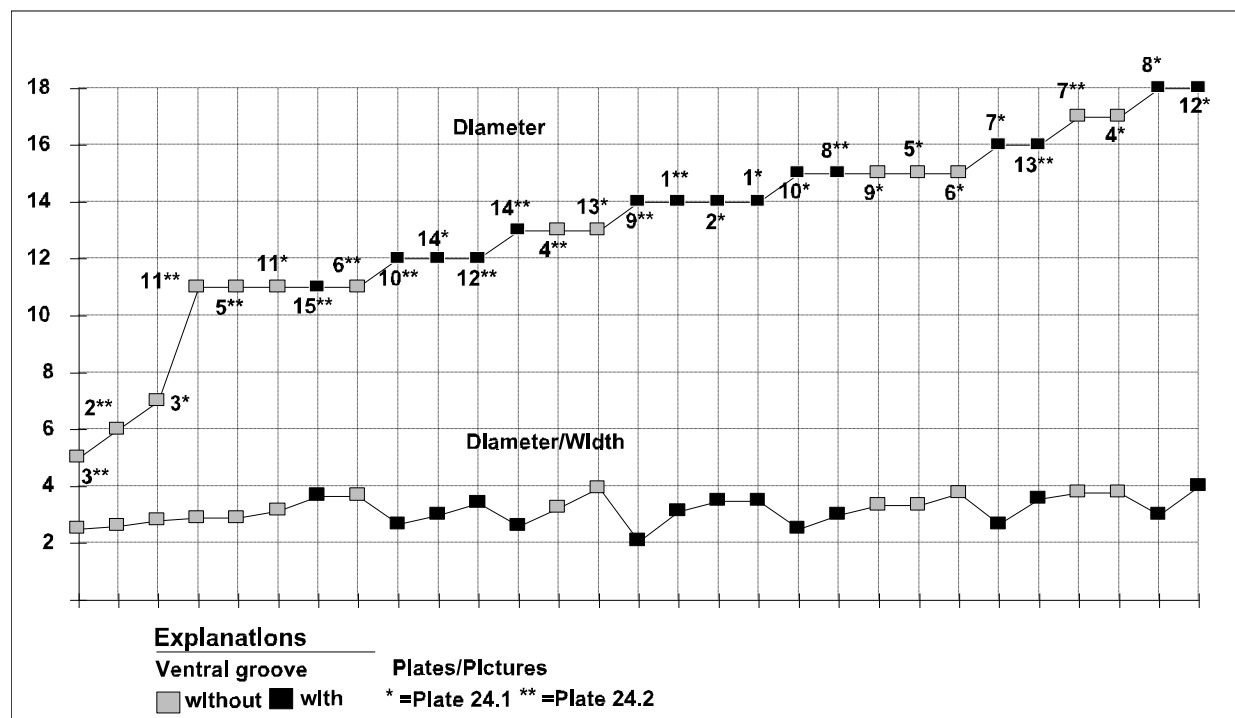


Scaphitodites

Scaphitodites scaphitoides = *Oekotraustes scaphitoides* (DE LORIO 1900 – plate 4/12-15)



Variants of Scaphitodites "scaphitoides" according plate 24.1 and 24.2

The diameter varies between 5 and 18 mm (findings only with hooked body chamber), the ratio shell diameter to shell width is between 2.2 to 2.8 with same shell diameter. At the same time there are species with a distinct ventral groove on the last third of the phragmokon before body chamber starts.

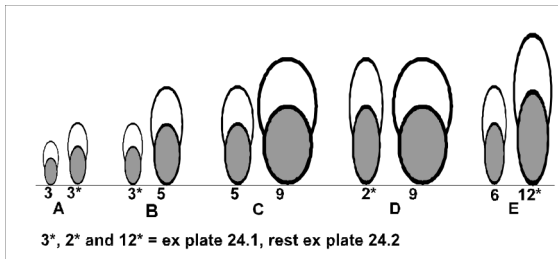
While HAAS is specially mentioning this ventral groove (plate 20.2 / fig.10,11), there is no according remark on *Scaphitodites navicula* (Palaeont. Association / see literature index) though the picture looks absolutely similar to *Scaphitodites scaphitoides*.

The above shown figure 4.841 shows the diameter and the ratio diameter to width of *Scaphitodites* shown on plate 24.1 or 24.2 respectively. All examples show the typical body chamber which means that all types have been grown up. The examples of plate 24.2 / fig. 11 and 15 show intimated ribs on the phragmokon.

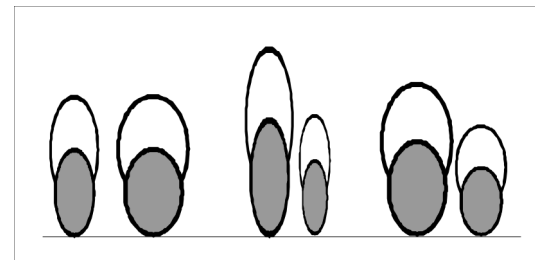
Types which are shown with black squares in the above shown figure have a more less distinct ventral groove at the beginning of the body chamber (like most of the findings).

Though for me measurements like in figure 4.841 are not so important, the examples show some remarkable differences like diameter of 1:3 or ratio diameter to width of 1:2. Besides that it is obvious that the bend body chamber may look quite different (compare plate 24.2/14 or plate

24.1/12 or 24.1/8). On one hand having some groupings based on these few criterions does not seem to make sense. On the other hand I have difficulties to imagin that a grown up species of 5-7 mm in size should be the same species having a diameter of 16-18 mm. Even the way out by statements like micro- or macro conch does not seem to be a solution, because there are better examples for having "pairs" as there are for example:

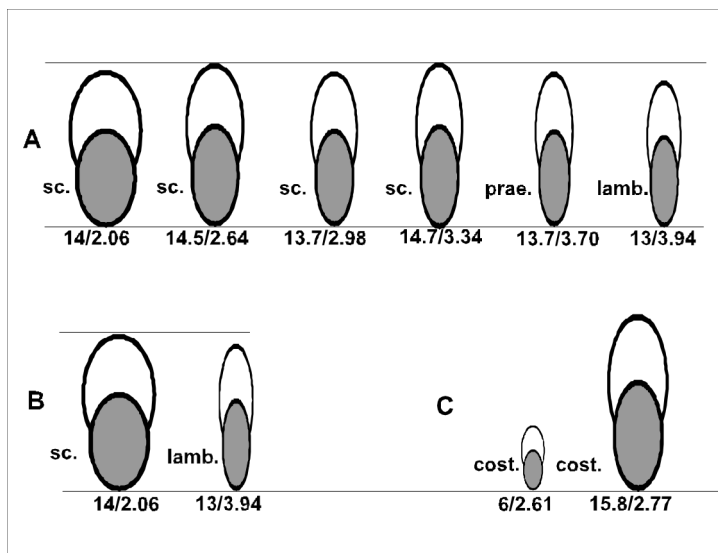


Micro- and Macro-Conch ? of Scaphitodites



Examples only from La Billaud

Arrangement according fig. 4.842 does not show findings of the same subchrone as the base is plate 24.1 and 24.2 respectively. But according to the collection (further 65 examples) it is no problem to arrange similar examples of the same locations (= same subchrone) see fig. 4.843 at the appendix. A-E are arbitray groupings of different findings.



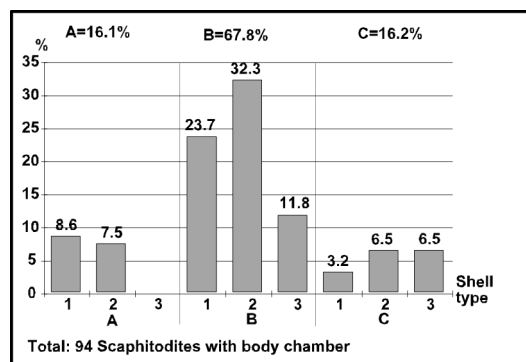
The "Variability" of Scaphitodites

For me highly interesting is the fact that certain Glochiceratids have a "ventral groove" at the beginning of the body chamber (e.g. GYGI 1991 / plate 5/3) like some Scaphitodites scaphitoides ? , others directly resemble Scaphitodites (Gy91 / Tafel 3/3+4).

