

About some significant ammonites from the Lower Aptian (Bedoulian) of the Angles-Barrême area (South-East France)

Su alcune ammoniti significative dell' Aptiano inferiore (Beduliano) nell'area di Angles-Barrême (Sud-Est della Francia)

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IGCP Projects
343: Stratigraphic Correlations Basins of Peritethyan
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ABSTRACT - The Lower Aptian (Bedoulian) from the stratotypical region of the Barremian has given some significant ammonites belonging to genera *Deshayesites* and *Chelonicerias* which are described and figured in this paper. On the basis of these new collected faunas, it is now possible to recognize in this area the mediterranean *Deshayesites tuarkyricus* and *D. weissii* Zones. Nevertheless their boundaries are still unclear. The *Deshayesites deshayesi* Zone could not have been revealed by the ammonites, except perhaps his upper part. The problem of the Barremian / Aptian boundary is discussed in the Angles section.

KEY-WORDS - Biostratigraphy, Ammonites, Lower Aptian, Lower Cretaceous, South-East France.

RIASSUNTO - L'Aptiano inferiore (Beduliano) nell'area dello stratotipo del Barremiano ha fornito alcune ammoniti significative, appartenenti ai generi *Deshayesites* e *Chelonicerias*, descritte e figurate nel presente lavoro. In base a queste nuove faune è possibile riconoscere in quest'area le zone a *Deshayesites tuarkyricus* e a *D. weissii*, valide per la regioni mediterranee. Tuttavia, i limiti di queste zone sono ancora di difficile definizione. La zona a *Deshayesites deshayesi* non è stata riconosciuta, salvo forse la parte superiore. Il problema del limite Barremiano/Aptiano è discusso per quel che riguarda la sezione di Angles.

PAROLE CHIAVE: Biostratigrafia, Ammoniti, Aptiano inferiore, Cretaceo inferiore, Sud-Est della Francia.

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1. - INTRODUCTION

The Lower Aptian from South-East of France (the so-called Bedoulian of TOUCAS, 1888) has been subdivided in two zones by KILIAN & REBOUL (1915): a lower zone with *Parahoplites weissi*, *P. consobrinus* and *Procheloniceras albrechtiaustriacae*, and an upper zone with *Parahoplites deshayesi*. This division of the Lower Aptian has been recognized by ROCH (1927) in his stratigraphical and paleontological study of La Bédoule (the type-area of the Bedoulian).

During the Symposium on the Lower Cretaceous, (Lyon, september 1963) only one zone has been maintained for the Bedoulian: the *Deshayesites deshayesi* Zone (FLANDRIN, 1965; anonymous, 1965), because of the too long range of the taxa used by KILIAN & ROCH (FABRE-TAXI *et alii*, 1965).

Later on, THOMEL (1964) and MOULLADE (1966) have given to *Puzosia matheroni* the prominent rank of index-species for all the Lower Aptian of the vocontian region.

In 1984, BUSNARDO has proposed seven zonal subdivisions for the Lower Aptian of La Bédoule area, from bottom to top the "*Prodeshayesites*", *Pseudocrioceras coquandi*, *Ancyloceras matheroni*, *Roloboceras hambrovi*, *Deshayesites grandis* and *Tropaeum bowerbanchi* Zones. However, the author stressed the difficulties in using some of these zones out of the stratotype of La Bédoule.

Because of their local use, the elements of these zonal scheme have not been maintained for the zonation of the mediterranean province during the workshop of the Lower Cretaceous Working Group of IGCP 262 in Digne (July 1990) (HOEDEMAEKER & BULOT, 1990). The zones used in the caucasian regions (Georgia, Turkmenistan) have been preferred (successively the *Deshayesites tuarkyricus*, *D. weissi*, *D. deshayesi* and *Dufrenoya furcata* Zones) (Tabl. 1).

One year later, a level containing some ammonites which can be referred to the *Prodeshayesites fissicostatus* Zone (CASEY, 1961a) was recognized in the vocontian area (DELANOY, 1991).

The proposal of HOEDEMAEKER & BULOT (1990) has been maintained during the second workshop of the Lower Cretaceous Working Group of IGCP 262 in Mula (July 1992) (HOEDEMAEKER & COMPANY, 1993). Thus, the identification of this zonation in the Lower Aptian of the vocontian area, especially in the Angles-Barrême-Castellane region, became very important.

The compilation of many works related to the Lower Aptian from South-East France and my own researches shows in advance the major difficulties to propose or to recognize a zonal scheme: the quantitative and qualitative disparities of the ammonite faunas between the deeper part of the basin and its marginal areas. As a matter of fact, the rich ammonite faunas described since more than 150 years came essentially from the outer part of the shelves (the old quarries of l'Homme d'Armes

Table 1 - Correlations between the Lower Aptian from England (CASEY, 1961a) and the mediterranean region (BOGDANOVA, 1983; HOEDEMAEKER & BULOT, 1990; HOEDEMAEKER & COMPANY, 1993).

- Correlazioni fra l'Aptiano inferiore dell' Inghilterra (CASEY, 1961a) e l'area mediterranea (BOGDANOVA, 1983; HOEDEMAEKER & BULOT, 1990; HOEDEMAEKER & COMPANY, 1993).

Mediterranean region	
England Casey, 1961	Bogdanova, 1971 Hoedemaeker & Bulot, 1990 Hoedemaeker & Company, 1993
Bowerbanki	Furcata
Deshayesi	Deshayesi
Forbesi	Weissi
Fissicostatus	Tuarkyricus

near Montélimar or La Bédoule near Marseille). On the other hand, the pelagic domain gives a less rich fauna, especially the heteromorph ammonites, and the inherited taxa from the Barremian (*Costidiscus recticostatus*, *Macroscephalites yvani*, *Pseudohaploceras matheroni*, *Eulytoceras phestus*...) represent an important part of the populations.

The significant ammonites of genera *Deshayesites* and *Cheloniceras* are generally represented by poorly preserved or fragmentary small specimens and it results that the specific determinations are very difficult, often impossible.

In addition, these two genera have been splitted in a great number of typologic species, sometimes without the knowledge of their precise stratigraphic position, or they have been diversely interpreted. Some genera usually considered as aptian taxa appear in the uppermost Barremian and they can be used only with many precautions (*Procheloniceras*, *Kutatissites*, *Pseudocrioceras*,...).

The research undertaken since some years in the Upper Barremian and in the Lower Aptian of the Angles-Barrême-Castellane area (DELANOY, in prep.) provided an interesting fauna of *Deshayesites* which allowed us to recognize the zones proposed for the

mediterranean province (HOEDEMAEKER & BULOT, 1990; HOEDEMAEKER & COMPANY, 1993). The results presented in the present paper are different but they complete the data previously published (DELANOY, 1991).

2. - STRATIGRAPHY

2.1. - THE STUDIED AREA

The studied area is located in the south-eastern part of the Vocontian Basin (Fig. 1). In this area are exposed the best sections of the Barremian because it is poorly affected by slumps and by the deformations of the alpine orogenesis (FERRY, 1988). It represents also the reference area of the Barremian stage (BUSNARDO, 1965). From a lithological point of view, in this area the greater part of the Bedoulian is indistinct from the Barremian. It is characterized by an

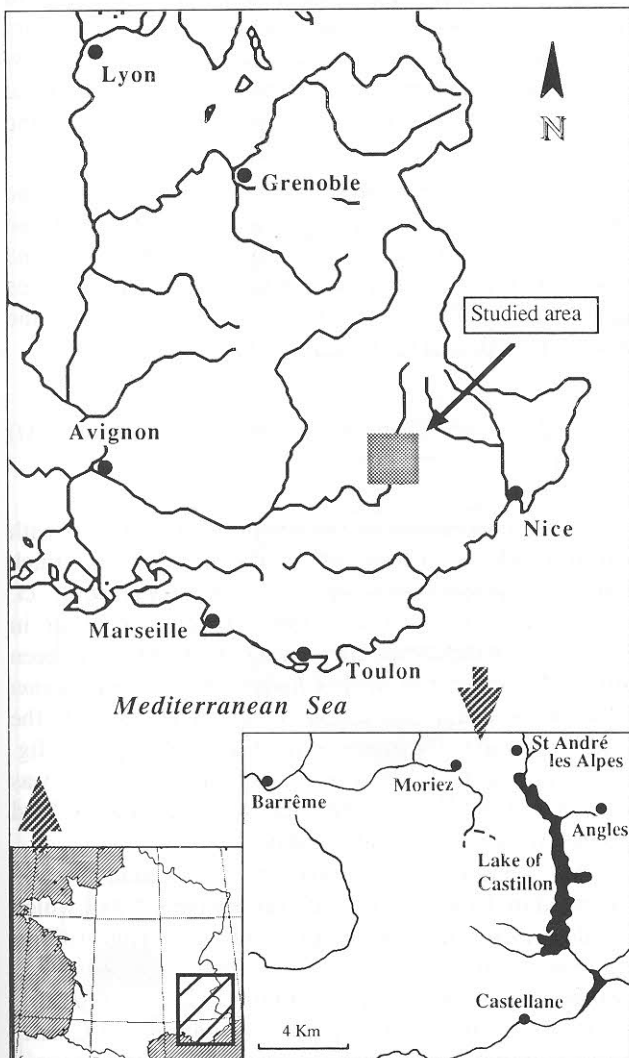


Fig. 1 - Geographical location of the area studied.
- Ubicazione dell'area di studio.

alternation of calcareous beds and marly interbeds. In contrary, the upper part represents the base of the Blues Marls Formation, the sudden change of lithology underlining a stratigraphical hiatus recognized in the whole area (MOULLADE, 1966; COTILLON, 1971; FRIES *et alii*, 1984).

2.2. - THE BARREMIAN/APTIAN BOUNDARY

The Barremian / Aptian boundary considered in this paper is not different than the one recognized so far (BUSNARDO, 1965; DELANOY, 1991, 1992; 1994). In 1965, BUSNARDO has fixed this boundary at the base of bed 197, which was considered the level where *Puzosia matheroni* (= *Pseudohaploceras matheroni*) appears. Nevertheless, the author recognized the lack of significant taxa in this part of the section (formation 15, beds 197 to 204).

This fact has been stressed by many authors (MOULLADE, 1966; ARNAUD, 1981; RAWSON, 1983). Recently the occurrence of *Deshayesitidae* has been recognized at the top of the "formation 15" with the discovery of a level with "*Prodeshayesites*" (DELANOY, 1991).

During the same time it has been proved that the genus *Pseudohaploceras* appeared in the *Hemihoplites feraudianus* Zone and the species *Pseudohaploceras matheroni* occurred in the *Martelites sarasini* Zone (DELANOY, 1992, in press).

The paleontological data obtained in the studied area prove indisputably that the genus *Deshayesites*, represented by taxa of the *Deshayesites tuarkyricus* Zone, occurs in the levels which are the equivalents of beds 201 b to 204 of the Angles section. These levels make a good lithologic landmark visible in the whole region (Fig. 7). They correspond to a bundle (the "thick bundle") of 3 or 4 thick (metric) beds in which are intercalated 1 or 2 thin beds and interpreted as a lowstand wedge (ARNAUD, JAQUIN & VAIL oral communication, 1990; ARNAUD & ARNAUD-VANNEAU, 1991).

They represent the upper part of the "formation 15" (BUSNARDO, 1965) and they will be considered in this paper as the base of the *Deshayesites tuarkyricus* Zone. In contrary, the occurrence of *Deshayesitidae* in the levels immediately below needs to be verified.

The possible presence of genus *Prodeshayesites* in bed 200 of Angles road cited by KAKABADZE (oral communication in DELANOY, 1991) could not have been confirmed by new collects. Consequently, because of the doubt concerning the FO of the *Deshayesitidae* in the whole studied area, the Barremian / Aptian boundary is not shifted in the stratotypical section of Angles. The levels included between this boundary, which has been recognized in the other sections by means of sequential correlation, and the base of the *Deshayesites tuarkyricus* Zone, as admitted in this paper (base of the "thick bundle"), are named "non-characterized zone".

2.3. - SECTIONS STUDIED

The 5 sections described in this paper have been studied bed by bed near the following localities:

- Angles: the road of Angles and La Combe Lambert sections.
- Saint-André les Alpes: Méouilles section.
- Moriez: the Colle gully section near the farm of Tremolies .
- Barrême: the Vignon's gully section.

The detailed location of these sections is published in DELANOY (in press). Some observations have been

made in incomplete sections of the same area which are not described in this paper.

2.3.1. - The road of Angles section (ANG) (Fig.2)

The Aptian begins at the base of bed 197. The "thick bundle" is represented by beds 201 b to 204 (pl. 8, fig. 1). The more significant taxa are *Deshayesites* sp. (= *Prodeshayesites* cf. *tenuicostatus* in DELANOY, 1991) in bed 206 and *Deshayesites* sp. gr *spathi/normani* (= *D. gr. primitivus/spathi* in DELANOY, 1991) in bed 210. The top of the section is not exposed, because it disappears under the grass. The beds 217 to 219 described by BUSNARDO (1965) are not now really visible today.

BUSNARDO (1965) has cited *D. cf. consobrinus* (D'ORBIGNY) in bed 214 and *D. deshayesi* (D'ORBIGNY) in bed 217. In the Lower Greensand, *Deshayesites* closely related to *D. consobrinus* (D'ORBIGNY) occur in the *Deshayesites forbesi* Zone (CASEY, 1963) and *D. deshayesi* (D'ORBIGNY) is the index-species of the *Deshayesites deshayesi* Zone (Tabl. 2). According to BOGDANOVA (1971) *D. consobrinus* (D'ORBIGNY) occurs in the *Deshayesites tuarkyricus* and *Deshayesites weissii* Zones and *D. deshayesi* (D'ORBIGNY) is present in the upper part of the *Deshayesites weissii* Zone and in the whole *Deshayesites deshayesi* Zone (Tabl. 3).

