- und Maastrichtianforaminiferen in den Kreidetaschen am Bielersee (während einer Assistenzvertretung am Geologischen Institut Basel) festigten seinen Ruf als ausgezeichneten Beobachter. Die Promotion hatte

am 15.4.1935 stattgefunden. Am 7.11.1935 trat er mit Rosa SCHNEIDER aus Langenbruck in den Ehestand; die glückliche, leider kinderlose Ehe dauerte bis zu deren Tod im Frühjahr 1987.

Im Oktober 1937 trat er in den Dienst der Royal Dutch/ Shell Gruppe, bei der er bis Oktober 1960 verblieb. Nach einer kurzen Einführung in Den Haag (Photogeologie bei J. KREBS) wurde er in Columbien eingesetzt. Unter D. TRÜMPY fand er dort ein ihm zusagendes Arbeitsfeld in den Llanos und im Magdelenatal und einen Arbeitsstil nach amerikanischem Vorbild. Nur ungern verliess er Columbien im Dezember 1941, kurz vor dem japanischen Angriff auf Pearl Harbour, um über Brisbane und Jakarta, wo seine Frau verbleiben musste, nach Balikpapan zu reisen.

Kaum dort angekommen wurde er wegen der japanischen Bedrohung nach Pladju (Sumatra) evakuiert. Als auch dort der Feind einfiel,flüchtete Otto in eine Schweizer Teeplantage in den Balisan Bergen. Nach kurzer Zeit dort aufgespürt wurde er nach Pladju zurückgebracht, um dort für die japanische Verwaltung arbeiten zu müssen. Durch Vermittlung von Prof. HANZAWA, den er von Basel her kannte, konnte er nach beschwerlicher Reise zu seiner Frau, nach Bandung (Java) gelangen. Mit H. KÜPPER hat er dort die Entwicklung von Grossforaminiferen studiert. Nach Hieroshima konnte das Ehepaar RENZ im August 1945 zu einem Erholungsaufenthalt in die Schweiz zurückreisen. Diese Zeit benutzte er zur Herausgabe einer Studie über Fossilien von der Insel Chios,(zusammen mit seinem Vater).

Ende 1945 reiste Otto RENZ nach Venezuela, das ihm eine zweite Heimat werden sollte und für dessen Stratigraphie, besonders der Kreide, er hevorragendes geleistet hat. Dort lebte er teils in Caracas, meist aber in Maracaibo. Pierre von SCHUHMACHER hatte ihm bei seiner Arbeit viel Freiheiten und Hilfe zugesagt und er erhielt die Erlaubnis, verschiedentlich darüber zu berichten, so 1956 als Teilnehmer am Internationalen Geologenkongress in Mexico City. 1954 und 1957 erhielt er vom Hauptbureau in Den Haag Erkundungsaufträge in Griechenland und in Spanien und am Ende seiner Shell Karriere durfte er Tiefseegesteine in Puerto Rico und in Jamaica untersuchen. Nach seiner Pensionierung hat er Studenten der Geologie an der Universidad Central de Venezuela, in Caracas betreut.

Ende Februar 1961 kehrte das Ehepaar RENZ in die Schweiz zurück und bezog ihr schönes Heim an der Schaublinstrasse, auf dem Bruderholz in Basel, in der Nähe seines Bruders Jani und von hilfreichen Nachbarn. Am Naturhistorischen Museum fand er als freiwilliger Mitarbeiter eine neue Arbeitsstätte, indem er sich vorwiegend der Stratigraphie der Kreide im Wadtländer und Neuenburger Jura widmete. Zusammen mit den Museumsgeologen wurden ergiebige Grabungen unternommen und die reichen Ammonitenfaunen wurden von ihm nach den Methoden von Prof. SCHINDEWOLF beschrieben. 1979 und 1980 konnte Otto auf Einladung von Dr. H. KRAUSE von der staatlichen Erdölgesellschaft Maraven Venezuela erneut besuchen und reiche Ammonitenfaunen herbringen und bestimmen. Das Resultat, ein von der Maraven finanziertes Buch «The Cretaceous Ammonites of Venezuela» bildet die Krönung seines Lebenswerks. Ein weiterer Aspekt seiner Studien am Museum ergab sich aus der Untersuchung von Cephalopodenresten aus Bohrkernen des Deep Sea Drilling Projects. Im Bestimmen von Aptychen hat er sich dabei als namhafter Experte im Dienste der Globalgeologie erwiesen.

Der Tod seiner Frau hat Otto seelisch und körperlich tief betroffen. Die Schäden, die sich in der Folge einstellten, führten zur Überweisung in die Klinik, wo er als gütiger und liebenswürdiger Patient sehr geschätzt war. Sein wissenschaftliches Vermächtnis ist in zahlreichen Publikationen festgelegt.

P. A. SODER

This publication has been lost during printing of the book: Ammonites of Venezuela. Please make copies to be distributed to the owners of the book (see p. 130).

To be added with Cretaceous Ammonite . . . . O.R

Eclogae geol. Helv. | Vol. 71/3 | Pages 677–685 | 8 figures in the text | Basle, November 1978

Genus *Mathoceras* (Ammonoidea) from the Upper Aptian in the Serrania del Interior, eastern Venezuela

By Otto Renz[1])

ABSTRACT

The ammonite genus *Mathoceras* was so far known from a single species (*M. matheti*) described by Pervinquière (1907) from the Upper Aptian of Tunisia. During 1958–60 Guillaume collected additional material of *Mathoceras* from the Valle Grande Formation in the Serrania del Interior in eastern Venezuela. Four new species can be distinguished which form part of a rich assemblage consisting of the genera *Dufrenoyia*, *Acanthohoplites*, *Colombiceras*, *Gargasiceras* and others, indicating the *martinezoides* Zone of the Upper Aptian.

ZUSAMMENFASSUNG

Die Ammonitengattung *Mathoceras* war bis jetzt nur durch eine einzige Art (*M. matheti*) vertreten, die von Pervinquière (1907) aus dem oberen Aptian von Tunesien beschrieben wurde. Während 1958–1960 sammelte Guillaume weiteres Material dieser Gattung aus der Valle-Grande-Formation in der Serrania del Interior in Ost-Venezuela. Vier neue Arten können unterschieden werden, die von einer reichen Ammonitenfauna begleitet werden, bestehend aus den Gattungen *Dufrenoyia*, *Acanthohoplites*, *Colombiceras*, *Gargasiceras* und anderen, welche auf die *martinezoides*-Zone des oberen Aptian weisen.