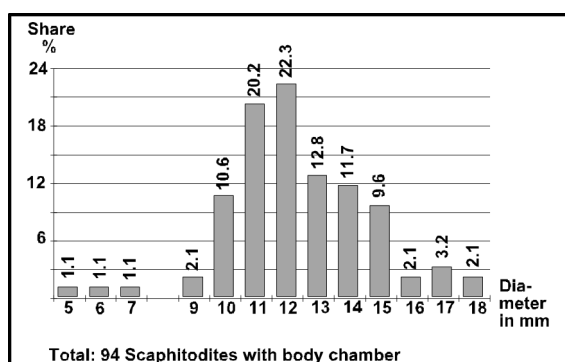
"Arbitrary" grouping of the Scaphitodites (all same scale)

Shell diameter : shell width = shell factor (SF)														
		SF 0 (= <2.1)	1 (= 2.1-2.89)		2 (= 2.9-3.49)		3 (= >3.5)							
Diameter (mm)	scale: approx. x1.5	A (= 5-10.9)	 sc.		 pr.	 co.	 R.	No findings with body chamber						
			5/2 2.5		6/2.3 2.61	9.7/4.1 2.37	10.6/3.9 2.72	9.6/3.2 3.0	10.9/3.2 3.41					
		B (= 11-14.9)	only 1 piece with body chamber  sc.		11/3.8 2.89		14.5/5.5 2.64		11.3/3.9 2.9		14.3/4.2 3.4		11.3/3.2 3.53	
Typ	C (= >15)	 pr.		 co.		 sc.		 pr.		 pr.		 sc.		
		15/6 2.5		15.8/5.7 2.77		15/5 3.0		18/6 3.0		15/4 3.75		18/4.5 4.0		
Explanations :														
xx.x/y.y = Diameter / width z.zzz = Shell factor				la. = lamberti-Sz. sc. = scarburgense-Sz.				pr. = praecordatum-Sz. co. = bukowskii-/costicardia-Sz.				R. = Renggeri-Ton (nicht näher definiert)		

Fig. 4.845: "Arbitrary" grouping of the Scaphitodites (all same scale)



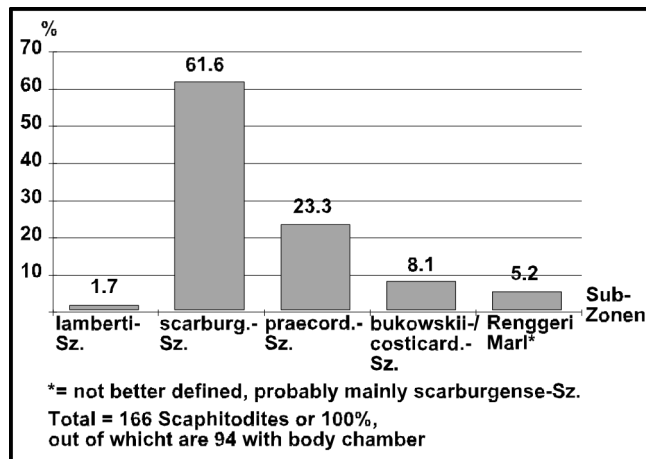
Grouping acc. prev. graph



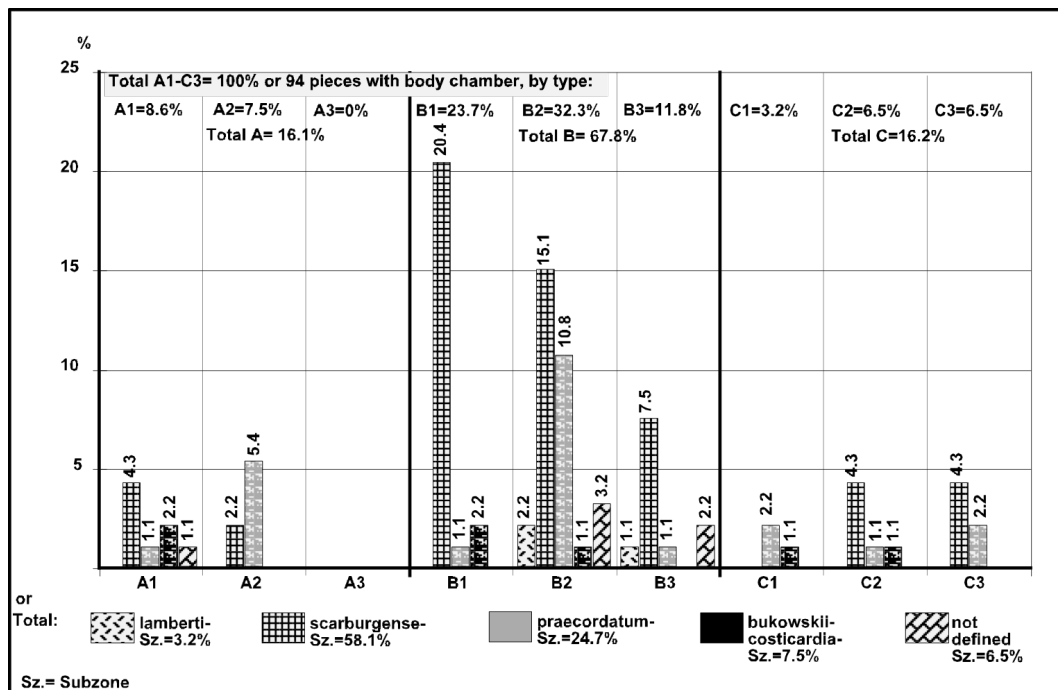
Grouping by diameter

Picture above shows, that 2/3 of the measurable findings correspond type B or according to The picture to the right about 80% of the findings have a diameter of 10-15 mm.

The picture below shows that the main occurrence of this genus / species is in the *Scarburgense* sub-chron.



The occurrence of Scaphitodites



The occurrence of *Scaphitodites* type by subchron

Summary

The following variants of *Scaphitodites* can be differentiated in the Renggeri marl:

- very small forms (size of approx. 5-7 mm), very rare (possibly just overlooked ?)
- medium sized forms (size of approx. 10-12 mm), predominating in the search area
 - a) slim shells (majority of the findings)
 - b) thick shells (seem to be restricted to La Billaud)
- big sized forms (16-18 mm in diameter). Remarkable less frequent, but widespread.
- with / without ventral groove (see page 92)

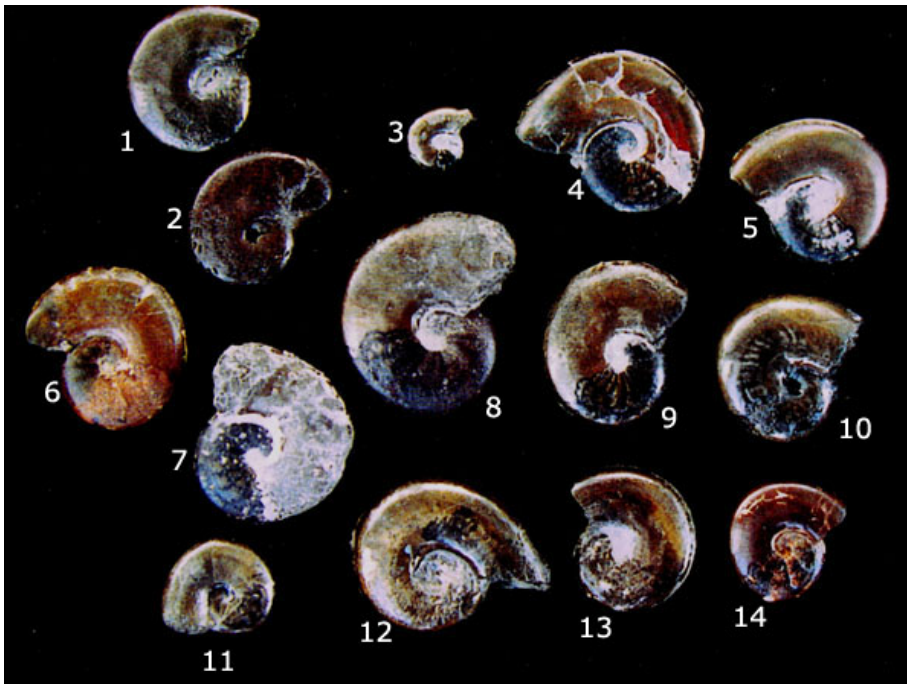
It should be left to the specialists, whether this grouping corresponds to the variance of *Scaphitodites scaphitoides*, whether there are macro- or micro conch or even different species.

The main occurrence of *Scaphitodites* (by frequency) with about 59.6% of all findings is at La Billaud, Eternoz and Champagne/bridge, that means early *Scarburgense* till early *Praecordatum* sub-chron. But it has been proved that they are already represented in *Lamberti* subchron

(Kandern) and still be found at *Costicardia* subchron (Villers-s/s-Montrond). The average frequency in the Renggeri marl is approximately 0.6% . Therefore generally this genus is quite rare.

Dimorphism within Scaphitodites

The following shown Scaphitodites represent an excerpt out of the collection R.Himmler at the Museum of Natural History Basel / CH, shown in: The Renggeri Marl and its Fossils, R.Himmler 1998.