I do not have found ammonites which may be identified with these two species and, although these citations do not deeply modify the zonal scheme proposed in the section, it should be interesting to see again the *Deshayesites* cited by BUSNARDO (as the specimens reported to the genus *Chelonicer*s too).

2.3.2. - La Combe Lambert section, near Angles (COM) (Fig. 3)

The Aptian begins in the bottom of the stream with bed 100, which corresponds to the base of the "thick bundle". *Deshayesites* sp. (= *Prodeshayesites* cf. *tenuicostatus* in DELANOY, 1991) specimens occur in level 107. *Deshayesites* aff. *euglyphus* CASEY has been collected in bed 122 with *Chelonicer*s *cornuelianum* (D'ORBIGNY) and *Ancyloceras* sp. The top of the limestones suddenly passes to the blue marls (pl. 10, fig. 1). According to BUSNARDO (1965) this boundary was pointed out by ferruginous deposits recalling a hard ground, which is not visible today.

This section corresponds to the second section presented by BUSNARDO (1965) on his table 1 and which was described briefly by the same author at page 108. In the upper part of the limestones BUSNARDO has cited *Deshayesites consobrinus* (D'ORBIGNY), *D. deshayesi* (D'ORBIGNY) and *Dufrenoya* cf. *praedufrenoya* CASEY, but I could not verify the occurrence of these species in the section and draw the stratigraphical conclusions on the basis of their presence.

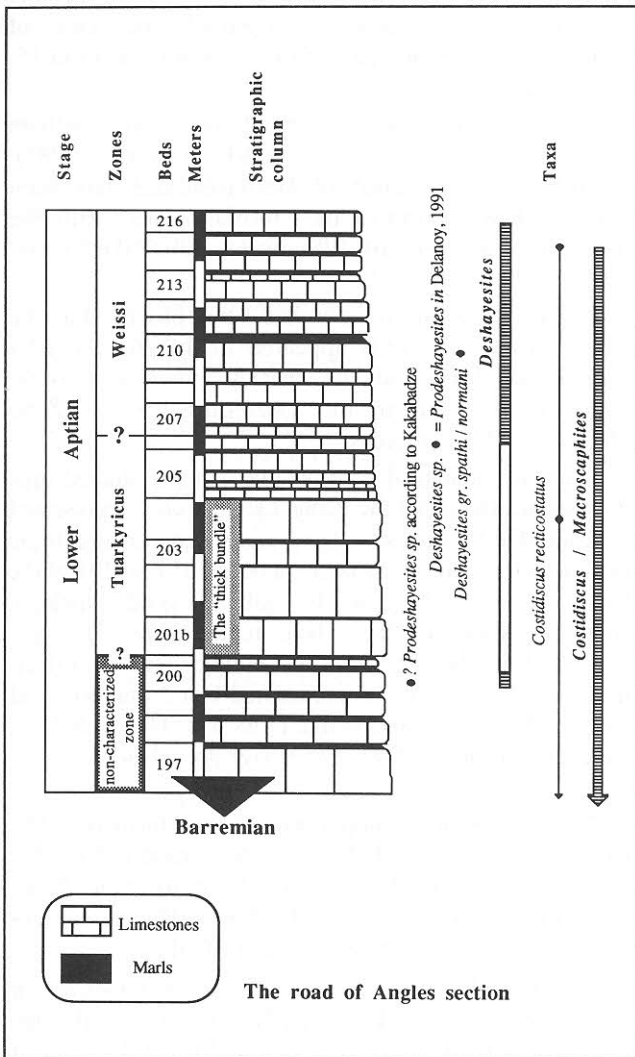


Fig. 2 - Section of the Aptian of the road of Angles. Only the significant identified ammonites have been documented. The total ranges of the most important genera based on specimens undeterminable at the specific level are represented by grey columns.

- Sezione dell'Aptiano della strada di Angles. Tra le ammoniti sono riportate solo quelle biostratigraficamente significative. Le barre in grigio rappresentano le distribuzioni verticali dei generi più importanti, desunte in base ad esemplari indeterminabili a livello specifico.

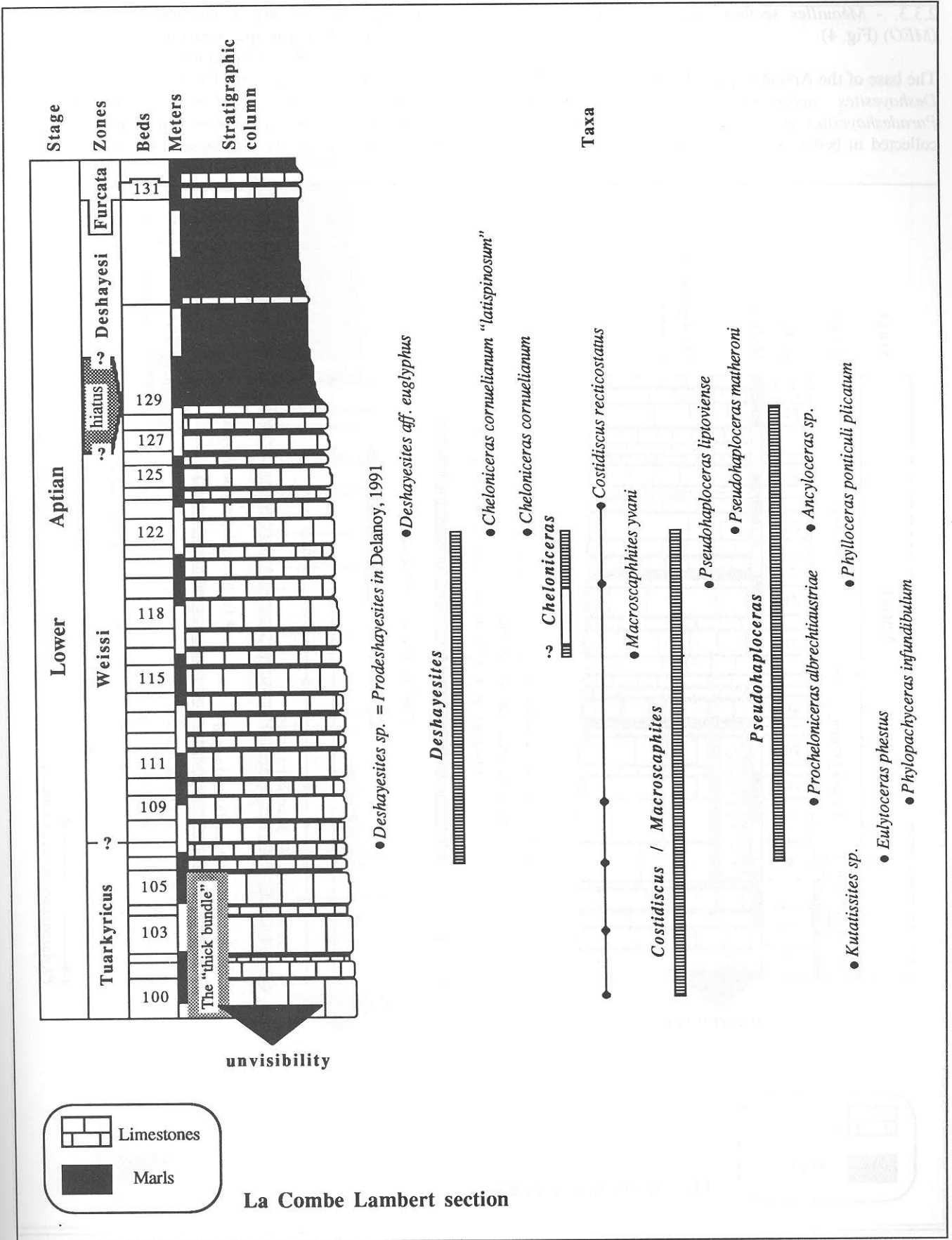


Fig. 3 - Section of the Aptian of La Combe Lambert near Angles (see Fig. 2 for explanation).
 - Sezione dell'Aptiano di "La Combe Lambert", presso Angles (vedi didascalia Fig. 2).

2.3.3. - Méouilles section, near St André les Alpes (MEO) (Fig. 4)

The base of the Aptian is placed at the base of bed 194. *Deshayesites oglanlensis* BOGDANOVA has been *Paradeshayesites* gr. *laeviusculus* in DELANOY, 1991) collected in bed 199, which represents the base of the

“thick bundle”. *D. aff. weissiformis* BOGDANOVA (= occurs in bed 200. The specimens of *Deshayesites* sp. (= *Proadeshayesites* cf. *tenuicostatus* in DELANOY, 1991) have been collected in level 208. The possible appearance of genus *Chelonicer* in bed 212 is documented by a poorly preserved fragment. The top of the section is not exposed because of the vegetation.

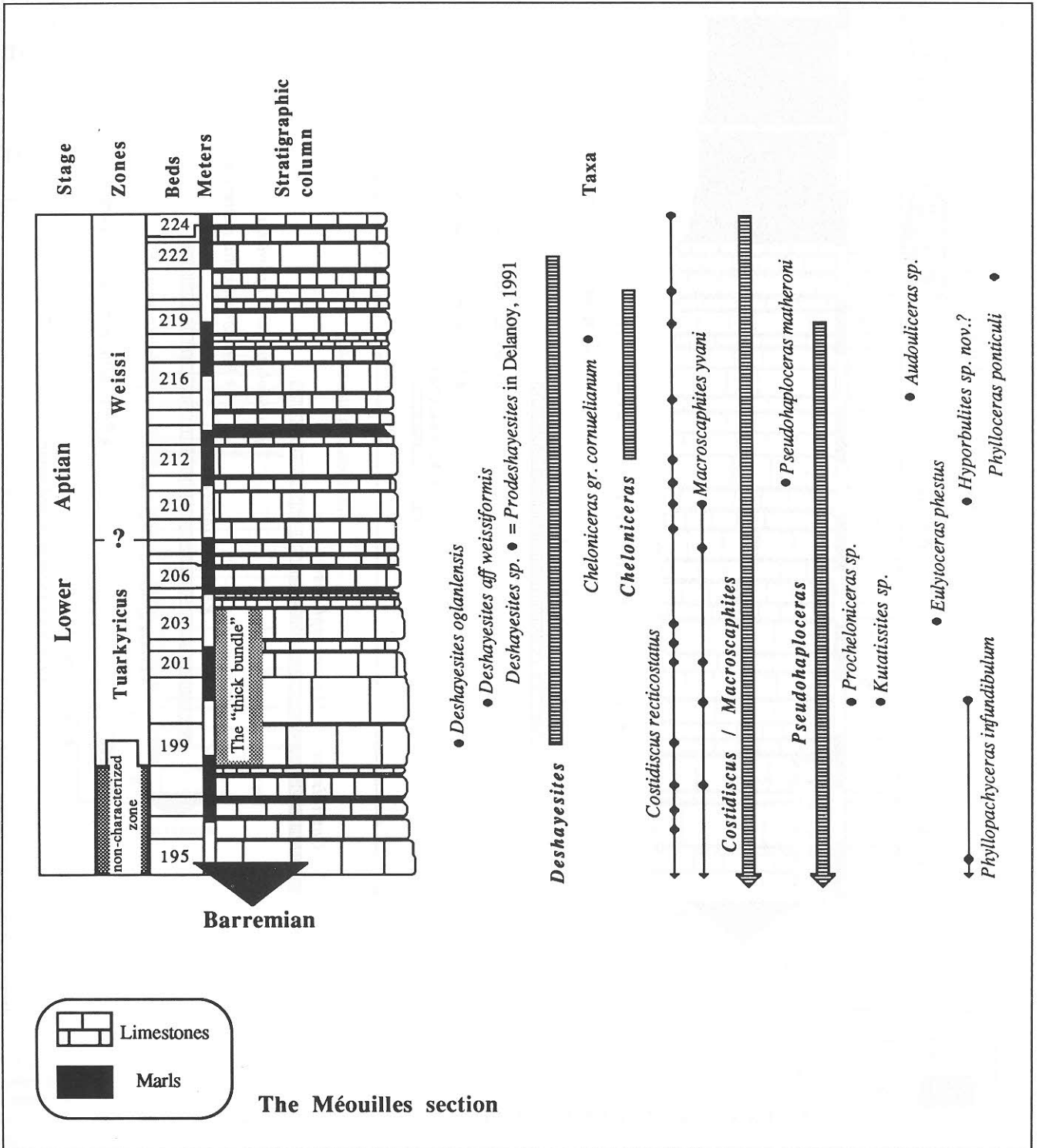


Fig. 4 - Section of the Aptian of Méouilles, near Saint André les Alpes (see fig. 2 for explanation).
 - Sezione dell'Aptiano di Méouilles, presso Saint-André les Alpes (vedi didascalia Fig. 2).

