Stratigraphy and Geological Correlation, Vol. 7, No. 4, 1999, pp. 343–355. Translated from Stratigrafiya. Geologicheskaya Korrelyatsiya, Vol. 7, No. 4, 1999, pp. 40–53.

The Lower Aptian of the Mangyshlak Mountains

T. N. Bogdanova

All-Russia Research Institute of Geology, Srednii pr. 74, St. Petersburg, 199026 Russia

Received March 4, 1996; in final form, April 15, 1997

Abstract—In the Mangyshlak Mountains, the lower Aptian deposits are represented by thin beds (0.5–1.5 m) of sandstone and conglomerate, and in the Kugusem anticline, this time range spans two conglomerate beds incorporating an intermediate clay member (up to 15 m thick). The lower Aptian beds rest with a hiatus on different horizons of the Cretaceous (Berriasian-Barremian), or on the Middle Jurassic rocks. The beds yielded diverse assemblages of various faunal groups: ammonites, belemnites, bivalves, brachiopods, Echinoidea, and others. The beds represent a condensed sedimentary sequence of the shallow-shelf type and are divisible into the lower Aptian *Deshayesites weissi, Deshayesites deshayesi*, and *Dufrenoya furcata* ammonite zones. The lower Aptian ammonite assemblages include 21 species from genera *Deshayesites, Dufrenoya*, and *Cheloniceras*, two of which (*Deshayesites semenovi* and *Cheloniceras sinzowi*) are new and described in the paper. The paper also presents images of 16 other species, including 11 forms discovered for the first time in the Mangyshlak Mountains.

Key words: *Transcaspian region, Mangyshlak, northern Caucasus, southern England, lower Aptian, ammonites, zone, correlation, condensed beds.*

In many Transcaspian areas (Kopetdag, Greater and Lesser Balkhany, Kubadag, and Tuarkyr), the lower Aptian deposits are represented by marine sediments, whose beds are 40 to 650 m thick and span the *Deshayesites tuarkyricus, D. weissi, D. deshayesi*, and *Dufrenoya furcata* zones[1] of the ammonite scale (*Resheniya ...*, 1977; Bogdanova, 1978). Sections of the Mangyshlak Mountains, where fossils of three ammonite zones are encountered in a bed less than 1.5 m in thickness, are unique in the stratigraphic aspect. This bed of massive calcareous sandstone incorporates pebbles and gravel of underlying rocks and phosphorites. It is a basal one in a rather thick sequence of clay with septarian concretions (the Septarium Clay of the Aptian after N.I. Andrusov).

The majority of researchers, who studied the Lower Cretaceous in the Mangyshlak Mountains, believe that the bed of calcareous sandstone or conglomerate (it was frequently referred to as "plate" in publications) spans the total range of the lower Aptian Substage (Luppov, 1932; Savel'ev and Vasilenko, 1963; *Melovye otlozheniya ...*, 1980). On the basis of ammonites represented by index species of different zones, Savel'ev and Vasilenko (1963, p. 271) arrived at the conclusion that the rocks of the "plate" represent the "typical condensed sequence." The lithologic composition of the "plate" was studied by Klycheva and Yakunitskaya (1963), who argued that, in some sections of the Karatau Range, the basal part of the septarium clay above the "plate" may also belong to the lower Aptian.

In 1971 and 1973, Luppov, Bogdanova, and Lobacheva studied 17 exposures of the lower Aptian deposits in the western and eastern Karatau Range, and also in the Karasyaz', Tumgashi, and Kugusem structures (Fig. 1). They outlined the relations of the bed in question with the overlying and underlying deposits, and showed a possibility to subdivide it into the lithologic units in certain localities. Applying in addition the bed-by-bed distribution analysis, Bogdanova identified ammonites and bivalves of the bed, and Lobacheva studied brachiopods[2] and sea-urchins from this unit.