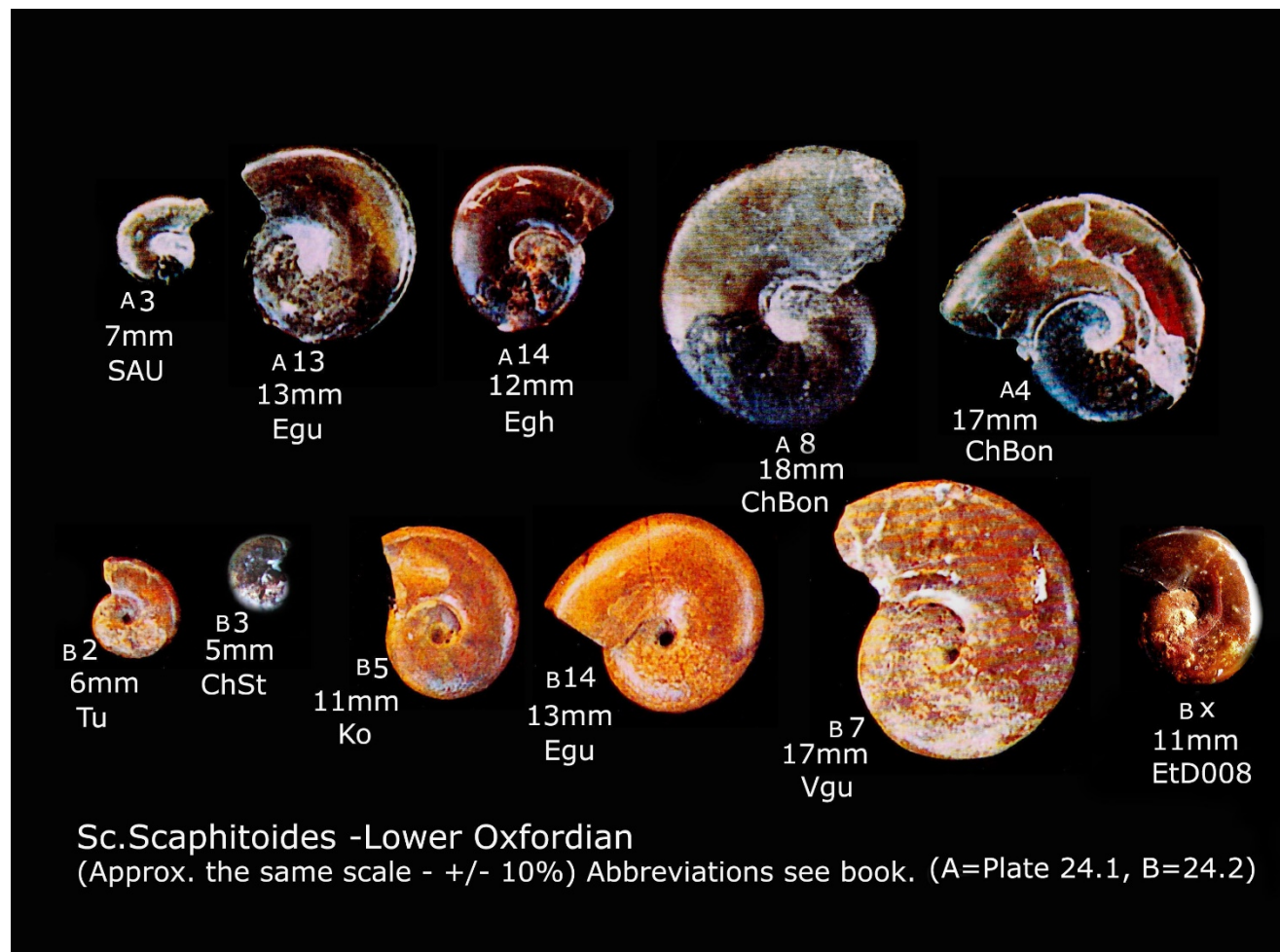
Excerpt: "Der Renggeri-Ton und seine Fossilien" –
Plate 24.1 Enlargement: $\sim x 2.0$



Excerpt: "Der Renggeri-Ton und seine Fossilien" –
Plate 24.2 Enlargement: $\sim x 2.1$

All shown examples have the typical scaphitoid bending (hook) of the body chamber of a grown up Scaphitodites.

What is eye catching is the enormous difference in size (with body chamber). The smallest example shown is only 5mm in diameter, but the biggest example measures 18mm, which is a difference of 1:3.6. Therefore it is obvious to look for a micro- and a Macro-conch, possibly for different species.



Trial of Grouping / Selecting

The picture above for me personally shows three groups of adult Scaphitodites (because all with a hooked body chamber), as there are

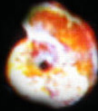
groups		types	mm
Small	Gr 1	A3, B2, B3	5-7
Medium	Gr2	A13, A14, B5, B14, Bx	11-13
Large	Gr3	A8, A4, B7	17-18

There are intermediates in size between the different groups, which differ in D/W (diameter/width) and the way the body chamber hook looks like. Possibly an analysis like I did for *Creniceras renggeri* (see page 82) would show additional grouping possibilities. But as I don't have enough statistical material here at Singapore, this question must be left open for further investigations.

Scaphitodites within Renggeri Marl



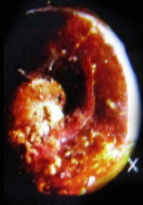
B3
5 mm
ChSt



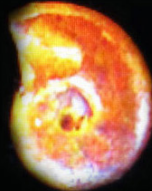
B2
6 mm
Ti



A3
7 mm
SAU



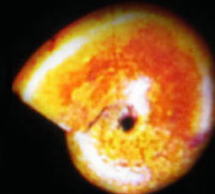
11 mm
EtD



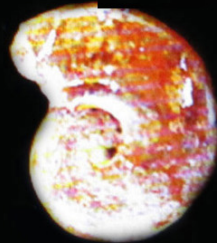
B5
11 mm
Ko



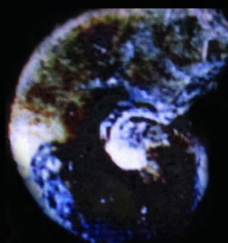
A14
12 mm



B14
13 mm



B7
17 mm
Vgu



A8
18 mm
ChBon

The three size-groups of Scaphitodites

As an argument, besides the hooked body chamber, according to

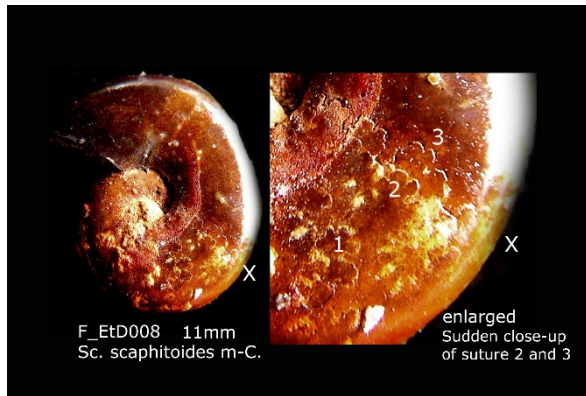
H.Markowski: 1971, S.337

"Close-up of sutur line is a sign for grown up. This fact is not sufficiently taken into account in literature."

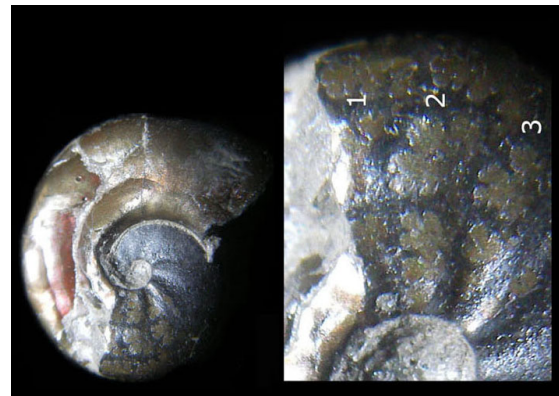
Own remarks / supplementing:

- A sudden close-up of the sutur line, which always is with the smaller partner of a dimorph pair (micro-conch) within 2-4 suture lines, is very obvious and not to fail to be seen.
- The close-up of the bigger partner (macro-conch) develops very slowly, practically on a total turn of a shell, and, as it is less obvious, one has to check very careful, especially if the sutur line is complicated.

"Unfortunately" the group of the middle sized ones (at least two examples) show a sudden close up of its suturline and therefore, according to what was said just above, would mean being a micro-conch. And if they are a micro-conch, the according macro-conch only can be one of the bigger ones, that means out of Group 3.