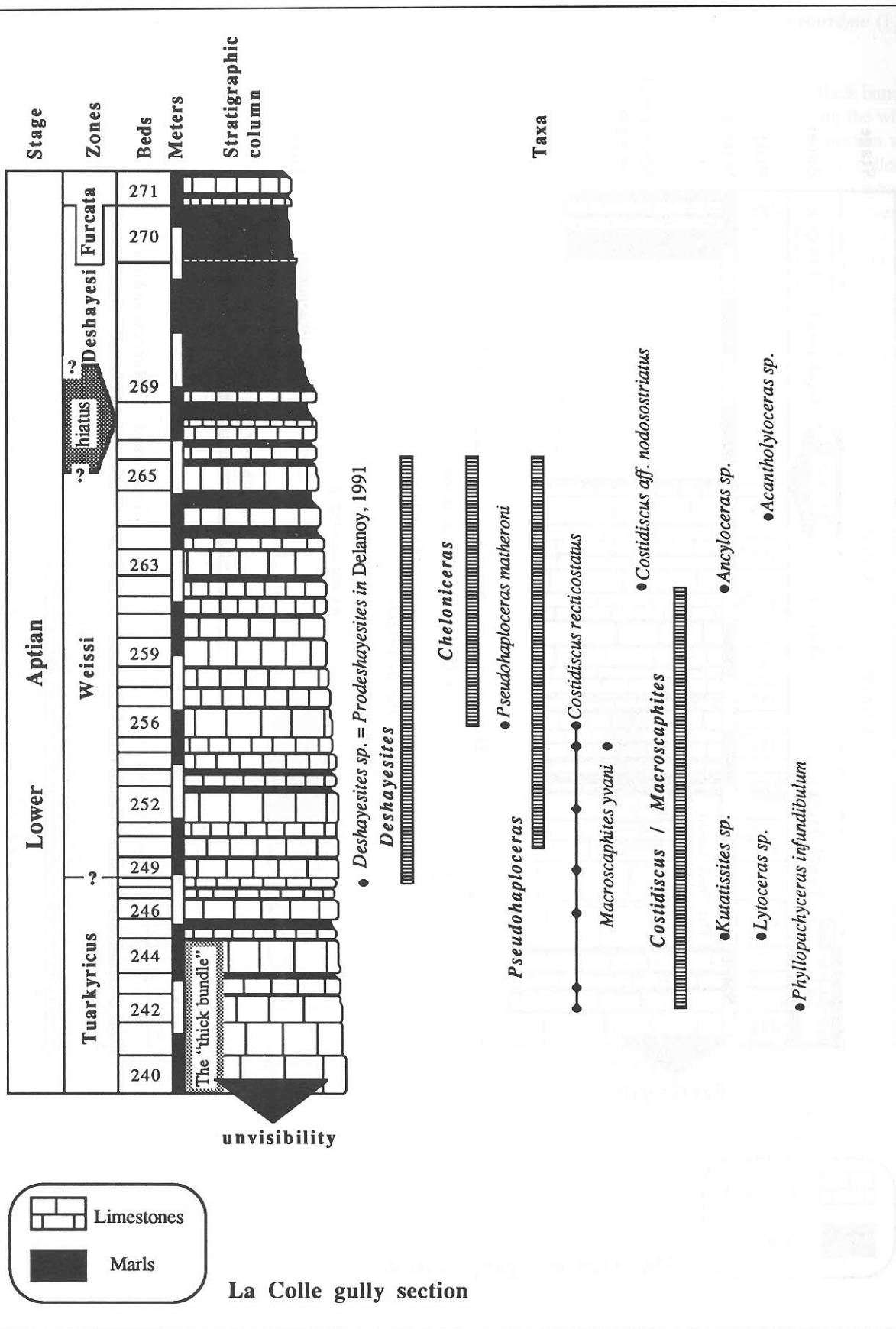


Fig. 5 - Section of the Aptian of the Colle gully under the farm of Tremolies, near Moriez (see fig. 2 for explanation).
 - Sezione dell'Aptiano del "Ravin de la Colle", presso la fattoria di Tremolies, Moriez (vedi didascalia Fig. 2).

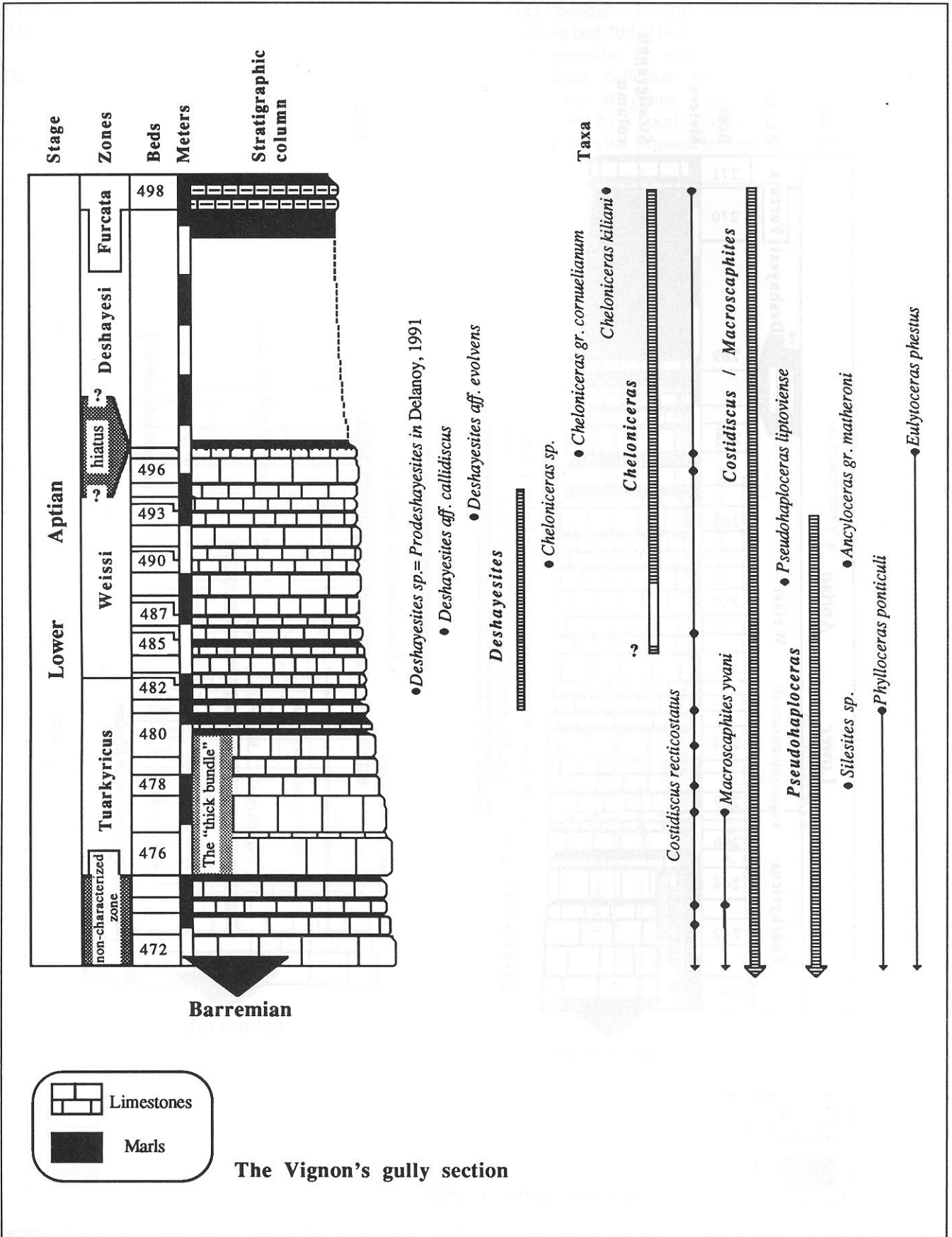


Fig. 6 - Section of the Aptian of the Vignon Gully, near Barrême (see fig. 2 for explanation).
 - Sezione dell'Aptiano del "Ravin du Vignon", presso Barrême (vedi didascalia Fig. 2).

2.3.4. - *La Colle gully section near the farm of Tremolies, near Moriez (TRE)* (Fig. 5; pl. 10, fig. 2)

The section begins with bed 240, i. e. the base of the "thick bundle". In one place, the upper part of this bundle shows slumps. *Deshayesites* are present in the whole of the section but always represented by too fragmentary and undeterminable specimens. A specimen of *Deshayesites* gr. *spathi / normani* has been collected in a fallen block. The level with *Deshayesites* sp. (= *Prodeshayesites* cf. *tenuicostatus* in DELANOY, 1991) has been recognized in bed 248. Generally, this section seems relatively poor in relatively well preserved ammonites authorizing a good specific determination. *Costidiscus* aff. *nodosostriatum* (UHLIG) has been found in bed 262. The transition from the limestones to the marls appears more progressive than in the other studied sections. The section seems more complete in his upper part and needs more important investigations.

2.3.5. - *The Vignon's gully section, near Barrême (VIG)* (Fig. 6)

The Aptian begins with bed 472 and the "thick bundle" with bed 476 (pl. 8, fig. 2), the section showing the whole succession of the aptian limestones and the transition with the blue marls. In the level 482 has been collected *Deshayesites* sp. (= *Prodeshayesites* cf. *tenuicostatus* in DELANOY, 1991). The two others significant *Deshayesites* discovered in this section are *D.* aff. *callidiscus* CASEY and *D.* aff. *evolvens* LUPPOV, respectively in beds 486 and 493. The genus *Chelonicerias* appears in bed 490 and *C.* gr. *cornuelianum* has been collected in bed 496. The top of the last limestone bed is remarkable because of its perforated surface which underlines the stratigraphical hiatus (pl. 9, fig. 1, 2). The base of the marls is covered by grass and limestone detritus but the double bed is well visible about 4 m after the limestone/marl boundary. *Chelonicerias kiliani* (KOENEN) has been collected in the second bed of this guide-level.

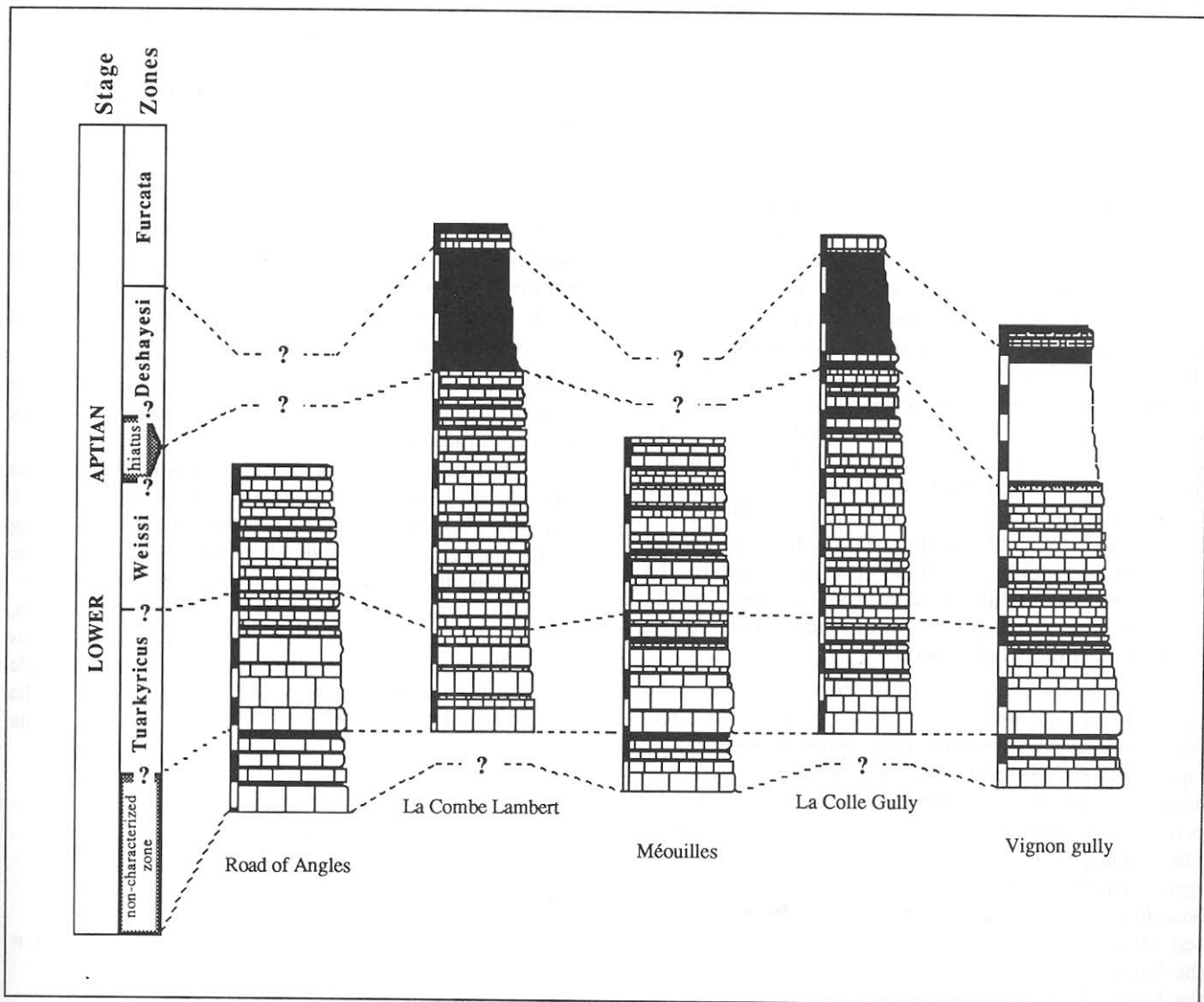


Fig. 7 - Correlations between the studied sections.
- Correlazioni fra le sezioni studiate

2.4. - STRATIGRAPHICAL INTERPRETATION

The "non-characterized zone" is represented by some beds in which the FO of the *Deshayesitidae* is not well documented (viz the occurrence of ? *Prodeshayesites* in bed 200 of the section of the road of Angles according to KAKABADZE).

The lower boundary has been defined by BUSNARDO (1965) in the Angles section and it has been recognized in the other sections by means of sequential correlation. The upper boundary corresponds to the base of the "thick bundle" (Fig. 7), which is considered in this paper as the base of the *Deshayesites tuarkyricus* Zone.