Figs. 2–6 illustrate principal structural features, lithological composition, and distribution of paleontological remains that have been detected in various exposures of the Aptian "plate" within the Karatau and Kugusem structural zones. In all the sections studied, the lower Aptian deposits overlie the uneven erosion surface of underlying deposits ranging in age from the Middle Jurassic (Besokty Formation) to the Hauterivian and Barremian (Kugusem Formation of variegated lagoonal-marine sediments).

In the Chirchili section (near the synonymous well in the westernmost piedmonts of the Karatau Range), the "plate" rests on the dark-gray massive Hauterivian sandstones (*Trigonia* Formation) and represents a gray 0.5-m-thick sandstone bed bearing abundant phosphorite nodules and pebbles variable in size. In addition to

[1] In 1979, Plenum of the Cretaceous Commission of the Interdepartmental Stratigraphic Committee (ISC) added to the lower Aptian the *Turkmeniceras turkmenicum* Zone formerly attributed to the Barremian (*Postanovleniya ...*, 1981; see for my own opinion on the issue at p. 65, point 5).

[2] Brachiopods are described in a separate paper by Lobacheva.

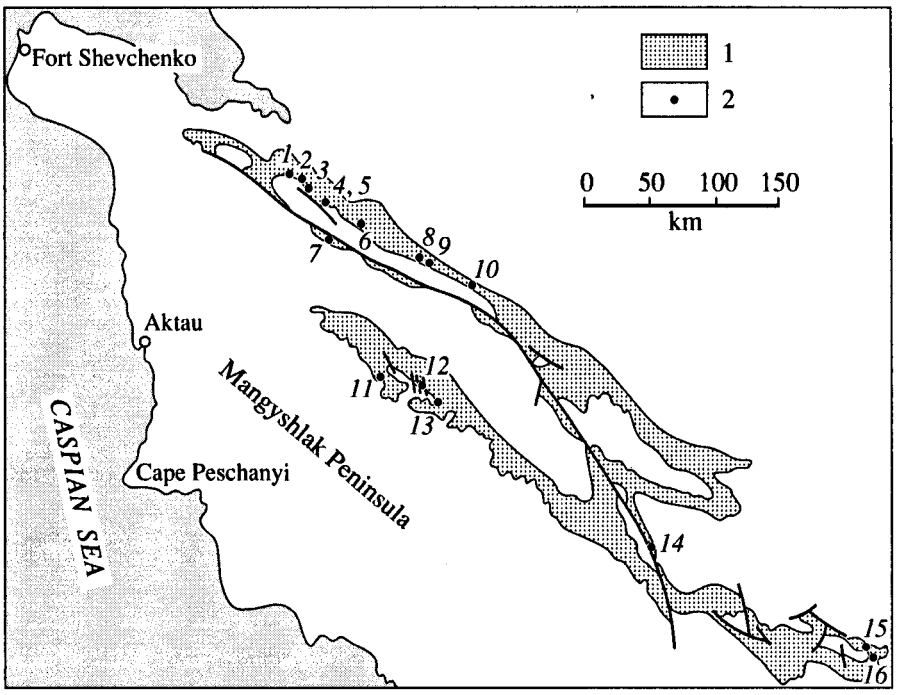

Fig. 1. Geographic scheme of the Mangyshlak Peninsula with outcrops of Lower Cretaceous deposits (1) and the sites studied (2): *1*, Chirchili; *2*, Sorbulak; *3*, Karashimrau; *4*, *5*, Shair; *6*, Kogozbulak; *7*, Tushchibek; *8*, Doshchan; *9*, Dzharmysh; *10*, Kurkruk, *11*, *12*, Karasyaz'; *13*, Sarmurun; *14*, Besokty; *15*, *16*, Kugusem.

ammonites indicated in Fig. 2, the bed yielded plentiful remains of bivalves (*Cucullaea, Lima* s. str., *Grenella, Thetironia, Arctica*, and *Opis*) and brachiopod shells. All fossil remains occur in a form of phosphorite casts or their fragments. The bed is overlain by black smeary clay of the middle Aptian age.