F-EtD008 11mm
Micro-conch

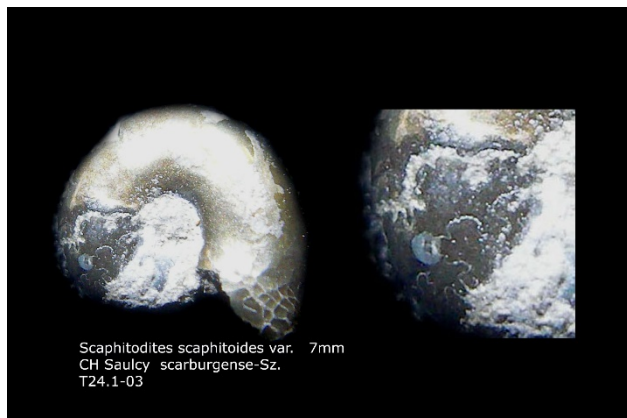


T24.1-04 F-ChBon 17mm
Macro-conch

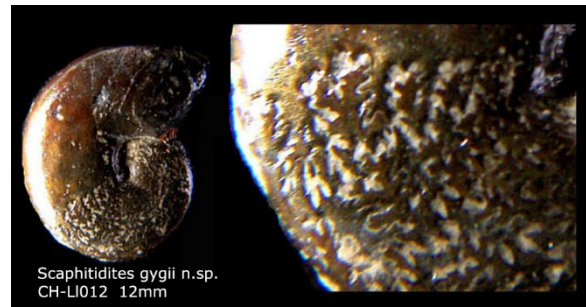
According to its size this Scaphitodites (above left) is of Gr.2 of the previous picture that means size wise it is in the middle of the shown findings. According to the sudden close up of the suture line it should be a micro-conch of a Scaphitodites (!?).

The according macro-conch (above right) must be therefore one of group 3 which are the bigger shells.

But if this is correct, what are the tiny examples A3 or B2 and B3 respectively? As they are much smaller than the above micro-Conch (pict. top/left) and the body chamber shows the typical adult change to a hook, it must be, according to Palframan's description, an "extreme small micro-Conch" ("dwarf micro-Conch", "micro-micro-conch"). But if one by logic rejects expressions like "giant micro conch" as well as "dwarf macro conch", the 3 species of group 3 must be a new species of Scaphitodites.



Scaphitodites gygii nov.sp.
7 mm micro-conch CH-Sau T24.1-03



Scaphitodites gygii n.sp.
12mm Macro-conch CH-LI012



Scaphitodites gygii n.sp.
12 mm Kandern/D Sammlung G.Knittel

According to the typical curved body chamber and the sudden close up of the suture line (looking at all 3 species at the museum at Basel in August 2012, only the above shown example showed a suture line, the others were covered by limonite), already because of being grown up (body chamber hook) and its very small size, these finding could be a micro-micro-conch or a micro-conch of a new species, because pict. 4 has already been told micro-conch of Sc.scaphitoides. (hopefully no one will start again talking about micromorphs, not well nourished species, dwarf forms because of life threatening surrounding like lack of oxygen, etc.). But which then is the according macro-conch? For sure not F_EtD008 on top page above, as this finding already was just considered a micro-conch (having a sudden close-op of the sutur line) of F-ChBon on top page above (France-Champagnole Bridge/top new)

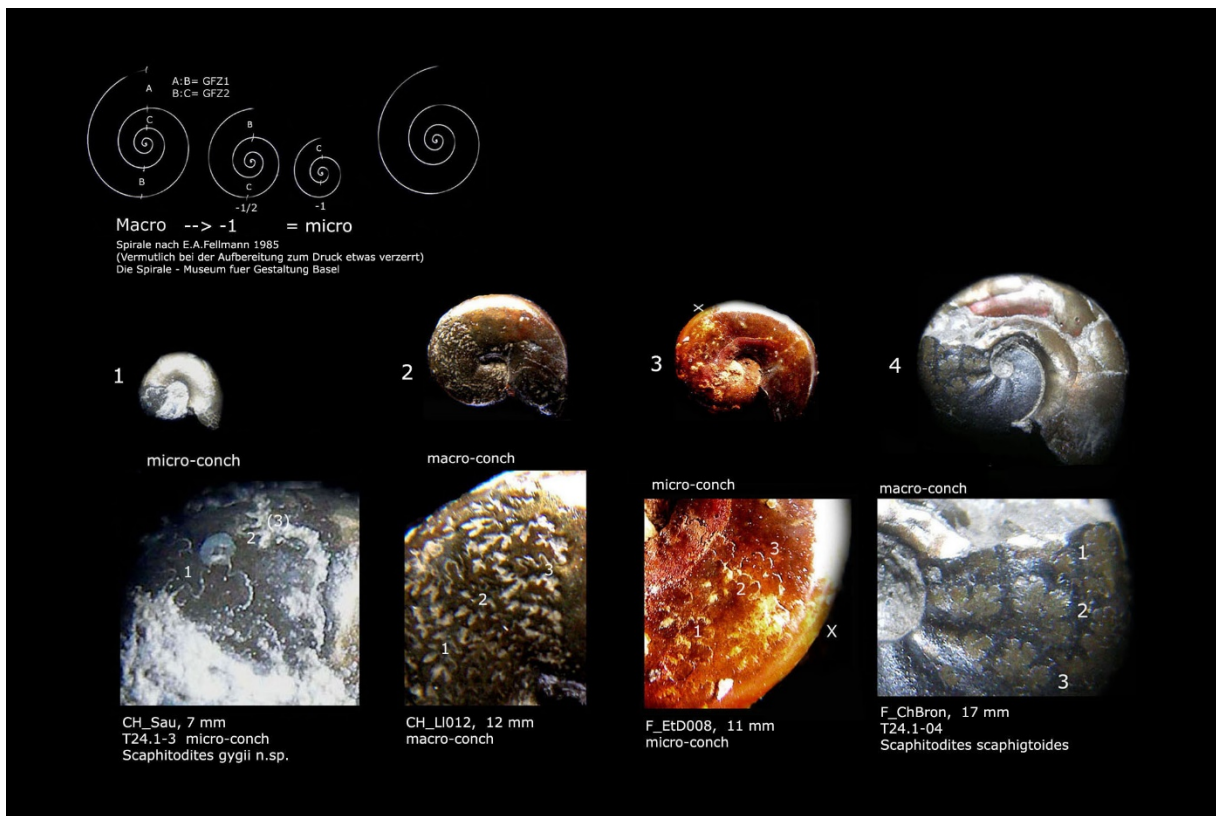
I personally don't believe that the variation of size within adult species and **same** number of windings should be more than 1:1.2. (**if at all !!** but only because of preservation of body chamber). Otherwise the growth according to the logarithmical spiral is a contradiction (or needs new interpretations, which I don't believe. I checked the spiral growth of several hundred medium cuts of ammonites, which were cut and polished for making pendants and other jewelry by a friend).

But if these are micro-conches, which are the macro-conches? Gr3 can't be, because they already have been classified / **believed** to be the macro-conch of Gr2. Logical wise **these searched macro-conches must have the size of approximately Gr2 !!**

Though I am living in Singapore and my collection is now in the Museum of Natural History / Basel, **I was lucky to find what I was looking for** in the left-overs of my collection at my place at Singapore.

Logical wise this must be the dimorph macro-conch of the new species of Scaphitodites. And again luckily a collector from Nuremberg area/D (Mr.G.Knittel) has sent me pictures of what he had found at the Ziegelei-Tongrube Kandern / D (close to Loerrach) (pict.8).

Additional remarks for better understanding:



Scaphitodites scaphitoides in comparsarion with Scaphitodites gygii n.sp.

The computer graphik on left top of should show the different sizes depending on number of windings. The two middle graphics show the same type with $\frac{1}{2}$ and 1 winding less compared to the outer types (left/right)

