

The different faunas of Soldado Rock

Objekttyp: **Chapter**

Zeitschrift: **Eclogae Geologicae Helvetiae**

Band (Jahr): **68 (1975)**

Heft 3

PDF erstellt am: **22.05.2024**

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But also in the stratified sediments the uneven distribution of the fossils is striking. Highly fossiliferous layers alternate with barren streaks, and the same bed, when followed laterally over any kind of distance, may show great differences in the fauna. For instance, the sample taken from Bed 9 at its outcrop in the measured section of the saddle (K. 2952, in square D-3 on the map) is barren, but the equivalent sample K. 1499 (E-2) carries a very rich fauna; Bed 7 is represented in the saddle by a typical Hantkenina marl with only a handful of Larger Foraminifera (K. 2954, D-4), but in K. 2855 (F-3) they occur in great quantities. This may be due to local variations in depth as well as to passive selection by sea currents or gravity. In several places, the presence of entire populations of Larger Foraminifera, from embryos to large adult forms of both generations and unsorted as to shape, is proof of sedimentation under very quiet water conditions on a level bottom. Turbidity currents must be held responsible for the later introduction of reworked older fossils.

The different faunas of Soldado Rock

VAUGHAN & COLE were well aware that the material at their disposal was insufficient to work out anything more elaborate than a "Preliminary Report". Our much more extensive collection now makes it possible to present a more complete inventory of the Soldado faunas. On the other hand, a few names that figure in the 1941 list are left out: *Discocyclina cubensis* (already dropped by VAUGHAN in 1945) and *Lepidocyclina* "sp. indet. 2" are insufficiently characterized for recognition; *Lepidocyclina* sp. aff. *ocalana pseudocarinata* has been included in the synonymy of our new species *Lepidocyclina spatiosa*, and *Lepidocyclina macdonaldi*, mentioned as "probably present in a mixture of K. 1316 and K. 1499", has been ignored.

The heavy reworking that has affected nearly all the deposits of the San Fernando Formation on Soldado Rock made it difficult to establish the vertical range of some of the species and even interfered with the age determination of the beds. In Bed 3, for instance, the Late Eocene fauna, represented by one specimen each of *Operculinoides soldadensis* and *Lepidocyclina pustulosa trinitatis*, is all but obscured by the very rich reworked Paleocene material. For the pertinent data we refer to the Distribution Chart (see Part 1), but for quick orientation a review of the autochthonous assemblages in the various beds (in numerical order) may be useful:

Bed 1

no trace of Larger Foraminifera found

Bed 2

"in situ":

Ranikothalia sp., small thickwalled form ("antillea")

? *Neodiscocyclina* sp., very small form

Amphistegina sp. div., including *A. cf. undecima*?

Dasyclad algae

In slumped masses and erratic blocks from deposits that probably have covered Bed 2 before erosion (for terminology, see Part 1 of this publication):

a) Dasyclad algae limestone:

Amphistegina sp.

Dasyclad algae

b) Athecocyclina limestone

*Ranikothalia antillea**Athecocyclina soldadensis**Neodiscocyclina* cf. *barkeri**Neodiscocyclina aguerreverei**Amphistegina* sp.c) *Ranikothalia* limestone, *Neodiscocyclina grimsdalei* limestone and intermediate units:*Ranikothalia antillea**Ranikothalia tobleri**Ranikothalia soldadensis**Hexagonocyclina inflata**Athecocyclina soldadensis**Neodiscocyclina barkeri**Neodiscocyclina grimsdalei**Neodiscocyclina mestieri**Neodiscocyclina* sp. indet. 1*Amphistegina* sp.

d) from disappeared softer marly beds between the limestones, reworked as detached specimens in the Upper Eocene:

*Ranikothalia antillea**Ranikothalia tobleri**Ranikothalia soldadensis**Hexagonocyclina inflata**Hexagonocyclina meandrica**Actinosiphon barbadensis**Athecocyclina soldadensis**Neodiscocyclina barkeri**Neodiscocyclina* cf. *caudriae**Neodiscocyclina grimsdalei**Neodiscocyclina aguerreverei**Neodiscocyclina fonslacertensis**Neodiscocyclina mestieri**Amphistegina* sp.