This type of appearance is characteristic of the "plate" under consideration in the Sorbulak, Shair, Tushchibek, Doshchan, Karasyaz', Sarmurun, and Besokty localities.

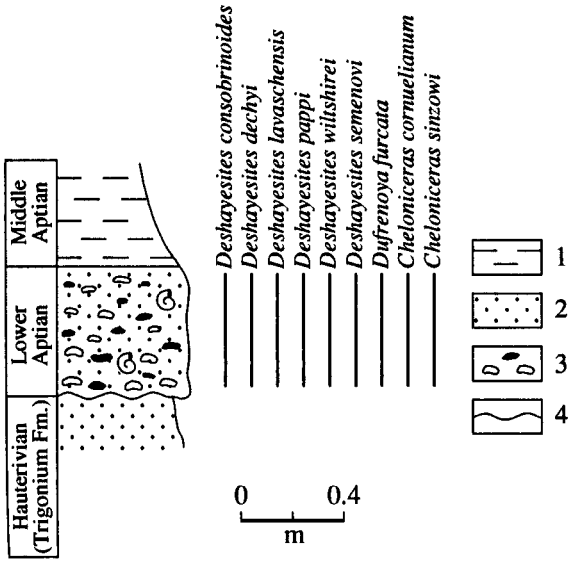

Fig. 2. Chirchili section: (1) clay; (2) sand or sandstone; (3) conglomerate; (4) erosion surface.

In the Karashimrau section (Fig. 3) (7 km to the east from the synonymous wells, the western Karatau Range), the "plate" consists of two beds and overlies the light-green silty clay of the Kugusem Formation. The lower bed of fine-grained rocks incorporates pebbles in its basal horizon only. The calcareous sandstone of the upper bed is intercalated with frequent gravel and conglomerate lentils. Both beds yielded well-preserved fossils. Ammonites of the upper zone of the lower Aptian are recovered from the upper bed only. Both beds are correlative in age with the conglomerate bed of the Chirchili locality.

In the Kogozbulak section (western wall of the Kogozbulak Canyon in the western Karatau Ridge), the "plate" is divisible by lithological features into four beds (Fig. 4). The lower bed of conglomerate with well-rounded pebbles of phosphorite and glauconite rocks is barren of fossils and overlies the erosion surface of grayish green Hauterivian shales. The second bed yielded rare fragments of degesitid shells. Beds 1 and 2 seem to be accumulated earlier than the "plate" rocks in the Chirchili and Karashimrau sections. Beds 3 and 4 include the mixed fauna of all lower Aptian zones and correspond in their formation time to the entire Karashimrau section. Sandstone of Bed 4 grades upward first into its silty variety, and then into the dark, almost black foliate clay enclosing an interlayer with septarium con-