Introduction

From Tunisia a small ammonite, Upper Aptian (Clansayesien) in age, has been described by Pervinquière (1907) under the name *Hoplites (Kilianella ?) Matheti* (p. 18, Pl. 7, Fig. 29a, b, juvenile stage; Fig. 31a, b, type species). Breistroffer (1947, p. 19) tentatively referred this ammonite to the genus *Dufrenoyia*. When studying *Dufrenoyia* for his monograph on the Ammonoidea of the Lower Greensand in Britain, Casey (1964, p. 289) established the genus *Mathoceras* for this specimen from Tunisia (Fig. 2).

A considerable number of fossils were collected by Guillaume during 1958–60, when surveying stratigraphic sections of the Lower Cretaceous exposed in the Serrania del Interior for Compania Shell de Venezuela. The cephalopods were send to the British Museum where they have been determined by C. W. Wright. Several ammonites, considered by Wright to represent new genera were donated to the British Museum (specimens BM.C.68185–89, Guillaume, Bolli & Beckmann 1972, p. 1653). Casey (1964, p. 289) saw those ammonites and recognized their similarity with *Mathoceras* from Tunisia.

Recently a limestone boulder with ammonites, collected by H. Kugler from the Upper Eocene Plaisance Conglomerate in Trinidad, was examined by the writer. Some of the ammonites extracted show a close resemblance to *Mathoceras* Casey. We therefore requested the curator of the British Museum to lend the material from Venezuela for comparison and study.

[1]) Museum of Natural History, Augustinergasse 2, CH–4001 Basel.

Stratigraphic introduction

The stratigraphic investigations by Guillaume in the Serrania del Interior were restricted to the Sucre Group equivalent to the Lower Cretaceous (Léxico Estratigráfico de Venezuela 1970, p. 575). Of special interest was the lateral transition of the clastic, partly deltaic facies in the south into successively more marine formations to the north. The southern facies is referred to as Barranquin Formation (Liddle 1928, p. 108), considered to be about Barremian to Aptian in age. It consists predominantly of quartz sands the origin of which is the Guayana Shield. These sandstones alternate with neritic limestones and black, carbonaceous shales containing abundant plant remains.

To the north parts of the lower Barranquin grades laterally into the Taguarumo Formation (von der Osten 1954) the age of which is assumed to be predominantly Lower Aptian (Guillaume, Bolli & Beckmann 1972, Fig. 1). Characteristic for

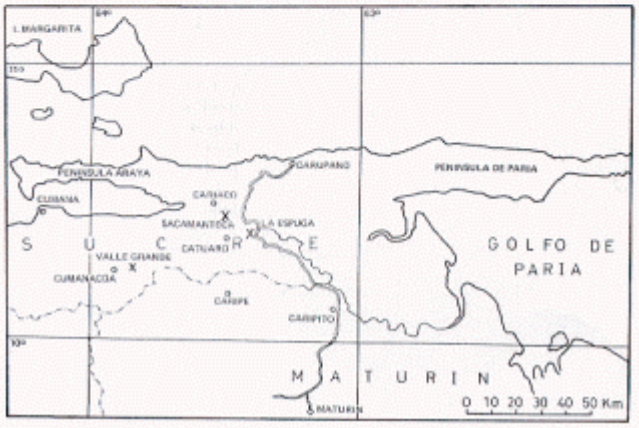


Fig. 1. Map showing distribution of the genus *Mathoceras* in the Valle Grande Formation of the Serrania del Interior.

this interval are limestones and marls rich in *Choffatella decipiens* SCHLUMBERGER. In the south the Barranquin is followed by a conspicuous shale body, which farther north overlaps on the Taguarumo. This shale interval was originally included within the El Cantil Formation (LIDDLE 1928, p. 124) consisting predominantly of massive, neritic limestones Aptian to Albian in age. It has been separated from the latter by GUILLAUME, BOLLI & BECKMANN (1972, p. 1628), and named Garcia Formation. The thickness of this interval increases considerably from south to north, reaching 150 m on Picuda Grande Island. The Garcia Shale is famous for its abundance of ammonite assemblages indicating mostly Upper Aptian. The *martinioides* Zone (CASEY 1961, p. 497) below and the *submodosocostatum* Zone above can be distinguished. The Garcia Shale grades laterally into the lower part of the Valle Grande Formation established by ROD & MAYNC (1954, p. 239). This interval comprises the Upper Aptian as well as time equivalents of the Lower Chimana Formation (HEDBERG & PYRE 1944, p. 8) of Lower and Middle Albian age, containing ammonite faunas which indicate the *mammillatum* Zone below and the *dentatus* Zone above. In the Léxico Estratigráfico (1970, p. 615) the name Valle Grande, according to SALVADOR (1964), has been declared invalid because of its lithological similarities with the Chimana, into which it has been incorporated. The Chimana was thus extended locally into the Upper Aptian. GUILLAUME, BOLLI & BECKMANN (1972, p. 1620) did not follow this suggestion and continued to use the term Valle Grande, what – in the writer's opinion – is correct at the present state of knowledge. The regional extension of the Garcia and Valle Grande reaches from Barcelona in the west, eastwards as far as the Caño Gariquén. Its southern boundary follows about the watershed of the Serrania del Interior.

Occurrence and preservation

Representatives of the genus *Mathoceras* were found by Guillaume at three localities, all situated in the Estado Sucre (Fig. 1).

1. Two specimens derive from the type section of the Valle Grande Formation in the Cumanacoa region, about 5 km east of the town (GUILLAUME, BOLLI & BECKMANN 1972, Fig. 2, 5, 9).

2. Two specimens were collected near the houses Sacamanteca along the trail connecting the town Cariaco with the village Catuaro, 11 km to the south (GUILLAUME, BOLLI & BECKMANN 1972, Fig. 2, 6).

3. One specimen comes from the rio La Espuga Valley, along the road Carupano–Caripito, just south of the bridge over the river (GUILLAUME, BOLLI & BECKMANN 1972, Fig. 6).

Mathoceras derives from shales within the transition zone from the Garcia into the Valle Grande Formation. All specimens consist of limonite. Occasionally parts of the tests are preserved as a thin layer of limonite. Aragonite thus seems to have been replaced by pyrite which oxydized to limonite.

The pelagic foraminiferal fauna, determined by BOLLI & BECKMANN (GUILLAUME, BOLLI & BECKMANN 1972, p. 1641) indicates the *Biglobigerinella barri* Zone of about Upper Aptian in age.

Systematic descriptions

Family ***Deshayesitidae*** STOYANOW 1949

The Deshayesitidae are subdivided by CASEY (1963, p. 289) in two subfamilies: the Deshayesitinae and Mathoceratinae. The former include *Burckhardtites* HUMPHREY 1949, *Prodeshayesites* CASEY 1961, *Kumziella* COLLIGNON (1962, p. 64, Fig. 1032–1035) and *Neodeshayesites* CASEY (1963, p. 289).