Bed 3

*Operculinoides soldadensis**Lepidocyclina pustulosa trinitatis*

Bed 4

*Operculinoides soldadensis**Operculinoides* sp. indet. (in hard rock)*Asterocyclina asterisca**Lepidocyclina peruviana**Lepidocyclina pustulosa**Helicolepidina spiralis**Amphistegina* sp.

Beds 5 and 6

barren

Bed 7

*Operculinoides soldadensis**Operculinoides ocalanus**Operculinoides kugleri**Operculinoides trinitatis**Operculinoides trinitatis* *granulatus**Proporocyclina mirandana**Asterocyclina asterisca**Asterocyclina soldadensis**Lepidocyclina peruviana**Lepidocyclina pustulosa* s.s.*Lepidocyclina pustulosa trinitatis**Lepidocyclina pustulosa tobleri**Lepidocyclina pustulosa compacta**Lepidocyclina* sp. indet. 1*Lepidocyclina* sp. indet. 2*Helicolepidina spiralis**Amphistegina grimsdalei**Helicosteginopsis soldadensis**Sphaerogypsina globulus* s.l.*Cycloloculina jarvisi*

Bed 8

barren

Bed 9

Operculinoides soldadensis
Operculinoides ocalanus
Operculinoides kugleri
Operculinoides trinitatis
Proporocyclina mirandana
Asterocyclina asterisca
Asterocyclina vughani
Asterocyclina aff. monticellensis

Lepidocyclina peruviana
Lepidocyclina pustulosa s.s.
Lepidocyclina pustulosa tobleri
Lepidocyclina spatiosa
Helicolepidina spiralis
Amphistegina grimsdalei
Helicosteginopsis soldadensis (A- and B-forms)

Bed 9a

Operculinoides soldadensis
Operculinoides ocalanus
Operculinoides kugleri
Operculinoides trinitatis
Operculinoides trinitatis granulatus
Operculinoides spiralis
Proporocyclina mirandana
Asterocyclina asterisca
Asterocyclina soldadensis
Lepidocyclina peruviana
Lepidocyclina pustulosa s.s.
Lepidocyclina pustulosa trinitatis
Lepidocyclina pustulosa tobleri
Lepidocyclina pustulosa, transition to *compacta*

Lepidocyclina spatiosa
Lepidocyclina ? sanfernandensis (B-form)
Lepidocyclina subglobosa
Lepidocyclina, transition forms from
L. pustulosa to *L. yurnagunensis*
Lepidocyclina sp. indet. 1
Helicolepidina spiralis
Amphistegina grimsdalei
Helicosteginopsis soldadensis
Helicosteginopsis, transition forms between
H. soldadensis and *Helicocyclina paucispira*
Helicocyclina paucispira, small non-typical
 juvenile specimens
Gypsina sp.

Bed 10

Operculinoides soldadensis
Operculinoides ocalanus
Operculinoides kugleri
Operculinoides trinitatis
Operculinoides spiralis
Proporocyclina mirandana
Asterocyclina asterisca
Asterocyclina vughani
Lepidocyclina peruviana
Lepidocyclina peruviana nana

Lepidocyclina pustulosa s.s.
Lepidocyclina pustulosa trinitatis
Lepidocyclina pustulosa tobleri
Helicolepidina spiralis
Amphistegina grimsdalei
Amphistegina sp., cf. *pregrimsdalei*
Amphistegina sp. indet., aff. *lessoni*
Amphistegina sp. indet. div.
Sphaerogypsina globulus s.l.
Cycloloculina jarvisi

Bed 11

1. Lower part (area C-3 and D-3 on location map):

Operculinoides sp. indet., small form
 (very rare, in block K. 10715 only, B-3)
Proporocyclina tobleri

Neodiscocyclina bullbrooki
Amphistegina undecima
Amphistegina pauciseptata

2. Upper part (area B-2, C-1 and D-1 on map):

Operculinoides cf. *soldadensis* (one small specimen)
Proporocyclina tobleri
Pseudophragmina s.s. sp.
Neodiscocyclina sp. aff. *barkeri*, B-form
 (one specimen)

Neodiscocyclina bullbrooki
Neodiscocyclina mauryae
Amphistegina undecima
Amphistegina pauciseptata
Sphaerogypsina globulus s.l.

Bed 12

barren