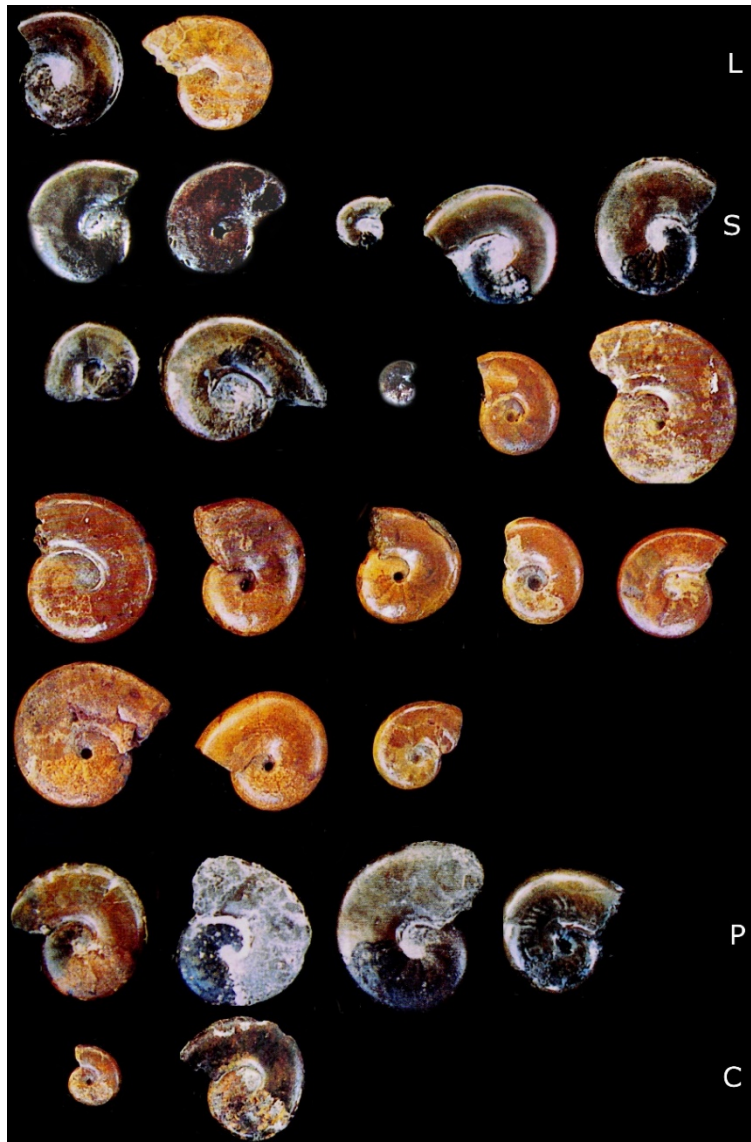
Similar size relations of micro-/macro-conch could be seen of Scaphitodites scaphitoides (3 & 4) and Scaphitodites gygii n.sp. (1 & 2). All examples showing a body chamber hook and therefore are grown up. For me personally two explanations are possible:

- a) two different species,
- b) shell (without body chamber) is not built by a logarithmical spiral (which **is very unlikely**) but interpretation of sutur line behavior fits (?!)

But there is another possibility (which should be shown at page 36:

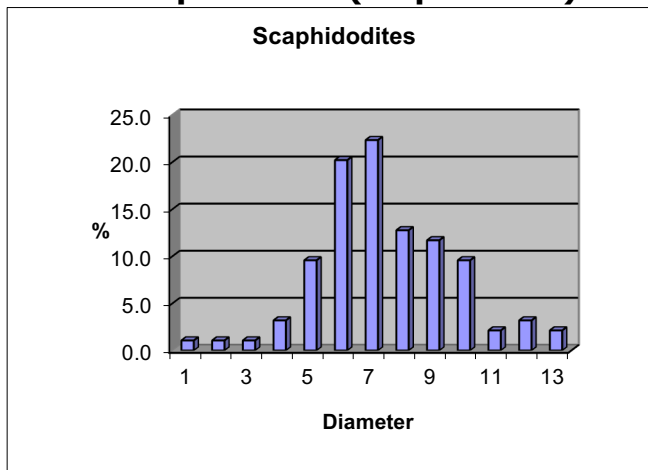
- c) embryonic chamber is different in size between male and female (micro- and macro-conch), which in my opinion is more than **very unlikely**

The following are additional information on genus Scaphitodites

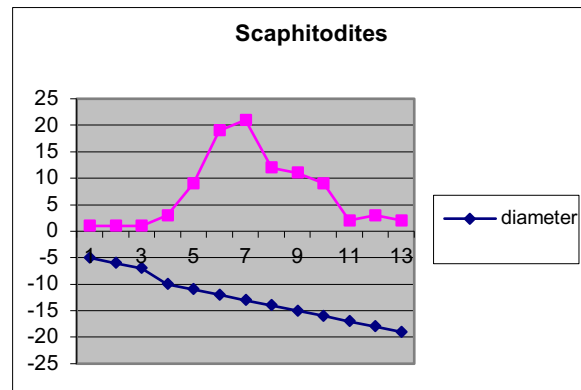


Scaphitodites by sub-zones:
L-lamberti, S-scrburgense, P-praecordatum, C-costicardia

Size of Scaphitodites (scaphitoides)

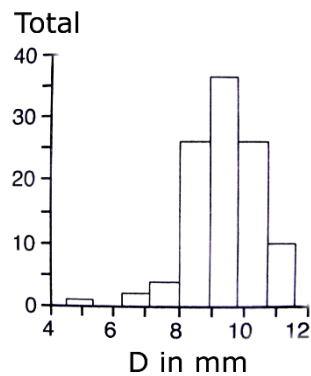


Total number: 94 grown up
 (with hook), 6f the total with a ventral groove
 Diameter: 1-3=5,6,7mm, 4-13=10-19mm
 Not yet separated Sc.gygii and Sc.scaphitoides



Blue: diameter in mm (5-19mm)
red: Frequency of diameter in % of total findings: Very small and very big shells are rare.

Scaphitodites scaphitoides



By P.Neige/D.Marchand

1997 / p.283

Size: They obviously have found some very small ones as well (5,7,8 mm)

Comment:

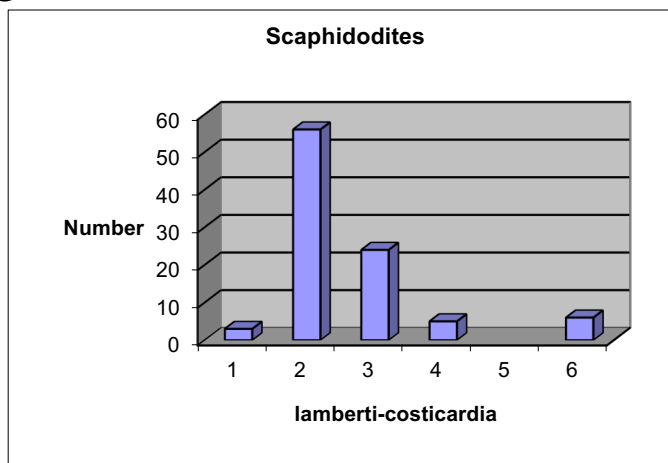
Obviously P.Neige / D.Marchand have found some **very small ones as well** (see above, graph. 4.5. 7 and 8 mm), but **no large ones**, which in my opinion are quite rarer compared to the micro-conches.

Same experience I have made with *Creniceras renggeri* where the ratio micro- to macro-conch is at least higher than 4:1

By the way: David Attenborough, a great presenter from BBC London/Bristol in a TV-film about squids made the remark:

Both sexes meet at a certain time of the year for mating and the ratio male to female is about 4:1, but this in my opinion might be a **random happening**.

Distribution in time



1- lamberti, 2- scarburgense,

3- praecordatum,

4- costicardia Subzone

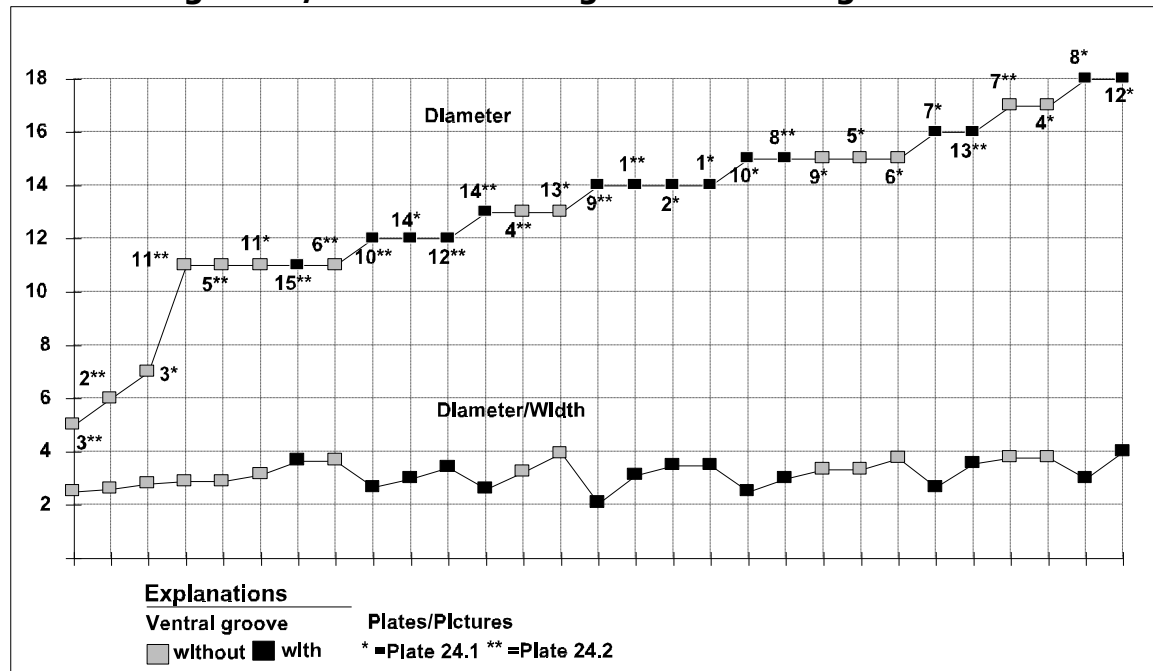
6- Renggeri marl (no better definition)

By far highest frequency is at scarburgense-Sz.