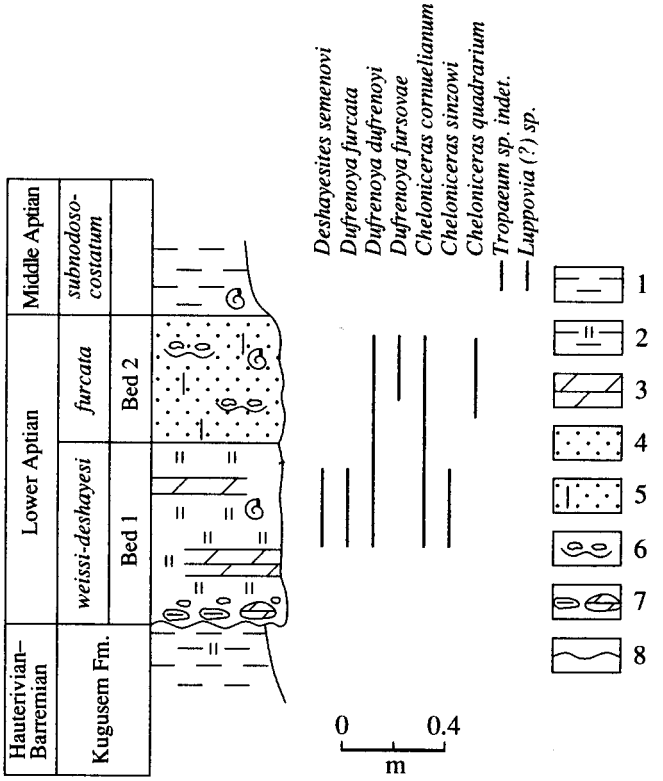

Fig. 3. Karashimrau section: (1) clay; (2) silty clay; (3) marl; (4) sand or sandstone; (5) calcareous sandstone; (6) conglomerate; (7) pebbles of clay and marl; (8) erosion surface.

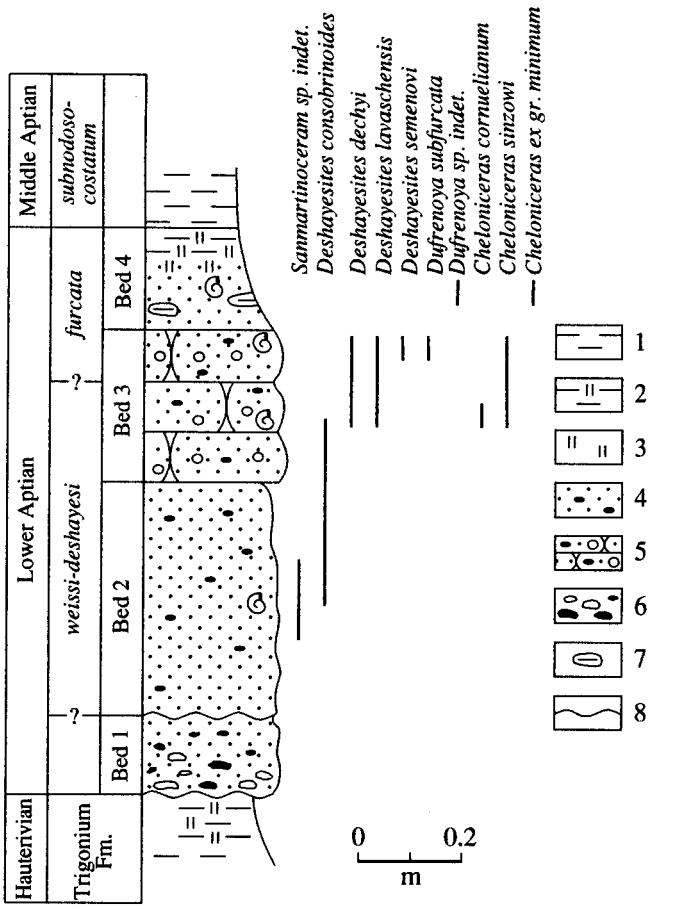

Fig. 4. Kogozbulak section: (1) clay; (2) clayey siltstone; (3) siltstone; (4) sandstone with phosphorite grains; (5) massive oolitic sandstone with phosphorite grains; (6) conglomerate; (7) pebbles of clay rocks; (8) erosion surface.

cretions at the top. The clay yielded remains of the middle Aptian ammonite *Epicheloniceras tschernyschewi* Sinz.

In this section, the lower–middle Aptian boundary does not coincide with the "plate" top and is located above it in the nonconsolidated clay, because the sandstone Bed 4 overlying the "plate" proper bears still the early Aptian ammonites. Since the middle Aptian *Epicheloniceras* forms always occur in Mangyshlak only in the septarium clay and never below it. I place the lower–middle Aptian boundary at the level of 0.5 m above the "plate" top, where the clay is already free of silty or sandy admixture.