The *Deshayesites tuarkyricus* Zone is materialized by *Deshayesites oylanensis* BOGDANOVA and *D. aff. weissiformis* BOGDANOVA, which are two characteristic species of this zone in Turkmenistan (BOGDANOVA, 1971, 1983) (Tabl. 3). The lower boundary of this zone corresponds to the base of the "thick bundle". On the other hand it is not possible to identify the upper boundary.

The *Deshayesites weissii* Zone is materialized by *Deshayesites gr. spathilnormani*, *D. aff. callidiscus* CASEY, *D. aff. euglyphus* CASEY and *Chelonicerias cornuelianum* (D'ORBIGNY) according to the fact that the *Deshayesites* to which the collected specimens are compared occur in the *Deshayesites forbesi* Zone of England (CASEY, 1961a, 1963) (Tabl. 2) and in the *Deshayesites weissii* Zone of Turkmenistan (BOGDANOVA, 1971, 1983) (Tabl. 3). *D. aff. evolvens* LUPPOV is considered as a form of this zone with doubt. The boundaries of this biostratigraphic unit are also difficult to establish. As in Turkmenistan (BOGDANOVA, 1971) (Tabl. 3) and other adjacent regions, the genus *Chelonicerias* HYATT appears sooner in South-East of France than in northern Europe. The lower boundary is temporarily located at the top of the level with the *Deshayesites* sp. (= *Prodeshayesites* cf. *tenuicostatus* in DELANOY, 1991), although the upper boundary is always impossible to define. Perhaps it is included in the stratigraphical hiatus which exists at the contact between the limestones and the Blue Marls Formation in the whole basin ?

The *Deshayesites deshayesi* Zone has not been materialized by ammonites. This zone is probably represented at the base of the Blue Marls Formation, this rapid change in sedimentation coinciding with the disappearance of the urgonian limestones on the perivocontian shelves (ARNAUD, 1981; RUBINO, 1988). The problem of the lower boundary is the same than the upper boundary of the *D. weissii* zone. The upper boundary should correspond to the base of the double-bed where *Chelonicerias kiliani* (KOENEN) was found in the Vignon's gully section and which is considered as the lower boundary of the *Dufrenoya furcata* Zone (= base of the *Tropaeum bowerbancki* Zone in RUBINO, 1988; MAGNIEZ-JANIN, 1991).

At least, the correlations between the zonal scheme defined in England (CASEY, 1961a) and that defined in Turkmenia (BOGDANOVA, 1971), as already considered by BOGDANOVA *et alii* (1983), seems to be confirmed (Tabl. 1).

3. - PALAEOONTOLOGICAL STUDY

GENUS *Deshayesites* KASANSKY, 1914

TYPE SPECIES: *Ammonites deshayesi* LEYMERIE in D'ORBIGNY

Deshayesites oylanensis BOGDANOVA, 1983
Pl. 2, fig. 1a, b

1983 *Deshayesites oylanensis* BOGDANOVA, p. 136, pl. 1, fig. 1-9; text-figs. 5, 6.

DESCRIPTION - An incomplete and compressed specimen with its body chamber. A part of the ribbing of the phragmocone is well preserved on the left side of the ammonite. The ribbing is palmate, fasciculate. The ribs make peri-umbilical bullae and after they broaden out considerably, but their relief is weakened in the middle part of the sides. In the upper part of the flanks they form 5 to 6 secondary ribs often united in 2 bundles. On the body chamber, the primary ribs show a well marked peri-umbilical bullae and they strongly broaden out before to bifurcate in the middle parts of the flanks. Each secondary rib bifurcates at new in the third upper part of the sides.

MATERIAL - Specimen 28653 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone, Méouilles section, Saint-André les Alpes.

DISCUSSION - Because of its evolute coiling and its ribbing, this *Deshayesites* belongs to the group of *D. tuarkyricus/oylanensis*. The density of the ribbing being more important in *D. tuarkyricus* BOGDANOVA, the studied sample is related to *D. oylanensis* BOGDANOVA.

OCCURRENCE - *Deshayesites oylanensis* Bogdanova, is a characteristic form of the *Deshayesites tuarkyricus* Zone (BOGDANOVA, 1971, 1983) (Tabl. 3). The sample described above has been collected in the bundle (the "thick bundle") near the base of the Aptian of the Méouilles section.

Deshayesites aff. weissiformis BOGDANOVA, 1983
Pl. 5, fig. 2

1991 *Paradeshayesites gr. laeviusculus* (KOENEN); DELANOY, p. 439, fig. 2d.

DESCRIPTION - The specimen is preserved as an impression and represents a relatively involute form.

Table 2 - Stratigraphical distribution of *Prodeshayesites*, *Deshayesites* and *Cheloniceras* (*Cheloniceras*) in the Lower Aptian from England according to CASEY (1961b, 1963).- Distribuzione stratigrafica di *Prodeshayesites*, *Deshayesites* e *Cheloniceras* (*Cheloniceras*) nell'Aptiano inferiore dell'Inghilterra secondo CASEY (1961b, 1963).

CASEY, 1961b, 1963					
Taxa	Zones	Fissicostatus	Forbesi	Deshayesi	Bowerbancki
<i>Prodeshayesites</i>					
<i>fissicostatus</i>		=====			
<i>germanicus</i>		=====			
<i>jacksoni</i>			=====		
<i>lestrangei</i>		===== ?			
<i>pseudokiliani</i>		=====			
<i>bodei</i>		=====			
<i>falcatus</i>		=====			
<i>laeviusculus</i>		=====			
<i>obsoletus</i>		=====			
<i>Deshayesites</i>					
<i>primitivus</i>		=====			
<i>forbesi</i>			=====		
<i>pygmaeus</i>			=====		
<i>fittoni</i>			=====		
<i>grapesi</i>			=====		
<i>cf. consobrinus</i>			=====		
<i>topleyi</i>			=====		
<i>kiliani</i>			=====		
<i>euglyphus</i>			=====		
<i>spathi</i>			===== ?		
<i>normani</i>			=====		
<i>punfieldensis</i>			=====		
<i>callidiscus</i>			=====		
<i>gracilis</i>			=====		
<i>mirabilis</i>			=====		
<i>saxbyi</i>			===== ?		
<i>deshayesi</i>				=====	
<i>involutus</i>				===== ?	
<i>multicostatus</i>				=====	
<i>consobrinoides</i>				=====	
<i>geniculatus</i>				=====	
<i>vectensis</i>				=====	
<i>wiltshirei</i>				=====	
<i>grandis</i>				=====	
<i>planus</i>			=====		
(C)<i>Cheloniceras</i>					
<i>cornuelianum</i>				=====	
<i>crassum</i>				=====	
<i>kiliani</i>				=====	
<i>disparile</i>				=====	
<i>minimum</i>				=====	
<i>proteus</i>				=====	
<i>parinodum</i>				=====	
<i>kikalnyi</i>				=====	
<i>quadrarium</i>				=====	
<i>meyendorffi</i>				=====	
<i>mackensoni</i>				=====	
<i>cf. gotshei</i>				=====	

The ribbing is sinuous, constituted by primary ribs with discrete peri-umbilical bullae; the ribs split into the middle of the flanks in bundles of 3 to 4 well marked ribs. The point of splitting is sometimes pointed out by a thickened primary rib. MATERIAL-Specimen 28579 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone, Méouilles, Saint-André les Alpes.

DISCUSSION - The sculpture of this *Deshayesites* (sinuous fasciculate ribs, relatively narrow umbilicus) allows us to include it in the group of *D. tuarkyricus* BOGDANOVA. *D. oglanlensis* BOGDANOVA shows thicker secondary ribs and *D. tuarkyricus* BOGDANOVA is a more involute form. Thus this specimen, which was previously identified as *Paradeshayesites* gr. *laeviusculus* (KOENEN) (DELANOY, 1991) is now compared with *D. weissiformis* BOGDANOVA.

OCCURRENCE - According to BOGDANOVA (1971, 1983) *Deshayesites weissiformis* BOGDANOVA occurs only in the *Deshayesites tuarkyricus* Zone of Turkmenistan (Tabl. 3). The specimen described above has been found in the "thick bundle" of the Aptian in the Méouilles section.

Deshayesites sp.

Pl. 2, fig. 2, 3, 4; pl. 6, fig. 3, 6

1991 *Proadeshayesites* cf. *tenuicostatus* (KOENEN); DELANOY, p. 439, fig. 2b, 2c.

DESCRIPTION - This taxon is represented by compressed and poorly preserved little ammonites. The shell is evolute with a wide umbilicus. The ornamentation is constituted by numerous sigmoid ribs which can be single or, mostly, bifurcate approximatively in the middle part of the flanks.

MATERIAL - Specimens 28580 Coll. DELANOY, La Colle gully, Moriez; 28581 Coll. DELANOY, Vignon gully section, Barrême; 28640 Coll. DELANOY, Méouilles section, Saint André les Alpes; 28641 Coll. DELANOY, Angles road section; 28643 Coll. DELANOY, La Combe Lambert section, Angles and many unregistered and fragmentary samples, all from the Lower Aptian, top of the *Deshayesites tuarkyricus* Zone.

DISCUSSION - These ammonites have been at first interpreted as *Proadeshayesites* gr. *fissicostatus* / *tenuicostatus* (DELANOY, 1991), which which they present great ornamental and morphological affinities. They are very probably conspecific with the *Deshayesites* from the Nice area figured by AUTRAN & DELANOY (1987).

However, the discovery of true *Deshayesites* characteristic of the *Deshayesites tuarkyricus* Zone in the underlying levels set at new the problem of their identification. According to RAWSON (oral and written communication), who has seen these ammonites and shown the specimen of the Nice area to CASEY and DEAN, these *Deshayesitidae* represent an evolute *Deshayesites*. Some ornamental and morphological

affinities really exist with some evolute *Deshayesites* described and figured by BOGDANOVA *et alii* (1979) as *D. formosus* BOGDANOVA, KVANTALIANI & SHARIKADZE, *D. michailovae* BOGDANOVA, KVANTALIANI & SHARIKADZE, *D. rarecostatus* BOGDANOVA, KVANTALIANI & SHARIKADZE, *D. babaschensis* BOGDANOVA and *D. dechyi* PAPP, all these *Deshayesites* presenting also remarkable convergences with the *Proadeshayesites* of the group *bodei* (KOENEN). *D. planus* CASEY is a small species which ornamentation is similar to the *Deshayesites* sp. of the vocontian area, but the coiling is less evolute. *D. luppovi* BOGDANOVA shows a ribbing strongly prorsiradiate in the lower part of the flanks.

OCCURRENCE - Considered as *Proadeshayesites*, the stratigraphic position of these ammonites was easy to precise. All the *Proadeshayesites* of Great Britain and Germany have been indeed collected in the first zone of the Aptian (*Proadeshayesites fissicostatus* Zone in Great Britain (Tabl. 2), *Proadeshayesites tenuicostatus* Zone in Germany) (CASEY, 1961a, 1963; KEMPER 1967, 1976; KEMPER *et alii*, 1974) which may be correlated with the *Deshayesites tuarkyricus* Zone as it has been suggested by BOGDANOVA *et alii* (1983). But, if these ammonites are true *Deshayesites*, it is more difficult to precise now their stratigraphic position. *D. planus* CASEY is a species of the *Deshayesites forbesi* Zone (CASEY, 1963) (Tabl. 2). In Turkmenistan, BOGDANOVA (1971) has cited *D. planus* CASEY and *D. dechyi* PAPP in the *Deshayesites weissii* Zone while *D. luppovi* BOGDANOVA in the *Deshayesites tuarkyricus* and *Deshayesites weissii* Zones (Tabl. 3). The species from Central Dagestan described and figures by BOGDANOVA *et alii* (1979) came from a *Deshayesites dechyi* - *Deshayesites deshayesi* Zone or were reworked in levels of an *Epicheloniceras subnodosocostatum* - *Colombiceras crassicostatum* Zone.

Waiting for a better preserved material which could elucidate the taxonomic problem raised by these ammonites, the level containing these *Deshayesites* is considered arbitrarily and temporarily as the top of the *Deshayesites tuarkyricus* Zone.

Deshayesites sp. gr. *spathi* / *normani*

Pl. 1, fig. 2

1991 *Deshayesites* gr. *primitivus/spathii*; DELANOY, p. 440, fig. 2a.

DESCRIPTION - The specimen is incomplete and represented by about half a whorl. The whorl section is strongly compressed. The internal whorls are partly visible and show primary, convex ribs, probably bifurcate in the upper half of the sides.

When the whorl height reaches 16 mm, the ornamentation is constituted by thick sinuous primary ribs, raising from the umbilical margin. The rib section is rounded and the ribs broaden in the middle part of the flanks before bifurcating or trifurcating. All the ribs

cross the venter where their thickness is maximum. On the last preserved part of the shell, the ribs thicken and trifurcations are replaced by short intercalatory ribs.

MATERIAL - Specimen 28592 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone, the road of Angles section, Angles.

DISCUSSION - The sculpture of this *Deshayesites* shows affinities with that of some *Deshayesites* of the *Deshayesites forbesi* Zone (CASEY, 1961a) like *D. spathi* CASEY or *D. normani* CASEY. *D. primitivus* CASEY from the *Prodeshayesites fissicostatus* Zone seems to be more evolute. This specimen is quite similar to the *Deshayesites* ex gr. *involutus* SPATH of the Lower Aptian from Slovakia figured by VASICEK *et alii* in 1983.