Subfamily ***Mathoceratinae*** CASEY 1963

This taxon includes, according to CASEY, the genera *Cleioceras* WHITEHOUSE (1927, p. 118; type species: *Hoplites raspolii* MAYER-EYMAR [1893, p. 258, Pl. 2, Fig. 10, 11] from Somalia) and *Somalites* TAVANI (1949, p. 47, Fig. 6–9).

Genus *Mathoceras* CASEY 1964

Type species: Hoplites (Kilianella ?) matho PERVINQUIÈRE 1907, p. 185, Pl. 7, Fig. 31a, b, Upper Aptian.

A description of the type species from Tunisia, based on PERVINQUIÈRE 1907 is given.

Mathoceras matho (PERVINQUIÈRE)

Fig. 2 a–c

1907 *Hoplites (Kilianella ?) Matho* PERVINQUIÈRE, holotype, p. 185, Pl. 7, Fig. 31a, b.
1947 *Dufrenoyia ? matho* PERVINQUIÈRE, BREISTROFFER, p. 35.
1963 *Mathoceras matho* (PERVINQUIÈRE), CASEY, p. 289, 377.

Description of holotype. – Initial smooth stage up to about 6 mm diameter. Whorl section of adult stage rectangular, slightly higher than wide. Venter trapezoidal, concave between two opposing rows of clavi. Sides faintly convex. Umbilicus about one third diameter. Umbilical wall vertical, umbilical margin rounded. Ribs flexuous inclining forward on ventral third of flank. At 12 mm diameter some secondary ribs, not reaching umbilical margin, appear. Later all ribs part from low conical tubercles on umbilical margin. Simultaneously ventrolateral tubercles as well as outstanding ventral clavi on ventral termination of ribs develop.

Measurements (based on Fig. 31a, b in PERVINQUIÈRE 1907). – Dm: 19 mm, Ww: 5 (0.29), Wh: 8 (0.41), U: 6.5 (0.34).

Remarks. – The holotype of *M. matho* has been collected by Aubert from the Upper Aptian (Clansayesien) between Bèjà-gare and l'Ouad Zerga in Tunisia.

Fig. 2. a, b = *Mathoceras matho* (PERVINQUIÈRE), copy of holotype from Tunisia, PERVINQUIÈRE (1907, p. 185, Pl. 7, Fig. 31a, b). 1:1. c = Suture line after PERVINQUIÈRE (1907, p. 185, textfig. 72, taken from juvenile specimen Pl. 7, Fig. 30). 6.4×.

Mathoceras venezolanum n. sp.
Fig. 3 a–b, l, 4a

Holotype. – Gu 1237, deposited in British Museum, BM.C68185.

Locus typicus. – Type section of Valle Grande Formation, Serrania del Interior, eastern Venezuela (Estado Sucre).

Age. – Upper Aptian, *martinioides* Zone.

Description of holotype. – About one-fourth of outer whorl belongs to body chamber (arrow). Whorl smooth on initial stage to about 4.5 mm diameter and whorl section oval. Later turning subquadrate, thickest on ventrolateral tubercles. Flanks parallel, slightly convex between ribs. Venter subtabulate, between opposing external clavi broadly concave. Umbilicus 30% of diameter. Umbilical wall falls steep on ventrolateral clavi on preceeding volution, and rounds gently into flank, without forming an umbilical edge. Costation distant, about 19 ribs on outer whorl from which eight, at about equidistant intervals are stronger primaries provided with prominent ventrolateral tubercles. Towards body chamber primaries are slightly raised into umbilical bullae. Intermediate secondaries, beginning on umbilical margin, are weak, inconstant in strength, and some are faintly elevated on ventrolateral shoulder. All ribs are straight between umbilicus and ventrolateral shoulder, and on outer third of flank turn distinctly forward towards the venter, broadening and flattening, and ending in prominent ventral clavi, obliquely projected forward. Few secondary ribs are only slightly elevated on venter. Suture (Fig. 3 l) as on *Dufrenoyia* (SCHINDEWOLF 1966, p. 688).

Measurements. – Gu 1237, BM.C68185 (end phrag.): Dm: 17.5, Ww: 7 (0.40), Wh: 7.4 (0.42), U: 5 (0.30).

Remarks. – The holotype has been collected in the Valle Grande Formation within a dark grey, arenaceous shale interbedded in calcareous glauconitic shale, about 8 m above the upper limit of the Taguarumo Formation which here is still Upper Aptian in age and bearing *Dufrenoyia*. *M. venezolanum* occurs associated with *Aconeceras nisus* (D'ORBIGNY). Some 30 m higher in the section, Guillaume collected a rich assemblage composed of the genera *Aconeceras, Melchiorites, Zuercherella, Dufrenoyia, Colombiceras* and *Gargasiceras*.

Paratype of *Mathoceras venezolanum* n. sp. (Fig. 3 i–k, 4b)

Gu 1609, BM.C68189. A chambered fragment of *M. venezolanum* has been collected some 40 km farther east, along the road Carupano–Caripito south of the bridge over the río Espuga. It derives from an interval, 25 m thick, of calcareous shale about time-equivalent with that exposed above the Taguarumo at the base of the Valle Grande near the houses of Sacamanteca. The accompanying ammonite assemblage, collected by Guillaume and determined by Wright, consists of:

Aconeceras nisus (D'ORBIGNY)
Sanmartinoceras haugi (SARASIN)
Valdedorsella genuina (COQUAND)
Acanthoplites cf. *archiliacensis* (ANTHULA)
Colombiceras sp.
Gargasiceras aff. *acuticostatum* (RIEDEL)
Zuercherella zuercheri (JACOB)

Mathoceras sucre n. sp.
Fig. 3 e–f, 4e

Holotype. – Gu 1238, deposited in British Museum, BM.C68186.

Locus typicus. – Type section of Valle Grande Formation, Serrania del Interior, eastern Venezuela (Estado Sucre).

Derivatio nominis. – Estado Sucre.

Age. – Upper Aptian, *martinioides* Zone.

Description of holotype. – Begin of body chamber uncertain (indicated by a line). Juvenile volutions, up to 7 mm diameter, smooth, oval, venter rounded. Later whorl section gradually turning rectangular simultaneous with strengthening of ventral clavi. Flanks parallel, slightly convex. Venter flat, tabulate, concave between external clavi. Sipho partly broken out. Umbilicus shallow, about one third of diameter. Umbilical wall low, falling on mid-flank of preceeding volution; umbilical margin rounded. Costation weak, inconstant, beginning at a diameter of about 7 mm. Ribs very low, sigmoidally curved, parting from umbilical margin where faint indications of umbilical bullae are recognizable on body chamber only (better visible on opposite side). Eight about equidistant ventrolateral bullae, different in strenght are developed. From there ribs turn slightly adorally ending in 20 prominent ventral clavi obliquely turning forward and different in hight according to strength of ribs. Faint looping of ribs between ventrolateral bullae and ventral clavi occasionally occurs (right side on Fig. 3e).