D. Marchand et al.

... characterized by a scaphitoid morphology and a ventral groove at the end of the phragmocone

Own findings with/without ventral groove according Pict.1+2

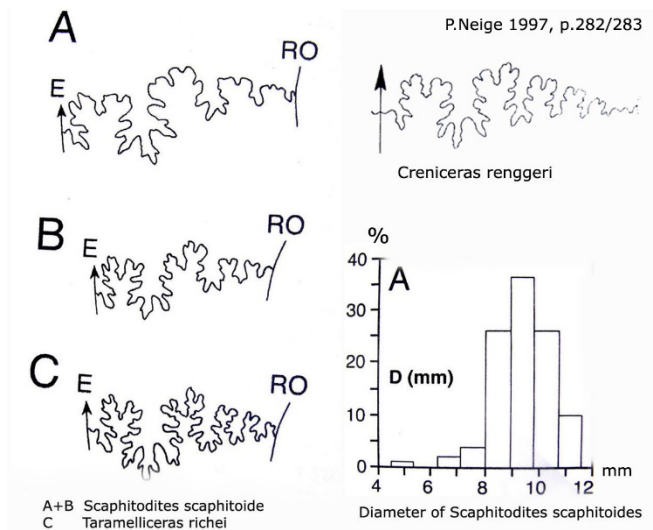
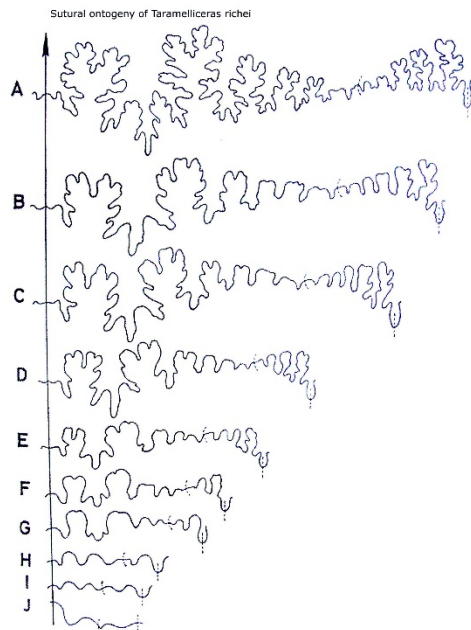


Variants of Scaphitodites "scaphitoides" / ventral groove according plate 24.1 and 24.2

A shell with ventral groove seems to be approx. as frequent as without. Whether this is a contradiction to the statement of D. Marchand (see above), I can't judge. But in my opinion it should not be an argument to create a new species.

P. Neige, D. Marchand, J. Rossi, J. Lange

- We argue that this genus **Scaphitodites** derived from **Taramelliceras** by a **complex process of progenesis** (sensu Landman et al., 1991)
- 1-3% of the ammonite fauna (in my opinion less than 1%)
- Fig.3: see picture S.282 or below: Size 4.5 – 11.6 mm (with body chamber up to 17 mm)
- **Suture (see below): ".....Un suture bien que simplifiee proche de celle du genre Taramelliceras.(figure 2c) Nous proposons donc d'enraciner le genre Scaphitodites dans le genre Taramelliceras.**
(Suture line is not suitable for determining species or even genus.)



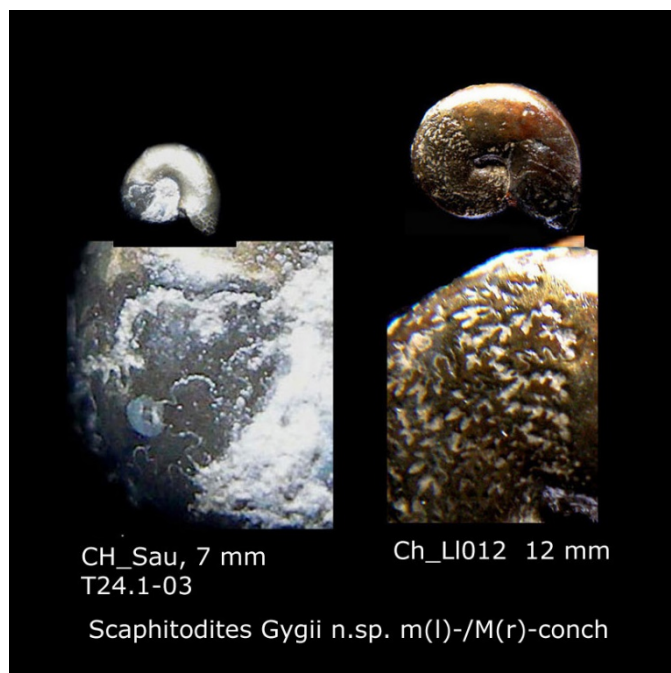
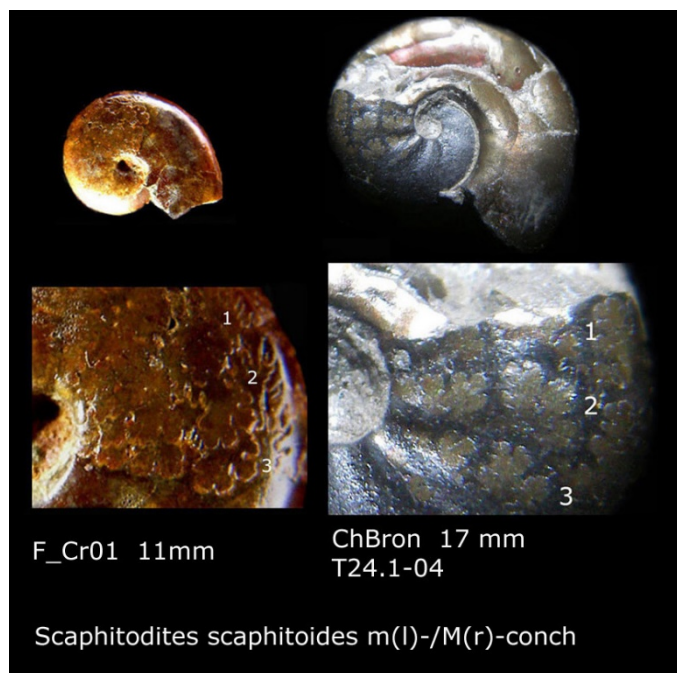
Sutur (top) looks more like
T.richei (suture at left =C

The Palaeontological Association / Fossils of the Oxford Clay 1991 (D.M. Martill & J.D. Hudson)
Pl.13, 7-8: Scaphitodites navicula (Buckman) micro-conch / macro-conch not recorded (S.96)

Mature size 10-13 mm, septated to 6-8 mm

Gygi: Revision der Ammonitengattung *Gregoryceras* (Aspidoceratidae) aus dem Oxfordian (Oberer Jura) der Nordschweiz und von Sueddeutschland –ECLOGAE, Vol.70, Nr.2, 1977, S.508

Nach der uebereinstimmenden Meinung von Makowski (1963) und Lehmann (1966, S.36) muss die Anzahl der Windungen bekannt sein, weil diese ein sehr konstantes Merkmal sowohl bei Mikro- als auch bei Makrokonchen ist. (Remarkable statement)



Comparison Scaphitodites scaphitoides with Scaphitodites gygii n.sp. (both micro- and Macro-conch). Shells (Top row of fotos) are according natural size, suture lines are enlarged for better seeing.

As I have given my total collection of fossils of the Renggeri Marl to Dr.R.A.Gugi of the Museum of Natural History Basel / Switzerland (several thousand specimens, species by location and I am living in Singapore to day, most of the shown photos are based on remaining stock. The overview "Who is who" (Cr.renggeri) is a reproduction of pictures out of my booklet "The Renggeri Marl and its fossils" (1998).