OCCURRENCE - Some species with an ornamentation similar to this sample (*D. kiliani* CASEY, *D. topleyi* SPATH and *D. normani* CASEY) have been cited by BOGDANOVA (1971) in the *Deshayesites weissi* Zone from Turkmenistan (Tabl. 3). According to CASEY (1961a, 1963) these *Deshayesites* occur in the *Deshayesites forbesi* Zone (Tabl. 2). *Deshayesites* cf. *normani* has been reported from the "Bedoulian" of Rumania (PATRULIUS & AVRAM, 1976).

An other specimen comparable to this group has been collected in the Tremolies section near Moriez, but its stratigraphic position is unfortunately unclear (specimen 28850 Coll. DELANOY, pl. 1, fig. 5).

Deshayesites aff. *euglyphus* CASEY, 1963

Pl. 1, fig. 4; pl. 4, fig. 4

DESCRIPTION - The sculpture is well visible since a whorl-height of about 6 mm. The ribbing is sinuous, regular, formed by some rounded primary ribs (9-10 per whorls), which are bifurcate just above or just below the mid flank. Rarely, an intercalatory rib appears in the area of the bifurcations and gives the impression of trifurcation. All ribs cross the venter with their maximum of thickness.

MATERIAL - Specimens 28634 and 28690 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone, La Combe Lambert section, Angles.

DISCUSSION - On the basis of their dimensional characters and mode of ribbing these two specimens show affinities with *Deshayesites euglyphus* described by CASEY in 1963, according to him a species closely allied with *D. kiliani* SPATH.

OCCURRENCE - In the Lower Greensands, *Deshayesites euglyphus* CASEY occurs in the *Deshayesites forbesi* Zone (CASEY, 1963) (Tabl. 2). BOGDANOVA (1971) has reported this species at the top of the *Deshayesites tuarkyricus* Zone and in the *Deshayesites weissi* Zone of Turkmenistan (Tabl. 3).

Deshayesites aff. *callidiscus* CASEY, 1961

Pl. 1, fig. 1 and 3 a, b

DESCRIPTION - Two small incomplete specimens which show the succession of two ornamental stages. Up to a whorl height of about 14-16 mm the ribbing is made of sinuous primary ribs, slightly raised in the middle part of the flanks just below the regular bifurcation in the upper part of the flanks. Intercalatory ribs or trifurcations appear progressively, although irregularly.

From this whorl height, the ribbing become more irregular and fasciculate. Now the ribs bear small, little peri-umbilical bullae and become thicker and give rise to a group of 3 to 5 secondary ribs of variable thickness. Further subdivisions of the ribs appear inside the bundle. All of them cross the venter forming a gentle arc towards the aperture and becoming weaker.

MATERIAL - Specimens 28615 and 28853 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone, Vignon's gully section, Barrême.

DISCUSSION - These two ammonites are closely related to *Deshayesites callidiscus* CASEY. The sample 28615 shows ornamental affinities with the sample SM B. 27057 (Coll. WILTSHIRE) figured by CASEY (1961a, 1963) from the Atherfield Clay Series. Nevertheless, they are different because of the weaker ribbing on the venter, without the strong curvature of the ribs observed in the british specimens.

OCCURRENCE - In Great Britain, *Deshayesites callidiscus* CASEY occurs at the top of the *Deshayesites forbesi* Zone (CASEY, 1961a, 1963) (Tabl. 2) and characterizes the *Deshayesites callidiscus* Sub-zone. In the Lower Aptian from Turkmenistan, *D. callidiscus* CASEY has been cited in the *Deshayesites weissi* Zone by BOGDANOVA (1971) (Tabl. 3) and also in the Lower Aptian (*Deshayesites deshayesi* Zone) of Bulgaria (DIMITROVA, 1967). In Rumania the species of CASEY occurs in the *Deshayesites* Zone (PATRULIUS & AVRAM, 1976).

Deshayesites aff. *evolvens* LUPPOV, 1952

Pl. 3, fig. 1

DESCRIPTION - This taxon is represented by a single, poorly preserved and compressed adult specimen. Only the last whorl (end of the phragmocone and the body chamber) is visible.

The end of the phragmocone bears relatively broad, flexuous ribs, well marked as early as the umbilical margin. These ribs are bifurcate or, more rarely, trifurcate in the upper half of the flanks. On the body chamber, the ribbing changes. On the first half there are intercalatory, single and bifurcate strong, broad, sinuous ribs. On the second half of the chamber, the bifurcate ribs disappear progressively and on the end of the preserved part subsist only single, less sinuous, distant ribs, strongly elevated on the venter.

MATERIAL - Specimen 28852 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone ?, Vignon gully, Barrême.

DISCUSSION - This *Deshayesites* shows great affinities with the ammonite figured by KILIAN & REBOUL (1915) as *Parahoplites weissi* NEUMAYR & UHLIG and considered later by LUPPOV (1952) as a representative of his new species *D. evolvens*. The body chamber is also very similar to the one of the lectotype of *D. consobrinus* (D'ORBIGNY) but, unfortunately, the inner whorls of this species are unknown.

OCCURRENCE - The exact stratigraphical position of *Deshayesites evolvens* LUPPOV is not known in Turkmenistan (*Deshayesites* Zone in LUPPOV, 1952) and the species is not cited by BOGDANOVA (1971). DIMITROVA (1967) describes and figures a specimen collected in the Lower Aptian of Bulgaria without any indications of its precise stratigraphical position. PATRULIUS & AVRAM (1976) have cited *Deshayesites* aff. *evolvens* LUPPOV in the *Deshayesites* Zone of Rumania. Its ornamental affinities with *D. weissi* (NEUMAYR & UHLIG) and *D. consobrinus* (D'ORBIGNY), two species of the *Deshayesites weissi* Zone and the collect of the specimen described some beds above a level with *D. aff. callidiscus* CASEY seems to indicate that it occurs in the same position.

GENUS *Chelonicerias* HYATT, 1903

TYPE SPECIES: *Ammonites cornuelianus* D'ORBIGNY

Chelonicerias cornuelianum D'ORBIGNY, 1841

Pl. 6, fig. 1 a, b and 2

1841 *Ammonites cornuelianus* D'ORBIGNY, p. 364, pl. 112, fig. 1 et 2

1924 *Chelonicerias cornuelianum* (D'ORBIGNY); SPATH, p. 79.

1961b *Chelonicerias (Chelonicerias) cornuelianum* (D'ORBIGNY); CASEY, p. 198, pl. 33, fig. 7 a-b; pl. 34, fig. 1 a-b, 9 a-b; pl. 35, fig. 1 a-b, 2, 3; text-fig. 60 a-c, 61, 62, 67e-f (*cum syn.*).

1964 *Chelonicerias cornuelianum* (D'ORBIGNY); KEMPER, p. 46, pl. 4, fig. 3 a-b; pl. 5, fig. 3; pl. 7 (*cum syn.*)

DESCRIPTION - The species is well represented by slightly compressed and incomplete specimens. The sculpture is similar to the one of the typical form. There are two types of ribbing.

1) The thick primary ribs which originate at the base of the umbilical wall, which they cross rursiradiate. They develop a first big tubercle on the umbilical margin, and a second tubercle just above the upper third of the flanks stronger than the umbilical one (those of specimen 28695 are flatter and more prominent, thus recalling the subspecies *latispinosum*). From this tubercle start two secondary ribs which cross radially the venter in their maximum of thickness.

2) The non-tuberculate intercalatory ribs (except some rare case of umbilical tuberculation in the internal whorl on **one side** of specimen 28696). These ribs are

less thick than the primary ribs in the lower half of the flanks, of the same thickness than the secondary ribs in the upper part of the flanks and on the venter.

MATERIAL - Specimens 28695 and 28696 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone, La Combe Lambert section, Angles.

DISCUSSION - These ammonites show the typical ornamentation of the species created by D'ORBIGNY in 1841. The rare presence of tubercles on the intercalatory ribs on one side of one specimen prove the great ornamental variation of this taxon as KEMPER (1964) has already considered.

OCCURRENCE - The stratigraphic position of the genus *Chelonicerias* HYATT, 1903 has already been discussed by CASEY (1961a, b) and KEMPER (1964). In the Lower Greensand, *C. cornuelianum* (D'ORBIGNY) occurs in the *Deshayesites deshayesi* and *Tropaeum bowerbancki* Zones (CASEY, 1961a, b) (Tabl. 2).

In northern Germany, the species has been reported in the *Chelonicerias latispinosum* Zone of KEMPER (1964) which corresponds to a part of the *Deshayesites deshayesi* Zone (KEMPER, 1964). In Turkmenistan the genus *Chelonicerias* HYATT is reported from earlier strata than in the north of the Europe, viz. in the *Deshayesites weissi* Zone (BOGDANOVA, 1971) (Tabl. 3).

Chelonicerias sp.

Pl. 5, fig. 1 a, b

DESCRIPTION - An incomplet specimen with a subcircular depressed whorl section. Two ornamental stages can be distinguished.

1) Up to a diameter of about 55 mm, the primary tuberculate ribs alternate with 5 non-tuberculate intercalatory ribs per interval. The former show a gentle peri-umbilical tubercle and, in the middle of the flanks, a stronger lateral tubercle which is the point of bifurcation or sometimes trifurcation

The secondary ribs cross the venter where their thickness is maximum. Intercalatory ribs do not bear tubercles except an angular swelling in the middle part of the flanks.

2) From this diameter until the end of the preserved part of the ammonite, the number of intercalatory ribs decreases (2-3). They are sometimes bifurcate in the middle part of the sides. The primary ribs are a few stronger than the intercalatories, the lateral tubercles are moderate sized, angular, the bifurcations disappear.

MATERIAL - Specimen 28684 Coll. DELANOY, Lower Aptian, *Deshayesites weisii* Zone, Vignon 's gully section, Barrême.

Table 3 - Stratigraphical distribution of *Deshayesites* and *Cheloniceras* in the Lower Aptian of Turkmenistan according to BOGDANOVA (1971).- Distribuzione stratigrafica di *Deshayesites* e *Cheloniceras* nell'Aptiano inferiore del Turkmenistan secondo BOGDANOVA (1971).

BOGDANOVA, 1971				
Zones	Tuarkyricus	Weissi	Deshayesi	Furcata
Taxa				
<i>Deshayesites antiquus</i>	—————			
<i>tuarkyricus</i>	—————			
<i>weissiformis</i>	—————			
<i>oglanlensis</i>	—————			
<i>luppovi</i>	—————			
<i>consobrinus</i>	—————			
<i>planicostatus</i>	—————	—————		
<i>euglyphus</i>	—————	—————		
<i>weissi</i>		—————		
<i>planus</i>		—————		
<i>subsimilis</i>		—————		
<i>normani</i>		—————		
<i>inflatus</i>		—————		
<i>kiliani</i>		—————		
<i>pappi</i>		—————		
<i>topleyi</i>		—————		
<i>dechy</i>		—————	—————	
<i>levigatus</i>		—————	—————	
<i>callidiscus</i>		—————	—————	
<i>latilobatus</i>		—————	—————	
<i>pygmaeus</i>		—————		
<i>kudriavzevi</i>		—————	—————	
<i>consobrinoides</i>		—————	—————	
<i>deshayesi</i>		—————	—————	
<i>kasanskii</i>			—————	
<i>terminalis</i>			—————	—————
<i>Cheloniceras seminodosum</i>		—————	—— —	—————
<i>cornuelianum</i>		—————		—————

DISCUSSION - This *Chelonicerias* differs from the forms of the *cornuelianum* group in its less prominent ornamentation and its greater number of intercalatory ribs in the inner whorls. Some affinities exist with the *Chelonicerias* figured by SINZOW (1906, pl. 1, fig. 1) as *C. cornuelianum* (D'ORBIGNY) which was considered by LUPPOV (1952) as variety *sinzowi*. However the tuberculation of the latter is stronger and the number of intercalatories is smaller.

OCCURRENCE - *Chelonicerias* sp. has been collected in the upper part of the aptian limestones of the Barrême section, a few beds below the level i which *Deshayesites* aff. *evolvens* has been found (top of the *Deshayesites weissii* Zone ?).

Chelonicerias kiliani (KOENEN, 1902)

Pl. 4, fig. 2

1902 *Acanthoceras kiliani* KOENEN, p. 406, pl. 33, fig. 3-6.

1921 *Chelonicerias kiliani* (V. KOENEN); SPATH, p. 314.

1961b *Chelonicerias (Chelonicerias) kiliani* (V. KOENEN); CASEY, p. 213, pl. 33, fig. 3-6; text-fig. 67a-d.

DESCRIPTION - Up to a diameter of about 50 mm, the ribbing is similar to that of the *cornuelianum* group. It is composed by thick primary ribs, which are tuberculated on the umbilical margin and in the upper third of the flanks, from where they bifurcate, and by 1-2 non tuberculate intercalatory ribs per interval. After this diameter the primary ribs suddenly disappear and the ribbing is only made of inerm ribs, simple or more rarely bifurcate from the umbilical margin.

MATERIAL - Specimen 28682 Coll. DELANOY (leg. ARNAUD-VANNEAU), Lower Aptian, top of the *Deshayesites deshayesi* Zone/base of the *Dufrenoyia furcata* Zone, Vignon gully section, Barrême.

DISCUSSION - This ammonite is very similar to the form described by KOENEN (1902) as *Acanthoceras kiliani*. The main feature of this species is the fast change of ornamentation (loss of the tuberculation) at a small diameter.

OCCURRENCE - *Chelonicerias kiliani* (KOENEN, 1902) has been described from the Aptian from Ahaus, in Germany. According to CASEY (1961a, b) the species occurs in the top of the *Deshayesites deshayesi* Zone (*grandis* Subzone) and in the *Tropaeum bowerbancki* Zone (*meyendorffi* Subzone) (Tabl. 2).