Measurements. – Gu 1238, BM.C68186: Dm: 15.5, Ww: 5.4 (0.34), Wh: 7 (0.46), U: 5 (0.32).

Remarks. – The holotype has been collected at the base of the Valle Grande Formation within the same shale interval as *M. venezolanum*.

Mathoceras caribense n. sp.
Fig. 3 g–h, m, 4d

Holotype. – Gu 1570, deposited in the British Mueum, BM.C68188.

Locus typicus. – Base of Valle Grande Formation, near houses Sacamanteca, south-southeast of Cariaco, Serrania del Interior (Estado Sucre).

Age. – Upper Aptian, *martinioides* Zone.

Description of holotype. – Diameter of phragmocon 10 mm (arrow). Inner volutions, up to about 5 mm diameter without sculpture, whorl section oval, venter broadly rounded. As growth proceeds whorl section more compressed, turning gradually subrectangular. Sides feebly convex between ribs, thickest below mid-flank. Venter about tabulate, flatly concave between peripheral clavi. Umbilicus one third of diameter. Umbilical wall rounding into flank and falling on preceeding volution slightly above mid-flank. Costation begins at 8 mm diamter. Eight distant, prorsiradiate primary ribs, swelling on body chamber into low umbilical bullae, and

gradually loosing strength toward the outer third of flank where they raise in low, bullae-like tubercles from which they curve forward, ending in prominent ventral clavi. Faint looping of ribs occurs between ventrolateral tubercles and peripheral clavi.

Measurements. – Gu 1570, BM.C 68188: Dm: 12.3, Ww: 4 (0.33), Wh: 5 (0.40), U: 4 (0.33).

Fig. 3. a, b = *Mathoceras venezolanum* n.sp., holotype, Gu 1237, BM.C 68185, type section Valle Grande Formation, about 6 km east of Cumanacoa. 2×. c, d = *Mathoceras laeve* n.sp., holotype, Gu 1569, BM.C 68187, houses Sacamanteca along trail Cariaco–Catuaro. 2×. e, f = *Mathoceras sucre* n.sp., holotype, Gu 1238, BM.C 68186, type section Valle Grande Formation, about 6 km east of Cumanacoa. 2×. g, h = *Mathoceras caribense* n.sp., holotype, Gu 1570, BM.C 68188, houses Sacamanteca along trail Cariaco–Catuaro. 2×. i, k = *Mathoceras venezolanum* n.sp., Gu 1609, BM.C 68189, río Espuga along road Carupano–Caripito. 2×. l = Suture of *Mathoceras venezolanum* n.sp., holotype. 4×. m = Suture of *Mathoceras caribense* n.sp., holotype. 8×.

Remarks. – *Mathoceras caribense* was collected from a calcareous shale interval, about 25 m thick, which overlays the Taguarumo Formation. It forms part of a rich ammonite assemblage consisting of:

Acomoceras ninas (D'ORBIGNY)
Sonnartinoceras haugi (SARASIN)
Zuercherella zuercheri (JACOB)
Valdedorsella cf. *angladai* (SAYN)
Colombiceras sp.
Gargasiceras sp.
Dufrenoyia justinae HILL
Dufrenoyia justinae sanctorum BÖRGI.
Pseudhaploceras laeve MATHERON
Mathoceras laeve n.sp.

Mathoceras laeve n. sp.
Fig. 3 c–d, 4c

Holotype. – Gu 1569, deposited in British Museum, BM.C 68187.

Locus typicus. – Base of Valle Grande Formation, near houses Sacamanteca, south-southeast of Cariaco, Serrania del Interior (Estado Sucre).

Age. – Upper Aptian, *martinioides* Zone.

Description of holotype. – Conch partly covered by thin, iron stained layer, possibly representing test, diagenetically altered. Beginning of body chamber uncertain (assumed position indicated by line). Whorl section on early stage oval, widest near mid-flank; on outer whorl section rectangular, flat-sided, widest below mid-flank. Venter tabulate, between opposing clavi concave. Umbilicus about 30% of diameter, shallow and low, slightly egrading towards end. Umbilical wall steep, grading into rounded margin. Sculpture begins near 8 mm diameter with faint ventral elevations. Costation smooth, unstable, nearly effaced arround mid-flank. Ribs distinct falcoid, without ventrolateral elevations. Ribs part from low, elongated umbilical bullae at irregular intervals, and changing in size. From some umbilical bullae branching or incipient branching is faintly indicated, and those ribs seem to unite again at rather low, elongated ventral clavi, continuing on venter with pronounced forward obliquity.

Measurements. – Gu 1569, BM.C 68187: Dm: 16.1, Ww: 5.3 (0.33), Wh: 7 (0.43), U: 4.9 (0.30).

Remarks. – The holotype has been found together with *M. caribense*.

Fig. 4. Whorl sections of *Mathoceras*. a = *Mathoceras venezolanum* n.sp., holotype, end of phragmocon, Fig. 3 a–b. 3×. b = *Mathoceras venezolanum* n.sp., Fig. 3 i–k. 3×. c = *Mathoceras laeve* n.sp., holotype, body chamber, Fig. 3 c–d. 3×. d = *Mathoceras caribense* n.sp., holotype, body chamber, Fig. 3 g–h. 3×. e = *Mathoceras sucre* n.sp., holotype, about end of phragmocon, Fig. 3 e–f. 3×.

Acknowledgments

I am gratefull to Dr. V. Pümpin of Maraven S.A. in Caracas for having provided us with the original stratigraphic sections from the report by Guillaume on the Serrania del Interior. I also wish to thank Mr. W. Suter from the Museum of Natural History, Basel, for the photographic work.