Typ	D	B	D/B	FP	F	Taf	Abb	Sub-Zone
A1	5.0	2.0	2.50	LI	n	24.2	3	scarburgense
A1	6.0	2.3	2.61	ChStr	n	24.2	2	costicardia
A1	7.0	2.5	2.80	Sau	n	24.1	3	scarburgense
A2	9.6	3.2	3.00	LI	n			scarburgense
B1	9.7	4.1	2.37	ChStr	n			costicardia
B1	10.0	4.7	2.13	Bil	j			scarburgense
B2	10.2	3.4	3.00	EtD	n			praecordatum
B1	10.2	3.9	2.62	EtD	j			praecordatum
B2	10.2	3.3	3.09	EtD	j			praecordatum
B1	10.5	4.1	2.56	Bil	j			scarburgense
B1	10.6	3.9	2.72	TSt	n			Renggeri-Ton
B2	10.8	3.2	3.38	EtD	j			praecordatum
B2	10.8	3.4	3.18		j			praecordatum
B2	10.8	3.5	3.09	ChBon	n			praecordatum
B2	10.9	3.2	3.41	LI	j			scarburgense
B3	11.0	3.0	3.67	Bil	j	24.2	15	scarburgense
B2	11.0	3.8	2.89	Bil	n	24.2	11	scarburgense
B3	11.0	3.0	3.67	TSt	n	24.2	6	Renggeri-Ton
B2	11.0	3.8	2.89	Bil	n	24.2	5	scarburgense
B2	11.0	3.5	3.14	LI	n	24.1	11	scarburgense
B2	11.2	3.3	3.39	EtD	j			praecordatum
B2	11.3	3.6	3.14	EtD	j			praecordatum
B2	11.3	3.9	2.90	ChBr	j			scarburgense
B3	11.3	3.1	3.65	Chat	j			scarburgense
B2	11.3	3.2	3.53	LI	n			scarburgense
B2	11.4	3.8	3.00		j			Renggeri-Ton
B1	11.4	4.7	2.43	Bil	j			scarburgense
B2	11.5	3.4	3.38	LI	j			scarburgense
B1	11.6	4.2	2.76	Ger	j			scarburgense
B3	11.6	3.8	3.05	EtD	j			praecordatum
B2	11.7	3.4	3.44	EtD	j			praecordatum
B1	11.8	4.1	2.88	ChBr	j			scarburgense
B3	11.8	3.2	3.69		j			Renggeri-Ton
B1	11.8	5.2	2.27	Bil	j			scarburgense
B2	12.0	3.4	3.53	Chat	j			scarburgense
B2	12.0	3.5	3.43	TSt	j			Renggeri-Ton
B2	12.0	3.5	3.43	TSt2	j	24.2	12	scarburgense
B1	12.0	4.5	2.67	Bil	j	24.2	10	scarburgense
B2	12.0	4.0	3.00	Epe	j	24.1	14	Renggeri-Ton
B2	12.1	3.7	3.27	Egu	n			scarburgense
B1	12.1	4.3	2.81	Ko	j			scarburgense
B2	12.2	4.0	3.05	EtD	j			praecordatum
B2	12.2	3.9	3.13	Chat	j			scarburgense
B1	12.2	5.1	2.39	ChStr	j			costicardia
B2	12.3	3.9	3.15	EtD	j			praecordatum
B2	12.3	3.9	3.15	Ku	n			lamberti
B2	12.4	4.0	3.10	ChBon	j			praecordatum

Typ	D	B	D/B	FP	F	Taf	Abb	Sub-Zone
B2	12.6	4.0	3.15	EtD	n			praecordatum
B3	12.6	3.5	3.60	ChBr				scarburgense
B1	12.7	5.2	2.44	Egu	j			scarburgense
B1	12.7	4.6	2.76	Bil	j			scarburgense
B2	12.8	4.2	3.05	EtD	j			praecordatum
B1	12.8	4.6	2.78	Ko	j			scarburgense
B1	12.8	4.9	2.61	Ko	n			scarburgense
B1	12.8	6.7	1.91	Bil	j			scarburgense
B2	13.0	4.3	3.02	Ku3	n			scarburgense
B1	13.0	5.0	2.60	Bil	j	24.2	14	scarburgense
B2	13.0	4.0	3.25	EtSt	n	24.2	4	costicardia
B3	13.0	3.3	3.94	Ku	n	24.1	13	lamberti
B1	13.2	5.3	2.49	ChBr	j			scarburgense
B2	13.2	4.2	3.14	Bil	j			scarburgense
B2	13.3	4.3	3.09	ChBr				scarburgense
B2	13.5	4.3	3.14	ChBr	j			scarburgense
B2	13.6	4.7	2.89	Ko	j			scarburgense
B3	13.7	3.7	3.70	EtD	j			praecordatum
B2	13.7	4.6	2.98	ChBr				scarburgense
B2	13.9	4.7	2.96	ChBr	j			scarburgense
B1	14.0	4.9	2.86	ChBon	j			praecordatum
B1	14.0	6.8	2.06	Bil	j	24.2	9	scarburgense
B2	14.0	4.5	3.11	LCI	j	24.2	1	lamberti
B2	14.0	4.0	3.50	LI	j	24.1	2	scarburgense
B2	14.0	4.0	3.50	LI	j	24.1	1	scarburgense
B1	14.1	5.2	2.71	ChBr	j			scarburgense
B2	14.3	4.2	3.40	EtD	j			praecordatum
B2	14.3	4.2	3.40	Bil	j			scarburgense
B1	14.5	5.5	2.64	Ger	j			scarburgense
B3	14.5	5.4	2.69	Vo	n			costicardia
B2	14.7	4.4	3.34	ChBr				scarburgense
C2	15.0	4.7	3.19	Vo	n			costicardia
C2	15.0	5.0	3.00	Bil	j	24.2	8	scarburgense
C1	15.0	6.0	2.50	LM	j	24.1	10	praecordatum
C2	15.0	4.5	3.33	ChB	n	24.1	9	scarburgense
C3	15.0	4.0	3.75	EtD	n	24.1	6	praecordatum
C2	15.0	4.5	3.33	ChB	n	24.1	5	scarburgense
C2	15.7	5.0	3.14	ChBr	n			scarburgense
C3	15.7	4.2	3.74	Bil	n			scarburgense
C1	15.8	5.7	2.77	To	j			costicardia
C3	16.0	4.5	3.56	Bil	j	24.2	13	scarburgense
C1	16.0	6.0	2.67	EtD	j	24.1	7	praecordatum
C3	17.0	4.5	3.78	Bil	n	24.2	7	scarburgense
C3	17.0	4.5	3.78	ChBon	n	24.1	4	praecordatum
C	17.8		0.00	ChBon	j			praecordatum
C3	18.0	4.5	4.00	Sau	j	24.1	12	scarburgense
C2	18.0	6.0	3.00	ChBon	j	24.1	8	praecordatum

Explanatuons:

Typ – subjective grouping

D – Diameter of shell

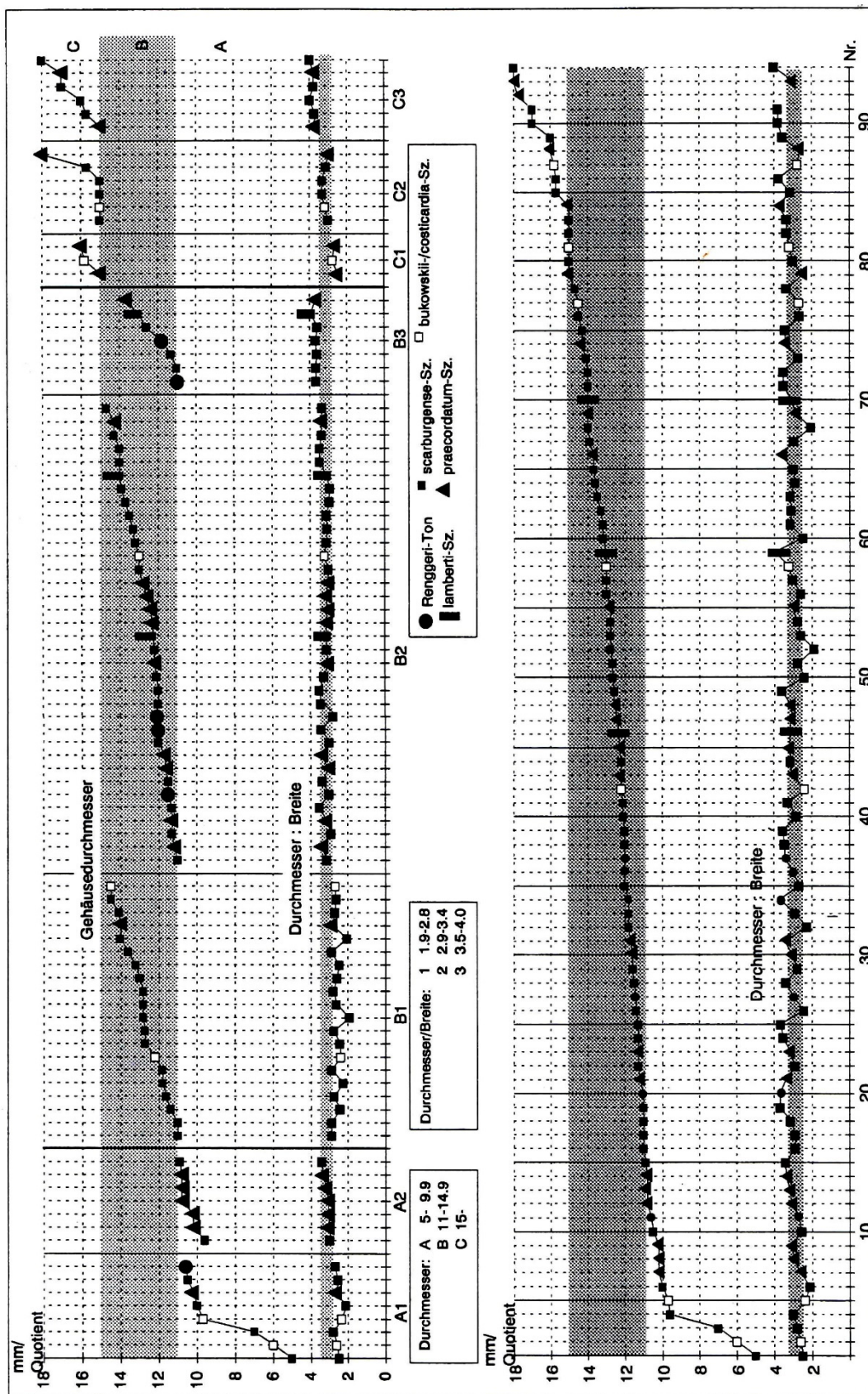
B – Width of shell

D/B – Diameter : Width

FP – location

F – furrow on keel

Scaphidodites (Analysis of statistic material)