5. - CONCLUSIONS

This work is only a stage in the knowledge of the ammonite fauna of the Lower Aptian of the Angles-Barrême area. There is no doubt that future collects of ammonite will modify the results presented in this paper. The figuration of the most significant ammonites collected up today in this area will permit, in any case, a better comparison with the faunas of the other regions.

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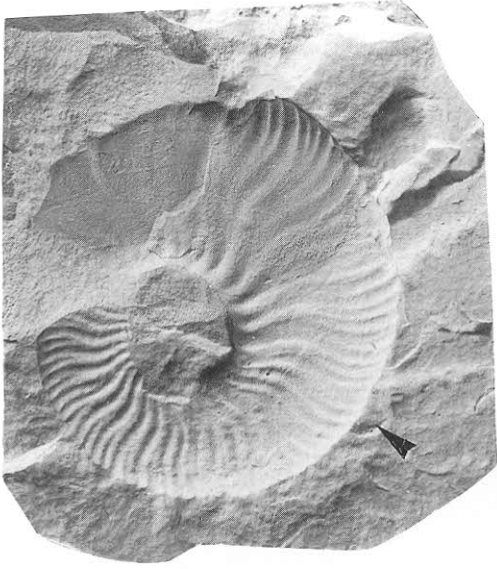
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PLATE I

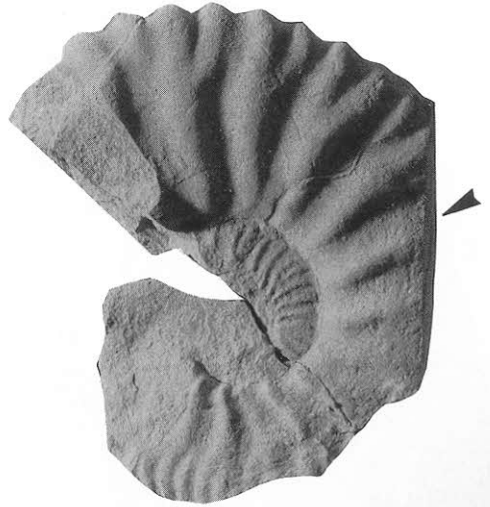
- Fig. 1 - *Deshayesites* aff. *callidiscus* CASEY, 1961: specimen 28615 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (VIG 486), Vignon's gully section, Barrême.
- Fig. 2 - *Deshayesites* gr. *spathi/normani*: specimen 28592 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (ANG 210), Angles road section, Angles.
- Fig. 3a, b - *Deshayesites* aff. *callidiscus* CASEY, 1961: specimen 28853 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (VIG 486), Vignon's gully section, Barrême.
- Fig. 4 - *Deshayesites* aff. *euglyphus* CASEY, 1963: specimen 28690 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (COM 122), La Combe Lambert section, Angles.
- Fig. 5 - *Deshayesites* gr. *spathi/normani*: specimen 28850 Coll. DELANOY, Lower Aptian, level unknown, Tremolies section, Moriez.
- All figures natural size.

TAVOLA I

- Fig. 1 - *Deshayesites* aff. *callidiscus* CASEY, 1961: esemplare 28615 Coll. DELANOY, Aptiano inferiore, Zona a *Deshayesites weissi* (VIG 486), sezione di "Ravin du Vignon", presso Barrême.
- Fig. 2 - *Deshayesites* gr. *spathi/normani*: esemplare 28592 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (ANG 210), sezione della strada di Angles, presso Angles.
- Fig. 3a, b - *Deshayesites* aff. *callidiscus* CASEY, 1961: esemplare 28853 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (VIG 486), sezione di "Ravin du Vignon", Barrême.
- Fig. 4 - *Deshayesites* aff. *euglyphus* CASEY, 1963: esemplare 28690 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (COM 122), sezione di "La Combe Lambert", Angles.
- Fig. 5 - *Deshayesites* gr. *spathi/normani*: esemplare 28850 coll. DELANOY, Aptiano inferiore, livello sconosciuto, sezione di "Ravin de la Colle", presso la fattoria di Tremolies, Moriez.
- Tutte le figure sono a grandezza naturale.



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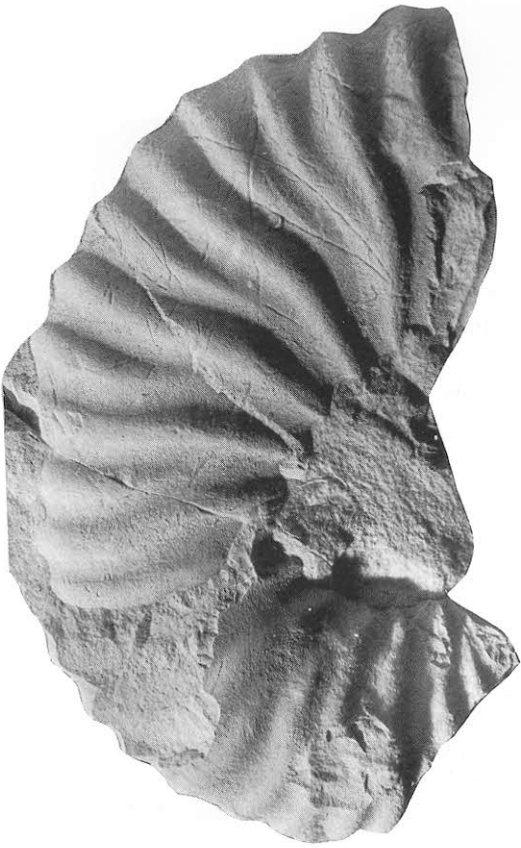
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3a



3b



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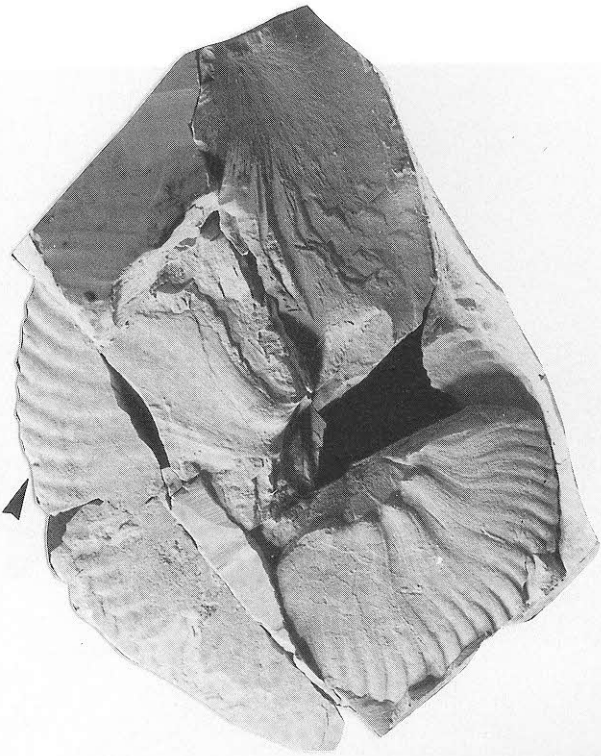
PLATE 2

- Fig. 1a, b - *Deshayesites oglanlensis* BOGDANOVA, 1983: specimen 28653 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone (MEO 199), Méouilles section, Saint-André les Alpes.
- Fig. 2 - *Deshayesites* sp.: specimen 28580 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone (TRE 248), La Colle Gully section near the farm of Tremolies, Moriez
- Fig. 3 - *Deshayesites* sp.: specimen 28643 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone (COM 107), La Combe Lambert section, Angles.
- Fig. 4 - *Deshayesites* sp.: sample 28640 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone (MEO 208), Méouilles section, Saint André les Alpes.
- All figures natural size.

TAVOLA 2

- Fig. 1a, b - *Deshayesites oglanlensis* BOGDANOVA, 1983: esemplare 28653 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites tuarkyricus* (MEO 199), sezione di "Méouilles", Saint-André les Alpes.
- Fig. 2 - *Deshayesites* sp.: esemplare 28580 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites tuarkyricus* (TRE 248), sezione di "Ravin de la Colle", presso la fattoria di Tremolies, Moriez
- Fig. 3 - *Deshayesites* sp.: esemplare 28643 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites tuarkyricus* (COM 107), sezione di "La Combe Lambert", Angles.
- Fig. 4 - *Deshayesites* sp.: esemplare 28640 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites tuarkyricus* (MEO 208), sezione di "Méouilles", Saint-André les Alpes.

Tutte le figure sono a grandezza naturale.



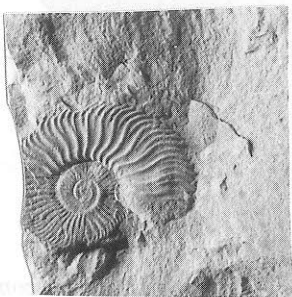
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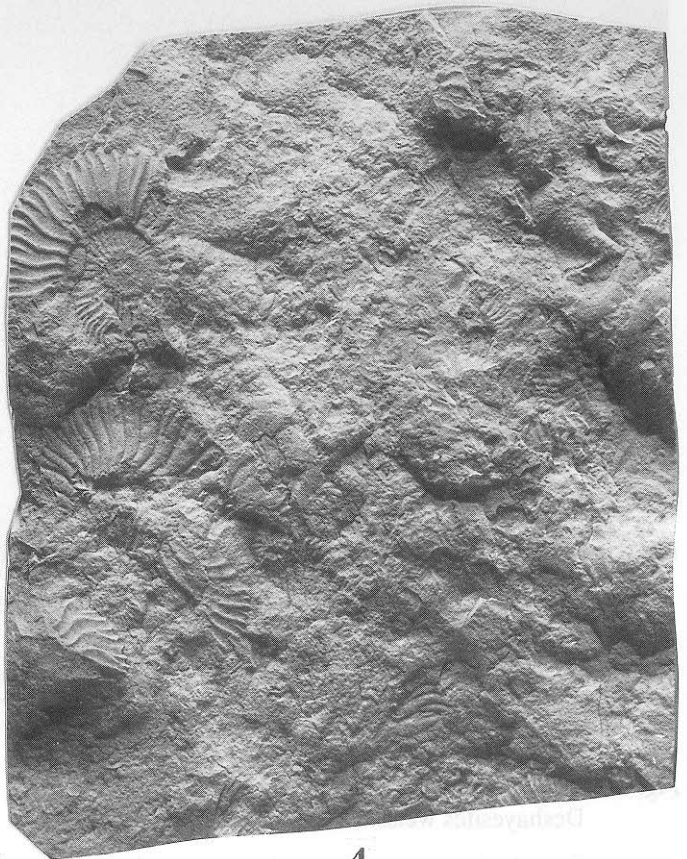
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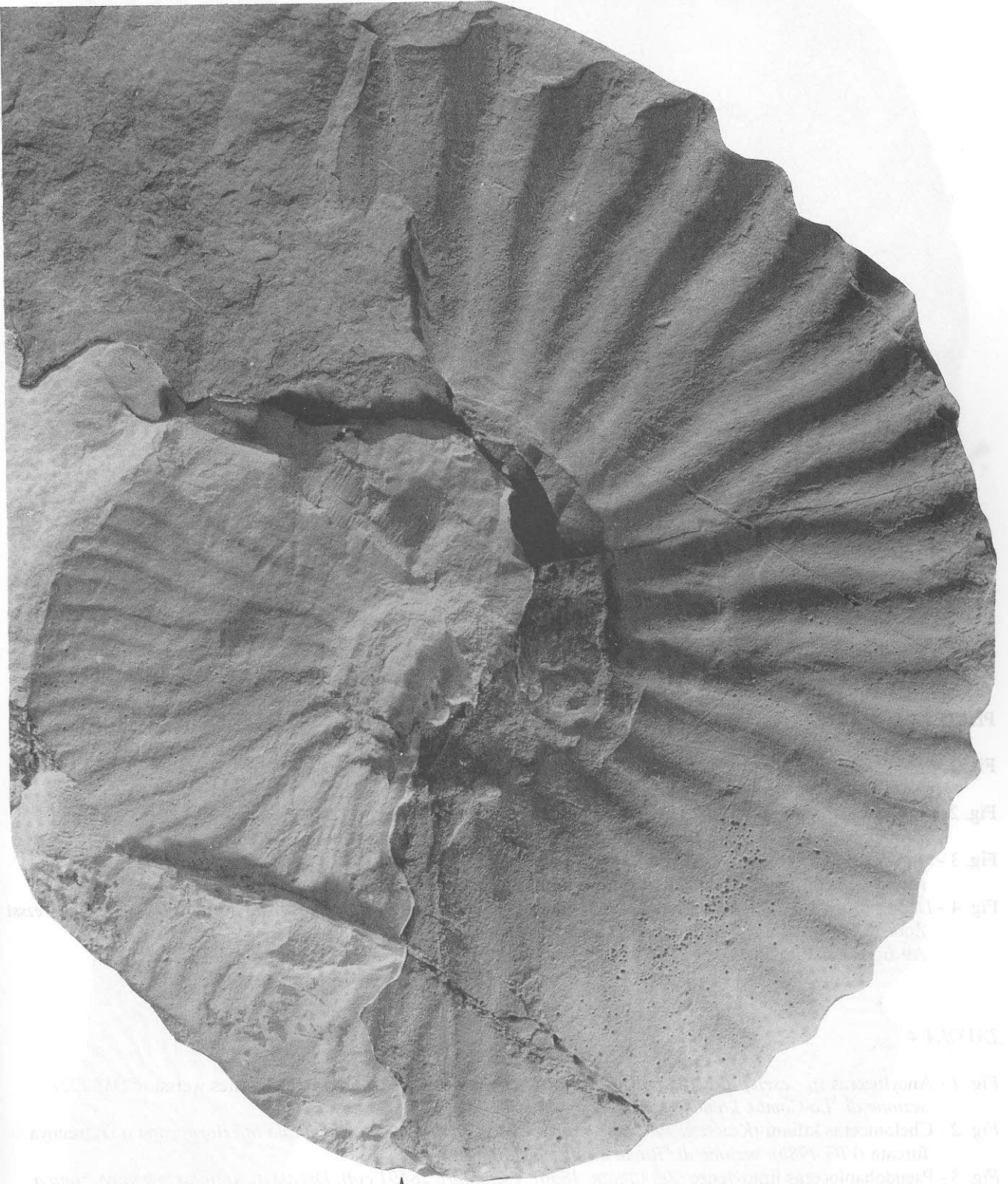
PLATE 3

Fig. 1 - *Deshayesites* aff. *evolvens* LUPPOV, 1952: specimen 28852 Coll. DELANOY, Lower Aptian, *Deshayesites weissii* Zone (VIG 493), Vignon gully section, Barrême.
All figures natural size.