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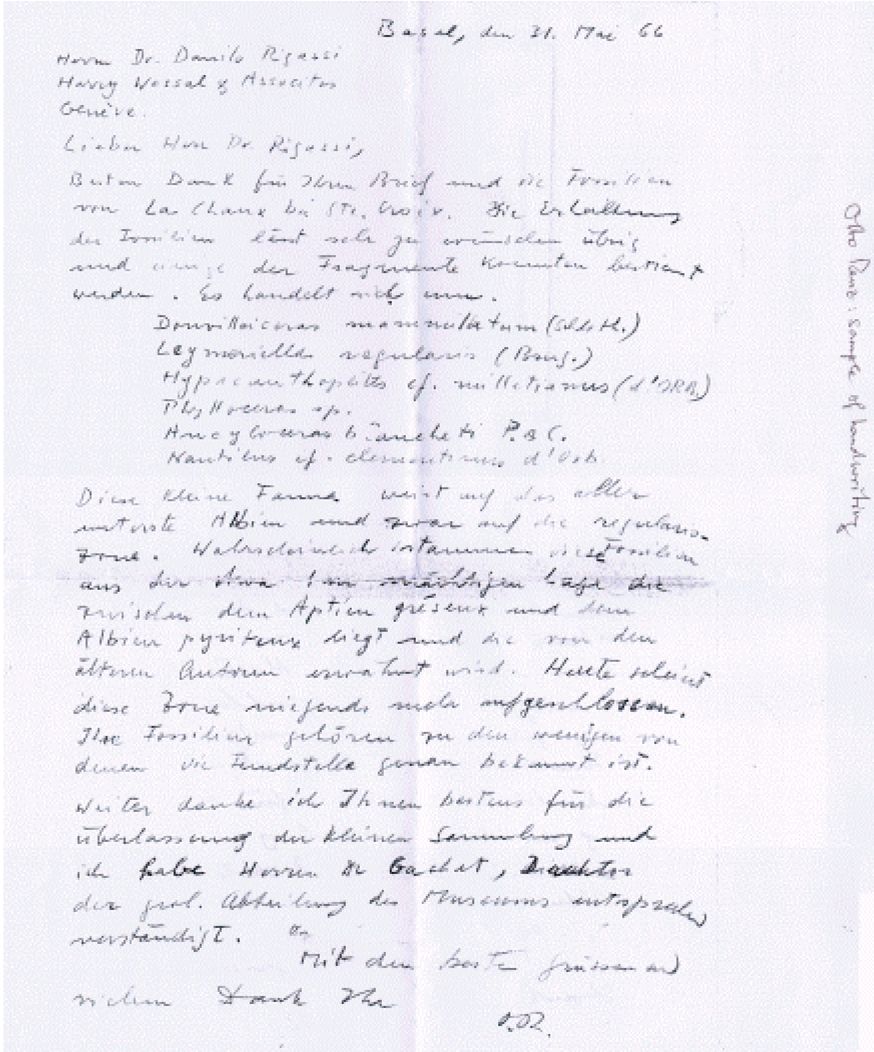


Basel, den 31. Mai 66

Herrn Dr. Danilo Rigassi
Harry Wassal & Associates
Genève.

Lieber Herr Dr. Rigassi,

Besten Dank für Ihren Brief und die Fossilien von La Chaux bei Ste. Croix. Die Erhaltung der Fossilien lässt sehr zu wünschen übrig und einige der Fragmente konnten bestimmt werden. Es handelt sich um:

Douvilleiceras mammillatum (Schloth.)
Leymeriella regularis (Brug.)
Hypacanthoplites cf. milletianus (d'ORB.)
Phylloceras sp.
Ancyloceras bianchetti P. & C.
Nautilus cf. clementinus d'Orb.

Diese kleine Fauna weist auf das allerunterste Albien und zwar auf die regularis-Zone. Wahrscheinlich stammen die Fossilien aus der Zone 1 m mächtigen Lage die zwischen dem Aptien gréseux und dem Albien pyriteux liegt und die von den älteren Autoren erwähnt wird. Heute scheint diese Zone nirgends mehr aufgeschlossen. Ihre Fossilien gehören zu den wenigen von denen die Fundstelle genau bekannt ist.

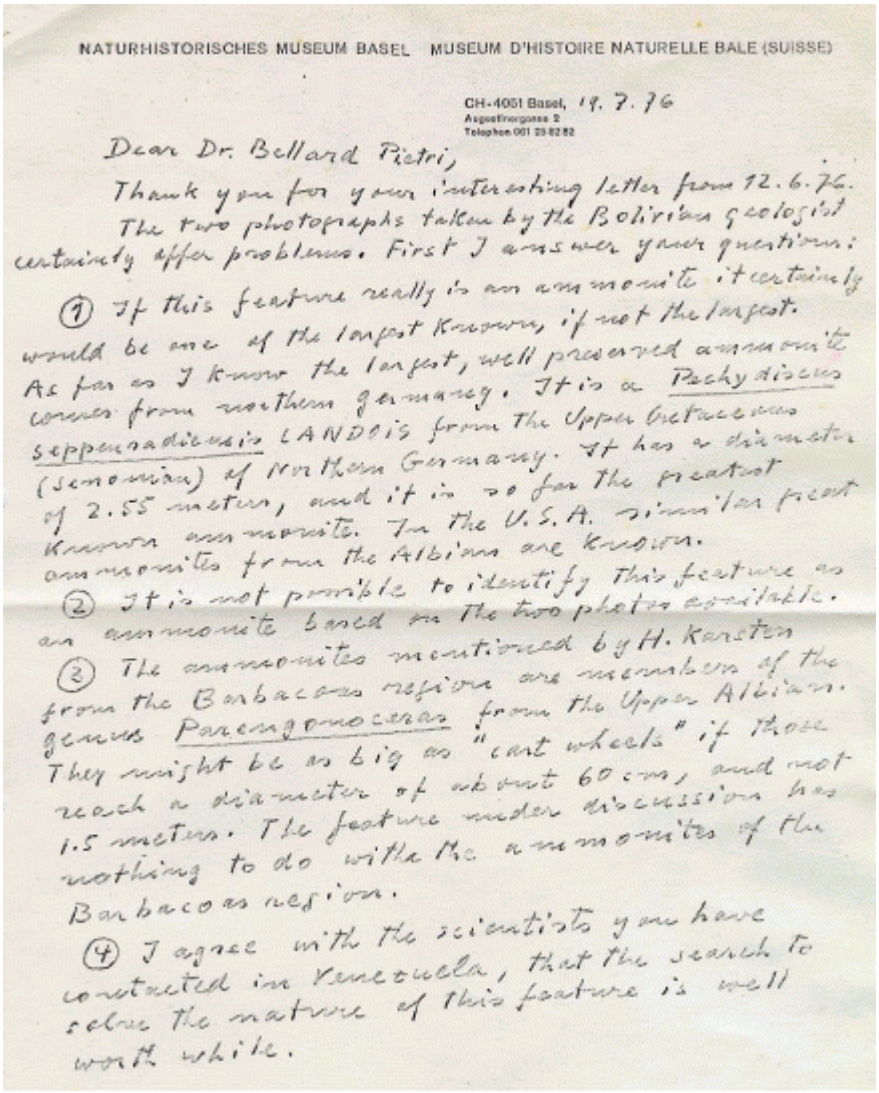
Weiter danke ich Ihnen bestens für die Überlassung der kleinen Sammlung und ich habe Herrn Dr. Gachet, Direktor der geol. Abteilung des Museums entsprechend verständigt.

Mit den besten Grüssen und vielen Dank Ihr

O.R.