In the Dishchan–Dzharmysh section situated between the Doshchan Cemetery in the west and the village of Dzharmysh in the east (the eastern Karatau Ridge), the upper part of the Kugusem Formation (up to 7 m thick) is composed of grayish yellow sandstones cross-bedded at the base and incorporating large concretions (up to 2 m in diameter) of massive calcareous sandstone (Fig. 5). Lentils of conglomerate and gravelstone with frequent phosphorite grains occur everywhere in this member. At the top of the member, there is a bed 1 m thick, and precisely this part of the member is usually considered as a stratigraphic analogue of the Aptian "plate." The bed is composed of yellowish gray, locally bleached sandstone incorporating pebbles and gravel at the base. Only this bed yielded the early Aptian ammonites associated with poorly preserved bivalves of genera *Glycymeris, Aucellina, Chlamys, Camptonectes, Lima* s. str., *Exogyra, Thetironia*, and *Opis*, and also with remains of brachiopods and sea-urchins. In the Doshchan Cemetery area 5–6 km to the west from this section, it is evident that the described bed discordantly overlies the various members of the Kugusem Formation. In this case, the "plate" has a sharp contact with overlying black clay.

In the Kugusem section (Fig. 6) studied in a ravine extending westward from the Kugusem Well, the upper beds of the Kugusem Formation (about 17 m thick in total) are composed, like in the Doshchan–Dzharmysh locality, of sandstones displaying frequently the cross-bedding and enclosing lenses and interlayers of fine-pebble conglomerate and gravelstone. By analogy with many sections of the Karatau Ridge and with the Dosh-

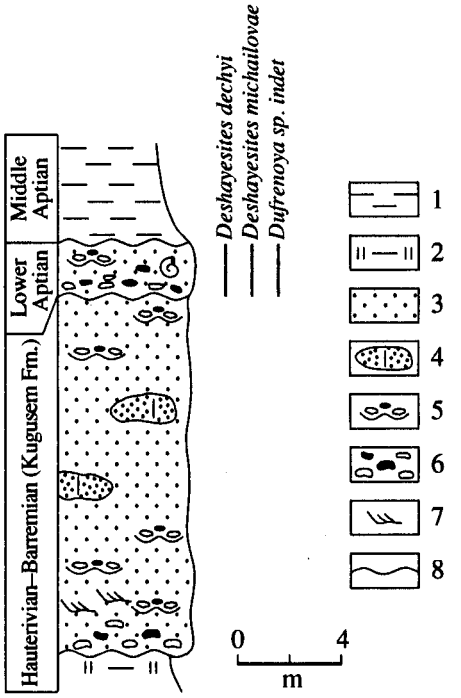

Fig. 5. Doshchan section: (1) clay; (2) clayey siltstone; (3) sand or sandstone; (4) nodules of calcareous sandstone; (5) gravel and conglomerate lentils; (6) conglomerate; (7) cross-bedding; (8) erosion surface.