TAVOLA 3

Fig. 1 - *Deshayesites* aff. *evolvens* LUPPOV, 1952: esemplare 28852 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissii* (VIG 493), sezione di "Ravin du Vignon", Barrême.

Tutte le figure sono a grandezza naturale.



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PLATE 4

- Fig. 1 - *Ancyloceras* sp.: specimen 185 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (COM 122), La Combe Lambert section, Angles.
- Fig. 2 - *Cheloniceras kiliani* (KOENEN, 1902): specimen 28682 Coll. DELANOY leg. ARNAUD-VANNEAU, Lower Aptian, base of *Dufrenoya furcata* Zone (VIG 498b), Vignon gully section, Barrême.
- Fig. 3 - *Pseudohaploceras liptoviense* (ZEUCHNER, 1856): specimen 28691 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (COM 119), La Combe Lambert section, Angles.
- Fig. 4 - *Deshayesites* aff. *euglyphus* CASEY, 1963: specimen 28634 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (COM 122), La Combe Lambert section, Angles.
- All figures natural size.

TAVOLA 4

- Fig. 1 - *Ancyloceras* sp.: esemplare 185 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (COM 122), sezione di "La Combe Lambert", Angles.
- Fig. 2 - *Cheloniceras kiliani* (KOENEN, 1902): esemplare 28682 coll. DELANOY, Aptiano inferiore, zona a *Dufrenoya furcata* (VIG 498b), sezione di "Ravin du Vignon", Barême.
- Fig. 3 - *Pseudohaploceras liptoviense* (ZEUCHNER, 1856): esemplare 28691 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (COM 119), sezione di La Combe Lambert, Angles.
- Fig. 4 - *Deshayesites* aff. *euglyphus* CASEY, 1963: esemplare 28634 coll. Delanoy, Aptiano inferiore, zona a *Deshayesites weissi* (COM 122), sezione di "La Combe Lambert", Angles.

Tutte le figure sono a grandezza naturale.



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PLATE 5

- Fig. 1a, b - *Chelonicerias* sp.: specimen 28681 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (VIG 490), Vignon gully section, Barrême.
- Fig. 2 - *Deshayesites* aff. *weissiformis* BOGDANOVA, 1983: specimen 28579 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone (MEO 200), Méouilles section, Saint André les Alpes.
- Fig. 3 - *Ancyloceras* ? gr. *matheroni* D'ORBIGNY, 1842: specimen 28686 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (VIG 490), Vignon Gully section, Barrême.
- All figures natural size.

TAVOLA 5

- Fig. 1 a,b - *Chelonicerias* sp.: esemplare 28681 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (VIG 490), sezione di Ravin du Vignon, Barrême.
- Fig. 2 - *Deshayesites* aff. *weissiformis* BOGDANOVA, 1983: esemplare 28579 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites tuarkyricus* (MEO 200), sezione di "Méouilles", Saint-André les Alpes.
- Fig. 3 - *Ancyloceras* ? gr. *matheroni* D'ORBIGNY, 1842: esemplare 28686 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (VIG 490), sezione di "Ravin du Vignon", Barrême.

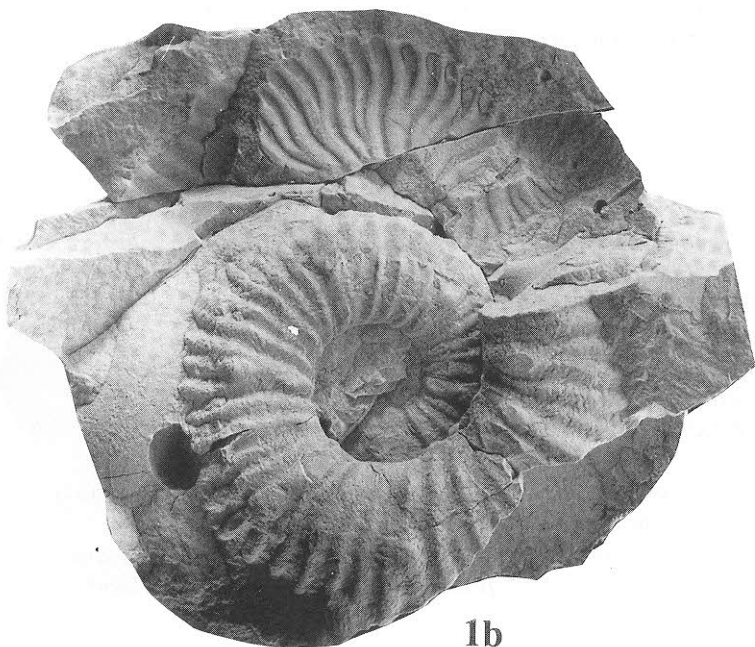
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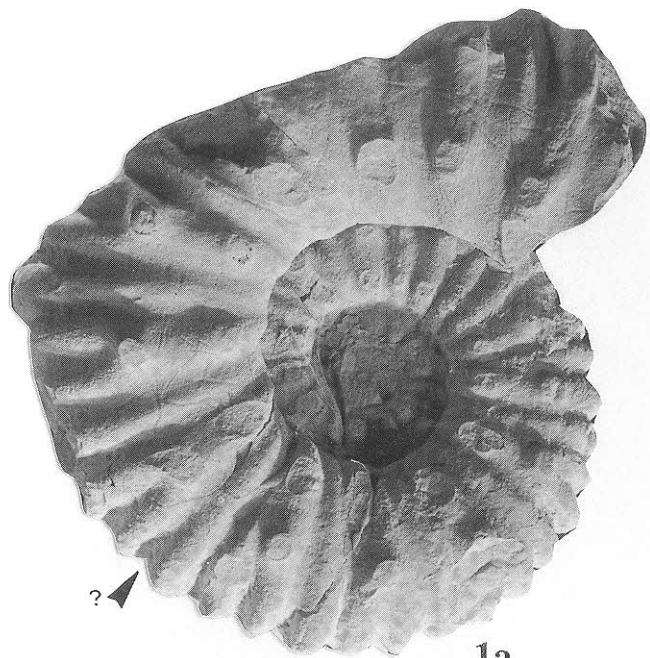
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PLATE 6

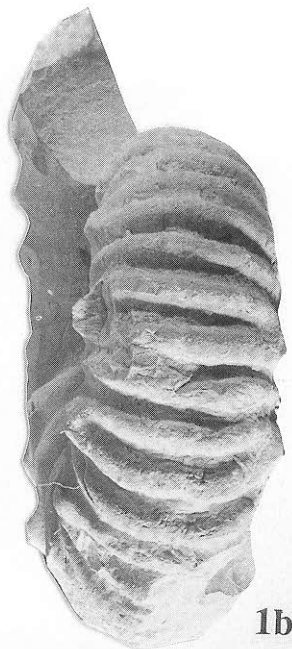
- Fig. 1a, b - *Cheloniceras cornuelianum* (D'ORBIGNY, 1841): specimen 28696 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (COM 122), La Combe Lambert section, Angles.
- Fig. 2 - *Cheloniceras cornuelianum latispinosum* (NIKTHICH, 1915): specimen 28695 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (COM 122), La Combe Lambert section, Angles.
- Fig. 3 - *Deshayesites* sp.: specimen 28641 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone (ANG 206b), Angles road section, Angles.
- Fig. 4 - *Deshayesites* sp.: specimen 28581 Coll. DELANOY, Lower Aptian, *Deshayesites tuarkyricus* Zone (VIG 482), Vignon gully section, Barrême.
- Fig. 5 - *Costidiscus recticostatus* (D'ORBIGNY, 1841): specimen 28639 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (VIG 497), Vignon gully section, Barrême.
- Fig. 6 - *Costidiscus* aff. *nodosostriatus* (UHLIG, 1883): specimen 28630 Coll. DELANOY, Lower Aptian, *Deshayesites weissi* Zone (TRE 262), La Colle gully section near the farm of Tremolies, Moriez.
- All figures natural size.

TAVOLA 6

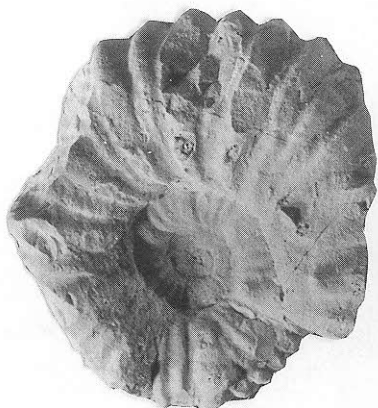
- Fig. 1a, b - *Cheloniceras cornuelianum* (D'ORBIGNY, 1841): esemplare 28686 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (COM 122), sezione di "La Combe Lambert", Angles.
- Fig. 2 - *Cheloniceras cornuelianum latispinosum* (NIKTHICH, 1915): esemplare 28695 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (COM 122), sezione di "La Combe Lambert", Angles.
- Fig. 3 - *Deshayesites* sp.: esemplare 28641 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites tuarkyricus* (ANG 206b), sezione della strada di Angles, Angles.
- Fig. 4 - *Deshayesites* sp.: esemplare 28581 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites tuarkyricus* (VIG 492), sezione di "Ravin du Vignon", Barrême.
- Fig. 5 - *Costidiscus recticostatus* (D'ORBIGNY, 1841): esemplare 28639 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (VIG 497), sezione di Ravin du Vignon, Barrême.
- Fig. 6 - *Costidiscus* aff. *nodosostriatus* (UHLIG, 1883): esemplare 28630 coll. DELANOY, Aptiano inferiore, zona a *Deshayesites weissi* (TRE 262), sezione di "Ravin de la Colle", presso la fattoria di Tremolies, Moriez.
- Tutte le figure sono a grandezza naturale.



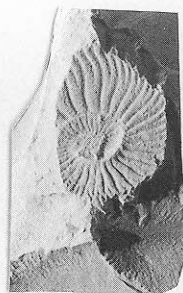
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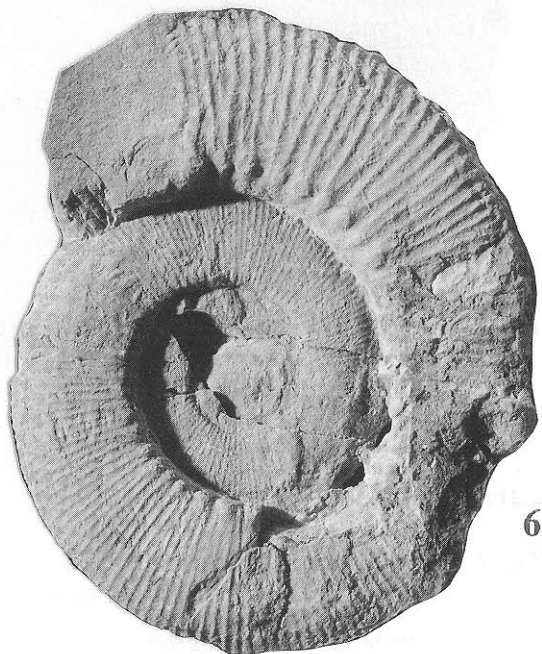
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PLATE 7

Fig. 1 - *Procheloniceras albrechtiaustriacae* (UHLIG, 1883): unregistered specimen Coll. MAGNIN-BÉCU, Lower Aptian, *Deshayesites tuarkyricus* Zone (COM 109), La Combe Lambert section, Angles.
All figures natural size.

TAVOLA 7

Fig. 1 - *Procheloniceras albrechtiaustriacae* (UHLIG, 1883): esemplare non catalogato coll. MAGNIN-BÉCU, Aptiano inferiore, zona a *Deshayesites weissii* (COM 109), sezione di "La Combe-Lambert", Angles.

Tutte le figure sono a grandezza naturale.



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Fig. 1 - II "thick bundle" della zona a *Deshayesites* *trispinosus* nella sezione della strada di "Ravin du Nigon",
Dorsme.

TABLE 8
Fig. 1 - The "thick bundle" of the zone a *Deshayesites* *trispinosus* in the section of the "Ravin du Nigon",
Dorsme.
Fig. 2 - The "thick bundle" of the zone a *Deshayesites* *trispinosus* in the section of the "Ravin du Nigon",
Dorsme.