Otto Renz: sample of handwriting

Carta dirigida al Dr. Danilo Rigassi por el
Dr. Otto Renz en el año 1966



NATURHISTORISCHES MUSEUM BASEL MUSEUM D'HISTOIRE NATURELLE BALE (SUISSE)

CH-4051 Basel, 19.7.76
Augustinergasse 2
Telephon 061 25 82 82

Dear Dr. Bellard Pietri,

Thank you for your interesting letter from 12.6.76. The two photographs taken by the Bolivian geologist certainly offer problems. First I answer your questions:

(1) If this feature really is an ammonite it certainly would be one of the largest known, if not the largest. As far as I know the largest, well preserved ammonite comes from northern germany. It is a Pachydiscus seppenradiensis LANDOIS from the Upper Cretaceous (Senonian) of Northern Germany. It has a diameter of 2.55 meters, and it is so far the greatest known ammonite. In the U.S.A. similar great ammonites from the Albian are known.

(2) It is not possible to identify this feature as an ammonite based on the two photos available.

(3) The ammonites mentioned by H. Karsten from the Barbacoas region are members of the genus Parengonoceras from the Upper Albian. They might be as big as "cart wheels" if those reach a diameter of about 60 cm, and not 1.5 meters. The feature under discussion has nothing to do with the ammonites of the Barbacoas region.

(4) I agree with the scientists you have contacted in Venezuela, that the search to solve the nature of this feature is well worth while.

Carta dirigida al Dr. Eugenio De Bellard Pietri por el Dr. Otto Renz en el año 1976 (Página 1)

NATURHISTORISCHES MUSEUM BASEL MUSEUM D'HISTOIRE NATURELLE BALE (SUISSE)

CH-4051 Basel,
Augustinergasse 2
Telephon 061 25 82 82

Observing the photograph with the rocks as background one gets the impression that this feature represents not a spiral, but rather a ring, which lower side has been destroyed:

It must have been freed from its matrix, which possibly is exposed along the lower part of the photo with the man on the left side. It looks like a rather coarse grained, unbedded sediment. According to my feeling we cannot exclude that this feature has been formed by erosion processes. If this is so it might be something like a concretion.

Recommendations: I think that the most important thing to do is to go to Altagracia de Orituco. As many people as possible should be contacted showing them the photographs. Especially the campesinos, which best know their surroundings might know about the existence of this feature.

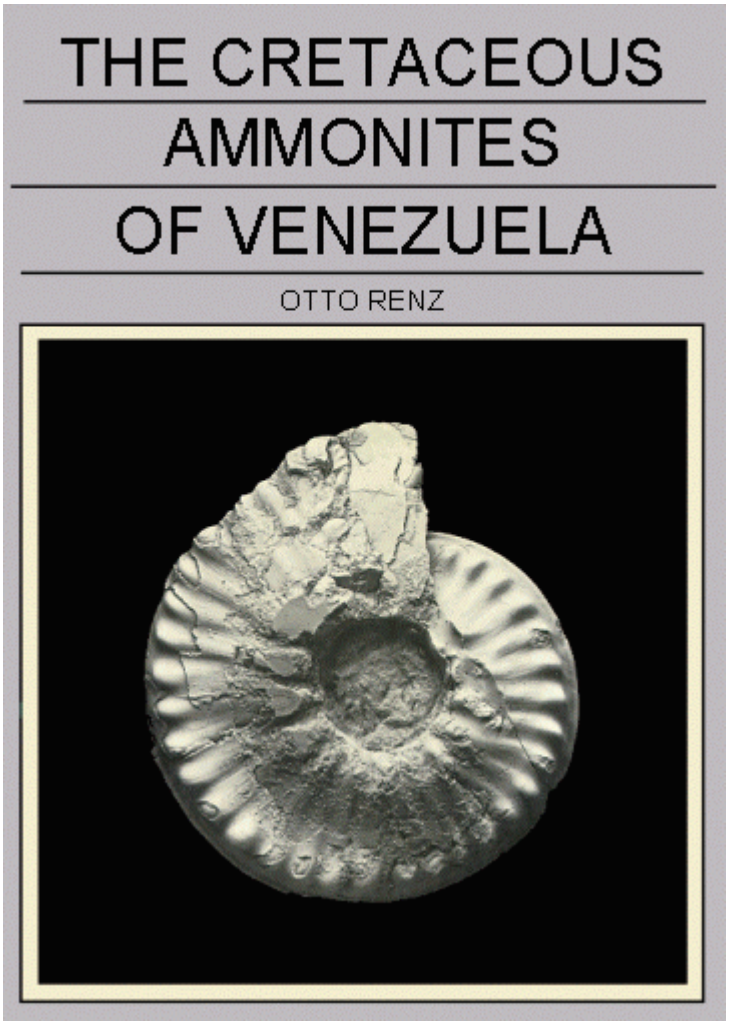
This is about all we can say at present. Please informe me about the results of your investigations.

With best greetings and saludos to the people of Venezuela.

Yours sincerely

O. Renz

Carta dirigida al Dr. Eugenio De Bellard Pietri por el Dr. Otto Renz en el año 1976 (Página 2)



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Otto Renz and the Microfossil Heritage of Ambrogio Soldani

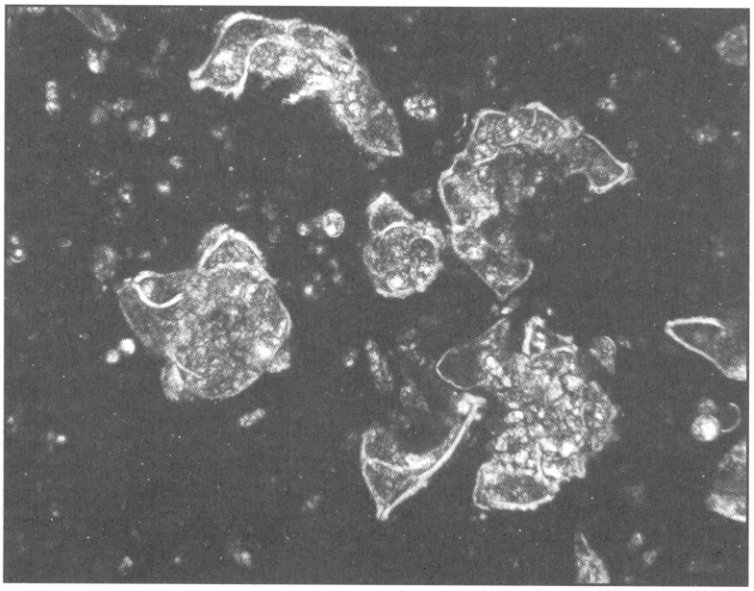
Ambrogio Soldani's pioneering work on microfossils at Siena in the late eighteenth century had to wait more than a hundred years before its potential was finally realized. But at last, at the beginning of the twentieth century, geologists began to make serious use of microfossils, and especially of the Foraminifera. With petroleum companies drilling wells all over the world in the search for oil, the tiny and often very abundant forams emerged as the ideal tool for determining the ages of marine sedimentary rocks.