Other genuses

Ochetoceras / Oxycerites / Fehlmannites

According to the discription of JEANNET (S. 33, 86, 89), a comparison is as follows:

	Venter	Lateral
<i>Ochetoceras</i>	sharp, often cutting,without siphonal groove	spiral like depression
<i>Fehlmannites</i>	On both sides week deepening	spiral groove only on youth stadium
<i>Oxycerites</i>	Cutting without siphonal groove	Spiral line mostly only very week outlined

These very characteristic types have been only found in late *Lamberti* and earliest *Scarburgense* subchron. In the younger parts of the Renggeri marl they have not been found any longer in the search area. They obviously appear together with *Creniceras renggeri* (possibly a little bit earlier). Mainly they look like variants of *Ochetoceras dentosum* or *frickense*. A presumable additional species (very similar to *Eochetoceras*) yet has not been identified. Obviously this genus is defined by a lateral spiral groove, so it not only means *Ochetoceras* but additionally species closely related to "*Lunuloceras kersteni*" (HAAS, plate 04/36) or *Oxycerites*. Anyway these types are very characteristic and not known to me at early *Lamberti* chron or younger parts of the Renggeri marl.

Disregardless of *Fehlmannites*, who should have a small groove on both sides of the venter, the only difference between *Ochetoceras* and *Oxycerites* seem to be how pronounced the spiral like depression on the venter is (faint spiral line up to a ventral depression).

When comparing the according figures of DE LORIO 1898 / pl.1-fig.7-12, one clearly can distinguish two different types (fig. 7-9 and 10-12). Both types do exist in earliest Renggeri marl at France and, where the type with very week ribbing is less frequent (plate 8.1/1). Besides these two variants we have found three other types as there is:

a variant without any ribbs (plate 8.1/ fig. 5, very rare),
an intermediat with moderate ribbing (plate 8.1 / fig. 2, most frequent version),
a variant with coarse ribbs (plate 8.1 / fig. 3 or plate 8.2 / fig. 2) and
a nearly smooth variant with clearly hooked body chamber (plate 8.1/4 and 8.2/5), without any sign of an injury, which as well has been found at Chatillon/CH (B.Hostettler)(possibly see also HAAS, plate 5/2 or 5). This might be *Oecotraustes kobyi* ex DE LORIO 1898 (plate 5/11-13).

For me it is not worthwhile to discuss whether the two types on plate 8.2/1-5 belong to *Oxycerites* or *Ochetoceras*. An argument for *Ochetoceras* could be the sharp cutting venter without ventral groove. But it is sure that all 5 types appear in the earliest Renggeri marl and shortly after that again disappear. Whether this means a change of a biotop is difficult for me to say. But it seems to be sure that these forms are no longer representative in the search area till end of the *Costicardia* / *Cordatum* subchron

The focal of that group (above 90%) is the borderline between *Lamberti* / *Scarburgense* subchron, another 7% was found in the earliest *Scarburgense* subchron.

Kosmoceratids

The Kosmoceratids of the latest Callovian are quite rare in the search area (plate 23.2) and are restricted, at least in the Swiss/French Jura mountain) to three species. As they can not be mixed up with any other genus in Callovian / Oxfordian border line, they are a very good indicator for the end of the Middle Jurassic (Callovian).

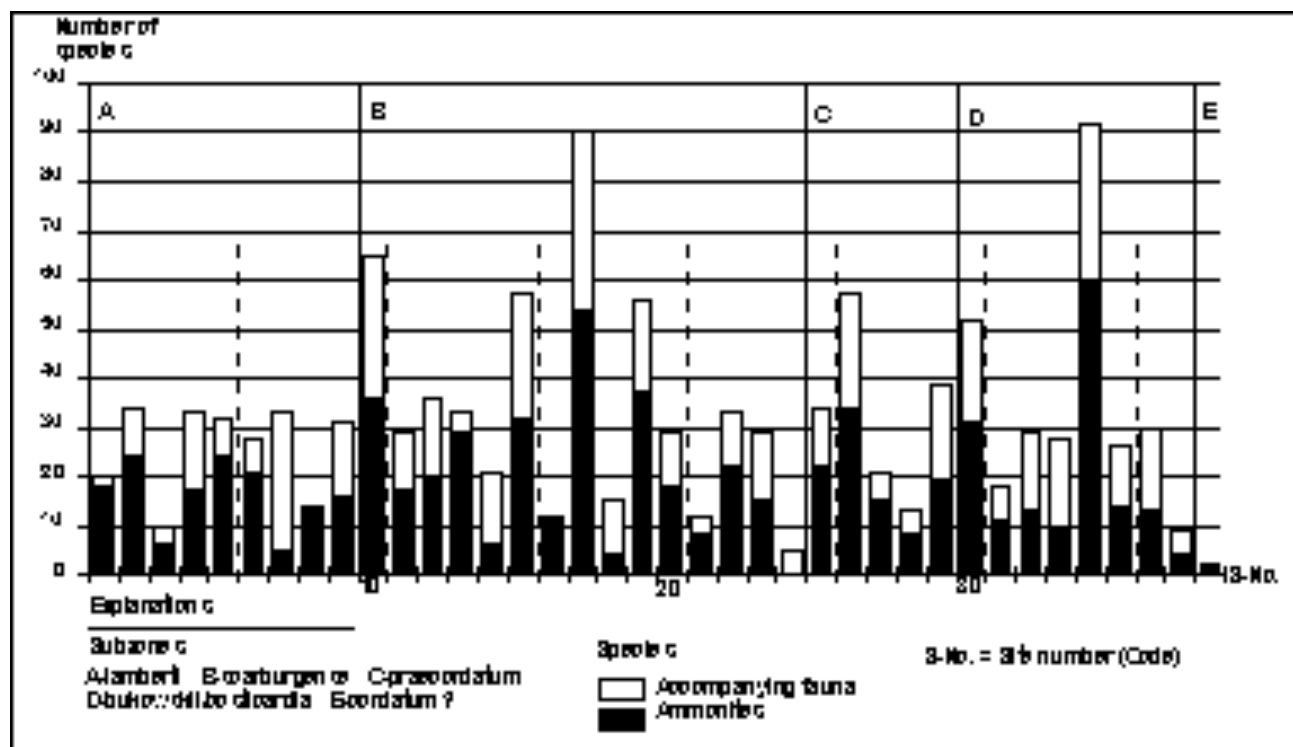
Others

Besides the ammonites mentioned so far, the remaining genus are rather exceptions. Depending on chron or subchron there are:

Chron	Subchron	Genus
Lamberti	Lamberti	<i>Horioceras</i> / <i>Distichoceras</i> , <i>Pachyceras</i> , <i>Longaeviceras</i>
Mariae	Scarburgense	<i>Lissoceras</i> , <i>Longaeviceras</i>
	Praecordatum	<i>Lissoceras</i> , <i>Trimarginites</i>
Cordatum	Bukowskii	?
	Costicardia	<i>Lissoceras</i> , <i>Trimarginites</i> , <i>Sphaeroceras</i> , <i>Rasenia</i>
	Cordatum	<i>Aspidoceras</i>

As the investigated sites / locations only exceptional wise include the late *Lamberti* subchron, the statement might not proof correct, that *Horioceras*/*Distichoceras* and *Pachyceras* only can be found exceptionalwise. But as it looks like these genus already had disappeared in the late *Lamberti* subchron. The genus *Aspidoceras* (not *Euaspidoceras*) seems to appear not earlier than *Cordatum* subchron.

The accompanying fauna



Share of accompanying fauna within Renggeri Marl