201b



PLATE 8

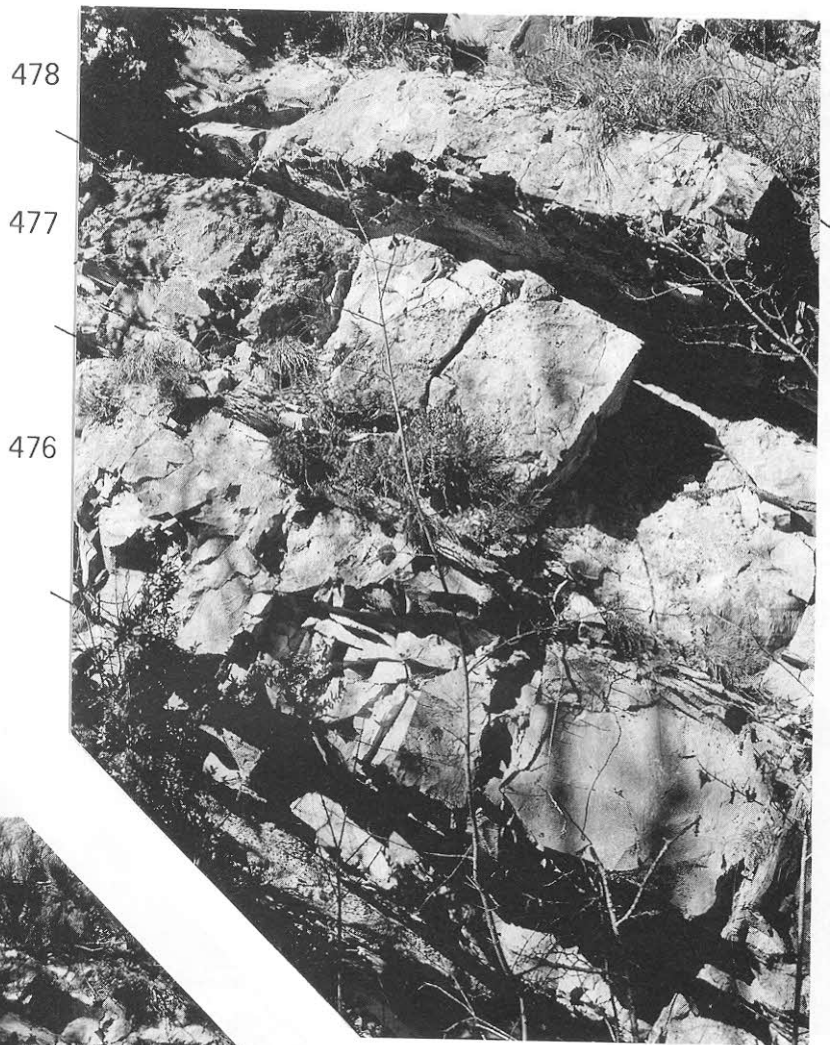
Fig. 1 - The "thick bundle" of the *Deshayesites tuarkyricus* Zone in the road of Angles section, Angles.

Fig. 2 - The "thick bundle" of the *Deshayesites tuarkyricus* Zone in the Vignon's gully section, Barrême.

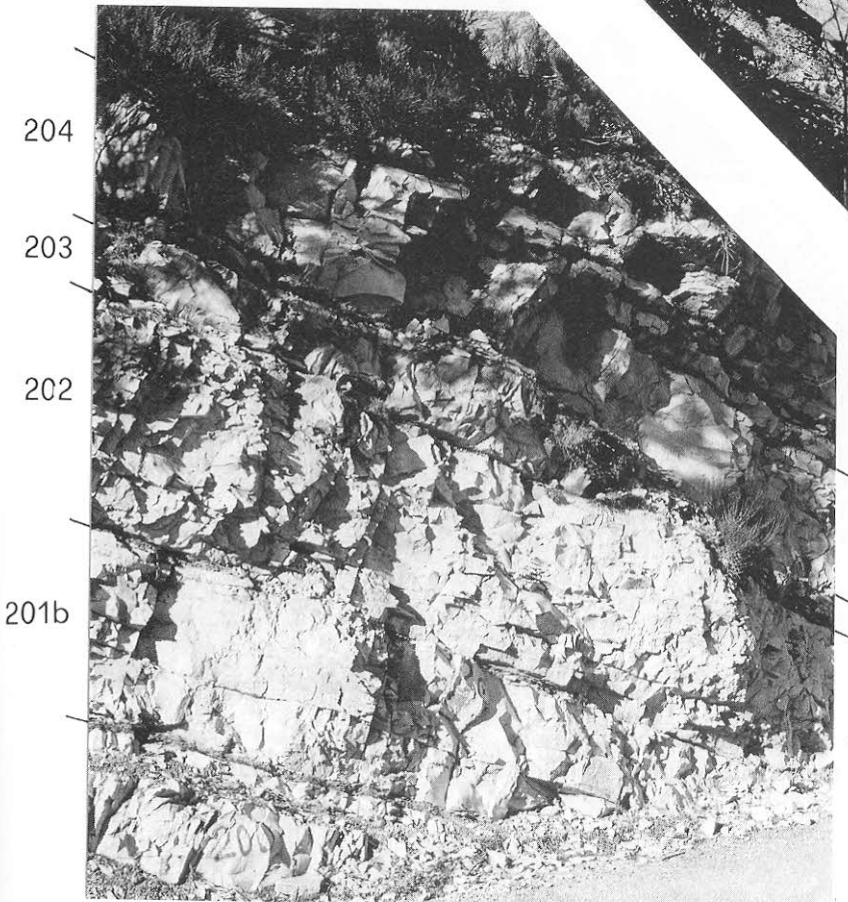
TAVOLA 8

Fig. 1 - Il "thick bundle" della zona a *Deshayesites tuarkyricus* nella sezione della strada di Angles, Angles.

Fig. 2 - Il "thick bundle" della zona a *Deshayesites tuarkyricus* nella sezione della strada di "Ravin du Vignon", Barrême.



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2



PLATE 9

Fig. 1 - The top of the bedoulian limestones in the Vignon's gully section.

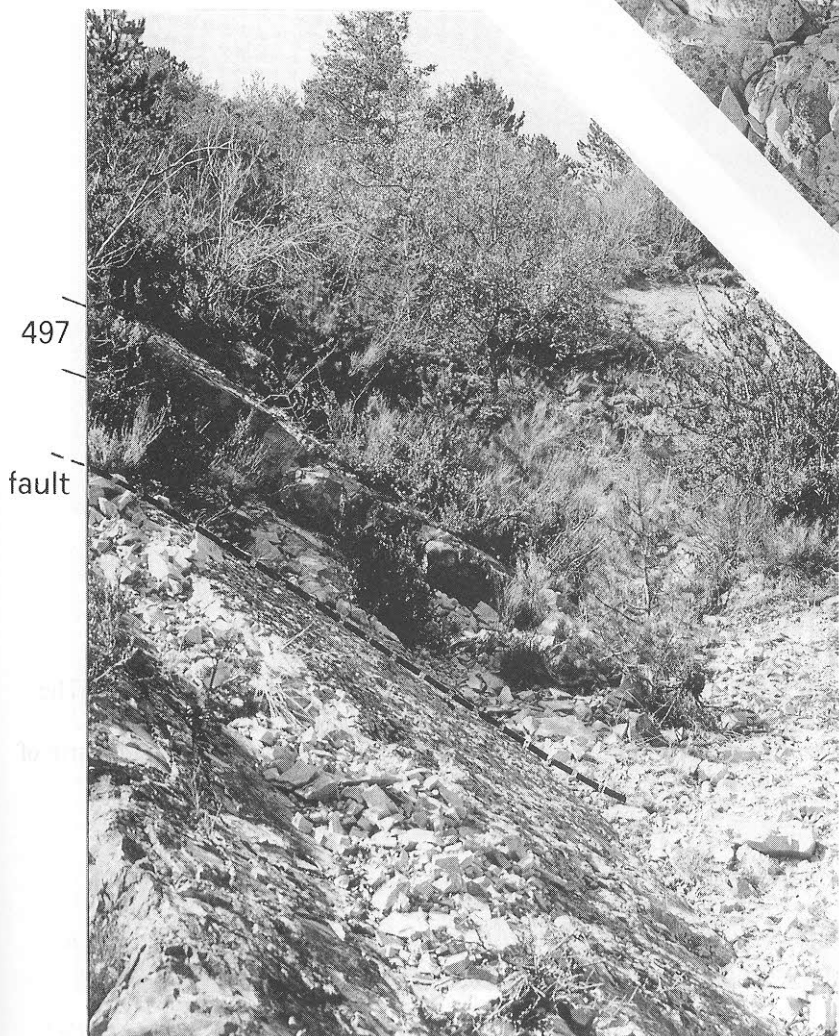
Fig. 2 - The perforated surface of the top of the bedoulian limestones in the Vignon's gully section.

TAVOLA 9

Fig. 1 - La sommità dei calcari bedouliani nella sezione di "Ravin du Vignon", Barrême.

Fig. 2 - La superficie sommitale perforata dei calcari bedouliani nella sezione di "Ravin du Vignon", Barrême.

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2

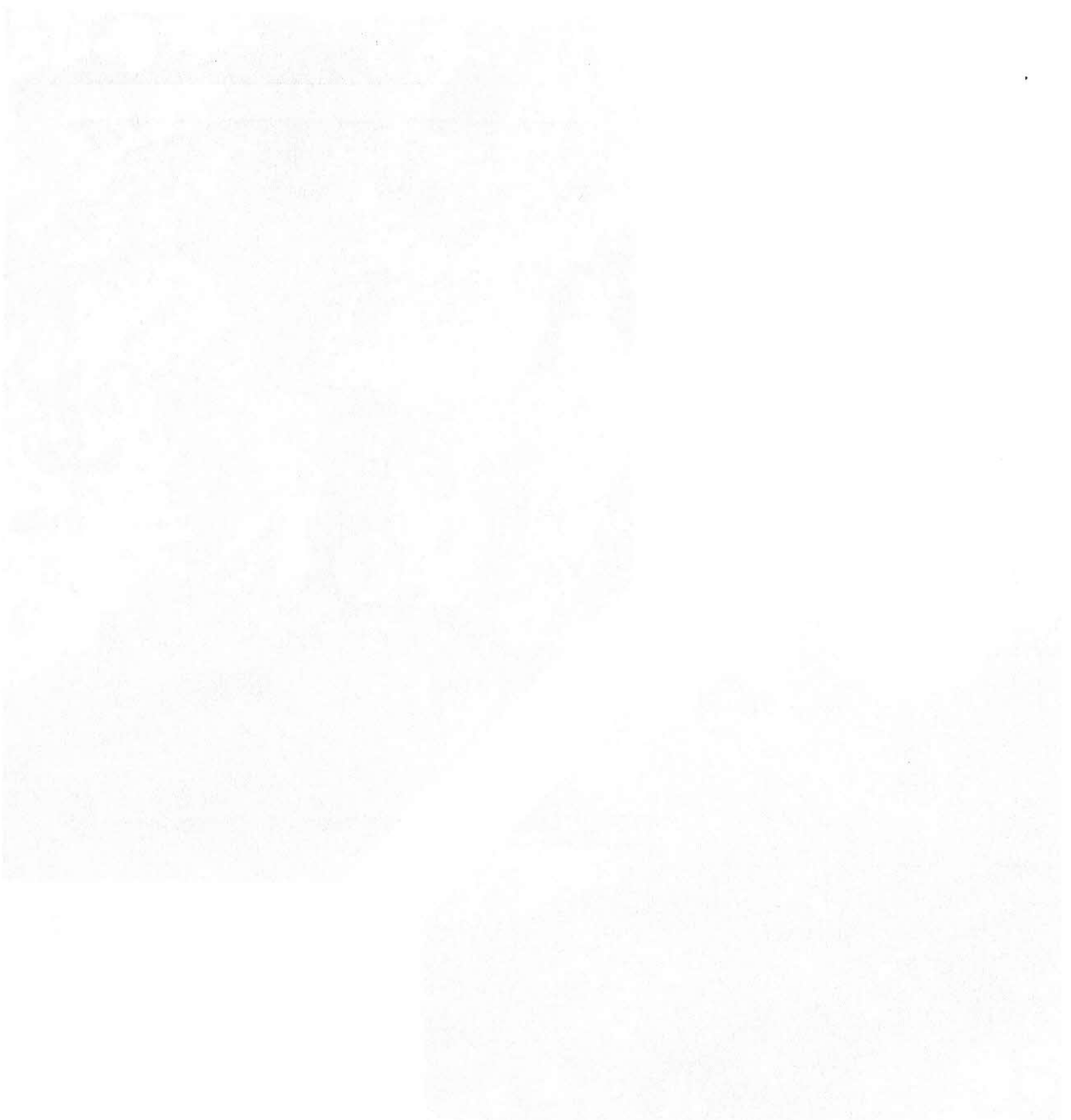


PLATE 10

Fig. 1 - The top of the bedoulian limestones and the beginning of the Blue Marls in La Combe Lambert section. The double bed (beds n° 131-132) is considered as the base of the *Dufrenoya furcata* Zone.

Fig. 2 - The double bed of the base of the *Dufrenoya furcata* Zone (bed 271) in La Colle gully section near the farm of Tremolies.

TAVOLA 10

Fig. 1 - La sommità dei calcari bedouliani e l'inizio della Formazione delle "Marnes Bleues" nella sezione di "La Combe Lambert", Angles. Il doppio strato (strati 131-132) è considerato come la base della Zona a *Dufrenoya furcata*.

Fig. 2 - Il doppio strato della base della Zona a *Dufrenoya furcata* (strato 271) nella sezione di "Ravin de la Colle", presso la fattoria di Tremolies, Moriez.

New data on the Upper Barremian biostratigraphy of the Caucasus region (Caucasus)

Nuovi dati sulla biostratigrafia georgiana (Caucaso)



271

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131

(*) A. Djanibekov, Geological Institute of Academy of Sciences of Georgia, T. Inshavashvili str. 130, 380011 Tbilisi, Republic of Georgia.