As Soldani had done, specialists called micropaleontologists would wash away the soft matrix of clay and silt, clean off the forams, and study them under the microscope. Micropaleontologists named the genera and species of forams, worked out their evolutionary family tree, and tied that family tree into the standard geological timescale. Forams offered a wonderful new tool for dating rocks.

The *Scaglia* limestones of the Apennines are full of forams. Even Brother Elias must have seen them, as tiny specks, in the limestone from the Assisi quarries that he used to build the Basilica of Saint Francis.

But they were frustrating to micropaleontologists, because the *Scaglia* is so solid and hard that it is impossible to get the forams out whole. When you hit a piece of *Scaglia* with a hammer, it breaks right across the forams, so you cannot see the surface details of the little shell that were needed to identify the species.

The breakthrough came in the early 1930s. A young Swiss geology student named Otto Renz was studying at the University of Bologna, where he was encouraged to investigate the *Scaglia*. Italian geologists suspected that some of the Apennine rocks were much younger than Bonarelli had thought in 1901, and the problem needed a careful, detailed study. Otto Renz accepted the challenge, and from 1932 to 1934 he roamed through the Umbria-Marche Apennines on a bicycle, mapping the geology, measuring stratigraphic sections of the *Scaglia*, and collecting samples[i].



Foram shells seen with a microscope, in a thin section of the Scaglia *limestone. The foram in the upper right happens to be cut in a profile that makes it easy to identify, but the other cuts are not diagnostic.*

The best exposures Renz found were in the Bottaccione Gorge at Gubbio. He measured the beds, drew diagrams, and collected samples, just as we were to do forty years later. Back to the lab, he made thin sections of the *Scaglia*. This is a standard geological technique for studying rocks. You cut the rock with a diamond saw, polish the surface flat, glue it to a glass slide, and grind it down so thin that you can see through it. Then you can identify the minerals and study all the fine details under a microscope.

Otto Renz did something new with his thin sections – he used them to identify the forams in the *Scaglia*! It was tricky because micropaleontologists were used to determining the species of whole, cleaned-off specimens, as Soldani had done, while all Renz could see was random cuts through the forams. Most of the cuts were useless, but occasionally he would see a profile that was diagnostic, as when you see a recognizable silhouette of a person's head.

It was not easy, but it was enough. Renz was able to identify the forams in thin section well enough to recognize their basic evolutionary changes. Most important, he recognized that all the forams of the genus *Globotruncana* became extinct partway up through the *Scaglia*. This, he knew, marked the end of the Cretaceous, and it had two important consequences.

First it meant that Bonarelli in 1901 had been wrong in thinking that all of the *Scaglia*, up to the *Scaglia cinerea*, was Cretaceous in age. In fact the upper part of the *Scaglia rossa* is Paleocene and Eocene, and the *Scaglia cinerea* is Oligocene. The tiny microfossils made it possible to correct an error of more than 40 million years.

Second, when Renz recognized the extinction of the genus *Globotruncana* in the *Scaglia rossa*, he set in motion the chain of events that would lead, almost fifty years later, to the recognition of the impact in Mexico that caused the extinction of the dinosaurs.

As Otto Renz was finishing his study of the forams in the *Scaglia*, he returned to the Apennines on a field excursion, and he tells of the great pleasure he had in visiting the *Scaglia* outcrops at Gubbio with Guido Bonarelli, then in his sixties[ii]. It must also have been a pleasure for Bonarelli to see how this young Swiss geologist could now use tiny fossils to date those hard limestones that had frustrated him when *he* was a young geologist.

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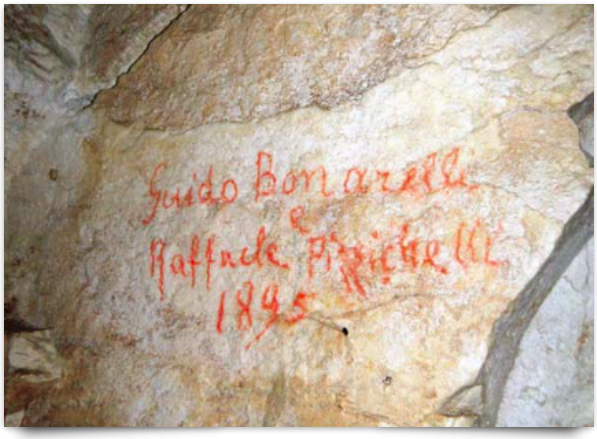
[i] This account is based on Renz's own introduction to his PhD thesis (Renz, O., 1951, Ricerche stratigrafiche e micropaleontologiche sulla Scaglia (Cretaceo Superiore-Terziario) dell'Appennino centrale [Italian translation of the thesis in German, 1936]: Memorie Descrittive della Carta Geologica d'Italia, v. 29, p. 11-12), and on an obituary in Spanish written in Venezuela, where Renz worked for many years (www.pdvsa.com/lexico/pioneros/renz.htm).

[ii] Renz, O., 1951, op. cit., p. 12.

Walter Alvarez on the Geological Discovery of the Bottaccione Gorge at Gubbio

Monday, June 27, 2016



Walter Alvarez, professor of the graduate school and eminent scholar of Earth history and tectonics, writes an article in the *GSA Special Papers*. This is a fascinating read on the history of geology and the development of the field of earth & planetary science.

The Bottaccione Gorge at Gubbio, Italy, a source of many discoveries in Earth history, was first recognized as an outstanding geological section by Guido Bonarelli (1871–1951). Bonarelli is remembered today mainly for the meter-thick Bonarelli Level, the local manifestation of oceanic anoxic event 2 (OAE 2), which he first recognized and described. Setting aside Bonarelli's long and distinguished career as a petroleum geologist in Borneo and Argentina, this paper concentrates on his role in the long and difficult effort to date the Scaglia rossa pelagic limestone of the Bottaccione Gorge and the surrounding Umbria-Marche Apennines. Old photographs show a barren Bottaccione Gorge a century ago; Bonarelli apparently had much better outcrops than we do today, after reforestation shortly before the middle of the twentieth century. In the absence of macrofossils, and with the inability to extract isolated foraminifera from these hard limestones, the Scaglia was dated indirectly in the late nineteenth century, and believed to be entirely of Cretaceous age, implying errors as great as 40 m.y. We can now understand why this dating seemed satisfactory at the time, because it did not conflict with Charles Lyell's view that there should be a huge hiatus corresponding to a major faunal overturn like the Cretaceous-Paleogene (K-Pg) boundary, and because thrust faulting that contradicted it had not yet been discovered. The K-Pg boundary was correctly placed within the Scaglia in 1936 when Otto Renz identified the foraminifera in thin section. Renz wrote with pleasure of a field trip with Bonarelli, who later presented Renz's new dating to the Società Geologica Italiana on a 1940 field trip to Gubbio. These two are the predecessors of all the geologists who have worked in the Bottaccione Gorge since the Second World War.

Professor Alvarez has been a faculty member at Berkeley since 1977. He is most famous for the theory that dinosaurs were killed by an asteroid impact, developed in collaboration with his Nobel Prize winning father Luis Walter Alvarez.

The article can be found here.

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THE CRETACEOUS AMMONITES OF VENEZUELA

OTTO RENZ

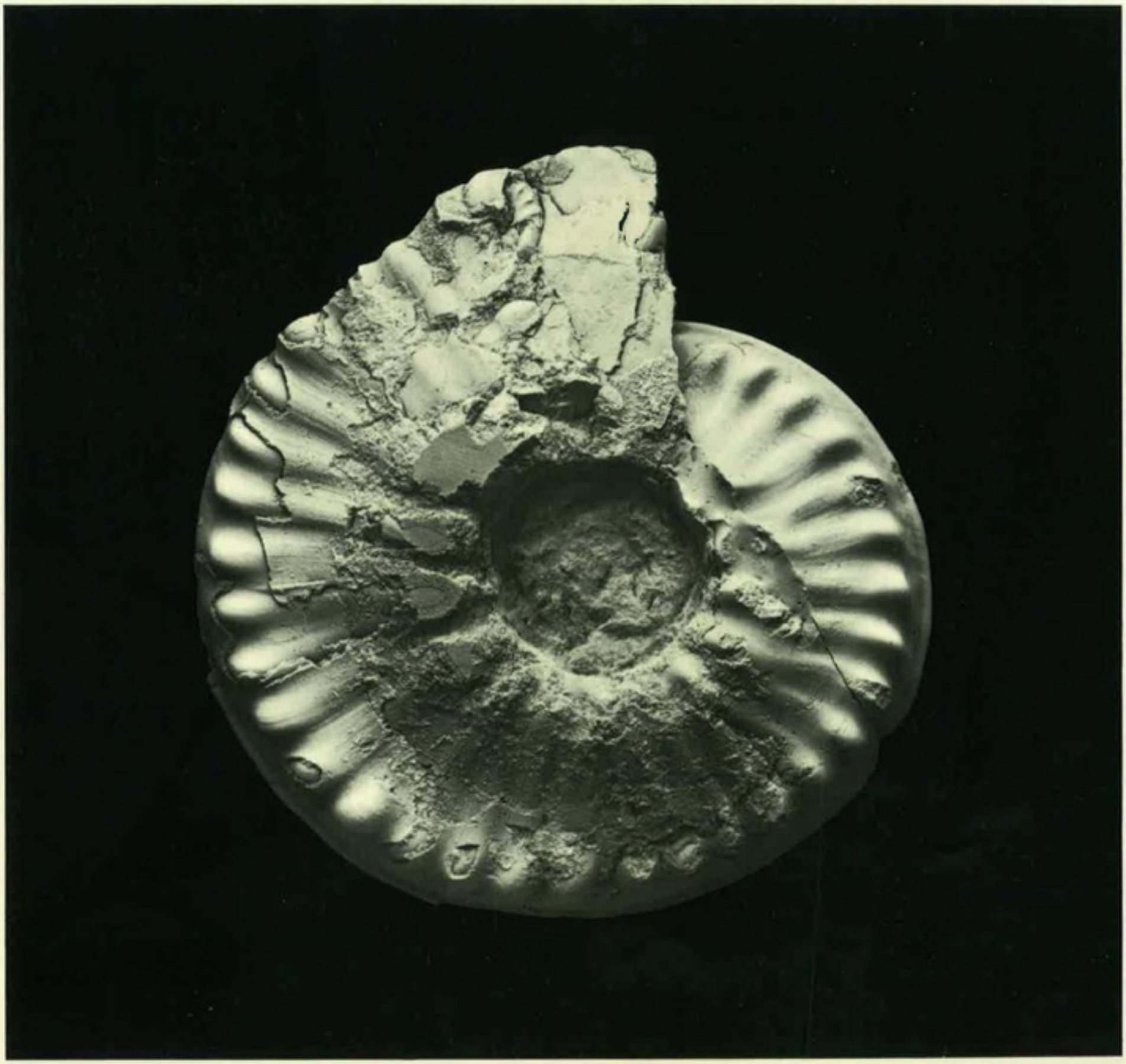

Plate 31

Lower Turonian, continued

Fig. 1a–b
Hoplitoides aff. *wohltmanni* v. Koenen
MBJ28522, Chejendé Member, culmination of road Barbacoas–San Pedro, lower Turonian, 1×. p. 100

Fig. 2a–b
Hoplitoides aff. *wohltmanni* v. Koenen
VK1283B-1 (J30574), allochthonous boulder in Guárico flysch south of Ortiz, Los Robles de Ortiz, Estado Guárico, lower Turonian, 1×. See *Benueites reymenti* Collignon, VK 1283B-d, from opposite side of specimen. Text fig. 70, fig. e. p. 100

Fig. 3a–b
Hoplitoides munieri Pervinquière
Re6851 (J30341), type section Chejendé Member, La Morita, Assemblage 1, lower lower Turonian, 1×. p. 100

Fig. 4a–b
Hoplitoides munieri Pervinquière
MBJ28524, Chejendé Member, culmination of road Barbacoas–San Pedro, lower Turonian, 1×. p. 100

Fig. 5a–b
Hoplitoides cf. *munieri* Pervinquière
Re6852 (J30368), type section Chejendé Member, La Morita, Assemblage 1, lower lower Turonian, 1×. p. 100

Fig. 6a–b
Hoplitoides munieri Pervinquière
Re6884 (J30348), type section Chejendé Member, La Morita, Assemblage 2a, upper lower Turonian, 1×. p. 100

Fig. 7a–b
Hoplitoides aff. *mirabilis* Pervinquière
Re6882 (J30346), with weak folds, type section Chejendé Member, La Paragua, Assemblage 2a, upper lower Turonian, 1×. p. 99

Fig. 8a–b
Hoplitoides aff. *mirabilis* Pervinquière
Re6883 (J30379), type section Chejendé Member, La Paragua, Assemblage 2a, upper lower Turonian, 1×. p. 99

Fig. 9a–b
Hoplitoides aff. *mirabilis* Pervinquière
Re6863 (J30363), with weak folds, type section Chejendé Member, Los Mamones, Assemblage 2, mid lower Turonian, 1×. p. 99

Fig. 10a–b
Hoplitoides mirabilis Pervinquière
Re6923 (J30364), variety with deeply grooved venter, type section Chejendé Member, La Paragua, Assemblage 2a, upper lower Turonian, 1×. p. 99

Fig. 11a–b
Hoplitoides munieri Pervinquière
Re6935 (J30482), type section Chejendé Member, Los Mamones, Assemblage 2, mid lower Turonian, 1×. p. 100