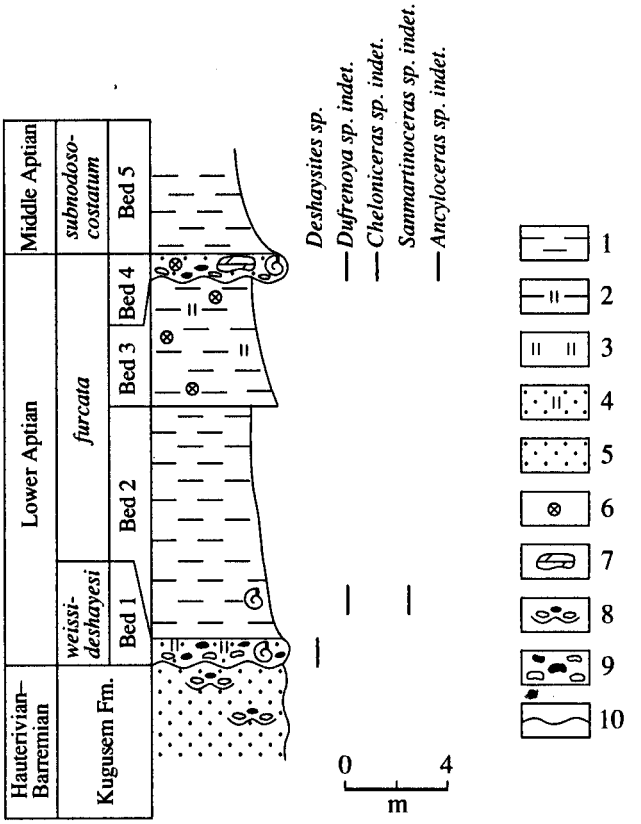

Fig. 6. Kugusem section: (1) clay; (2) silty clay; (3) siltstone; (4) silty sandstone; (5) sand or sandstone; (6) septarium nodules; (7) marl nodules; (8) gravel and conglomerate lentils; (9) conglomerate; (10) erosion surface.

chan–Dzharmysh locality, in particular, the conglomerate Bed 1 at the top of this sandstone sequence is accepted for the basal lower Aptian unit. From this bed, Klycheva and Yakunitskaya (1963) recovered ammonites of the genus *Deshayesites*. In contrast to many other sites, however, the bed does not exhaust here the total range of the lower Aptian. The clay Bed 2 above it yielded the early Aptian *Dufrenoya* forms (Plate II, images 12 and 13; Plate III, image 7). Above the Bed 3 of clayey siltstone barren of fossils, there is another conglomerate bed similar in composition and structure to the lower one and bearing casts of *Dufrenoya* and *Cheloniceras* species. Accordingly, this bed should also be considered as a constituent of the "plate" looking like it is split in two parts by the clay and siltstone interlayers.

By analogy with other sections, the lower–middle Aptian boundary is placed here at the base of the clay Bed 5. This decision is still arbitrary, because the middle Aptian ammonites are extremely rare in the Kugusem area and completely missing from the section in question.

The presented brief description shows that the Aptian "plate" and units below and above it are variable in structure. In the majority of localities however, the lower Aptian interval of the section is represented by either the sandstone, or most frequently, by conglomerate bed up to 1.5 m in thickness, and only in the Kugusem area, this interval includes the 15-m-thick clay unit occurring between two conglomerate beds.

As is already mentioned, Klycheva and Yakunitskaya (1963) additionally attributed to the lower Aptian the basal beds of the septarium clay overlying the "plate." Amid three localities they described, the Chirchili section situated in the southern slope of the eastern Karatau Range is most intriguing. In this section, Klycheva and Yakunitskaya attributed to the lower Aptian the 76-m-thick unit of black clay with remains of *Cheloniceras* sp., *Deshayesites* sp., and *Nuculana pseudomariae* J. Nik., but they did not indicate the position of ammonite remains in the unit. In two other cases (the Keriz and Karakuduk sections), the clay units were dated on the basis of bivalve remains, and such a situation is insufficient to substantiate the early Aptian age of the enclosing rocks. Savel'ev and Vasilenko (1963) also argued that this age suggested for a thick sequence of septarium clay is doubtful and inadequately grounded from the paleontological viewpoint.

The ammonite assemblage from the Mangyshlak Mountains, which was studied in this work, includes 21 species of genera *Deshayesites, Dufrenoya*, and *Cheloniceras*. They occur together with shell fragments of

Table 1. Distribution of ammonites in the lower Aptian section of the Mangyshlak Mountains and other regions

Ammonite species (species marked with asterisk are pictured in Plates I–III)	Mangyshlak Mountains											Turkmenistan						Northern Caucasus					Southern England				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	1	2	3	4	5	1	2	3	4	5
*Deshayesites babaschensis**					7										+												
*D. consobrinoides**	1			4	15									+	+										+		
*D. dechyi**	17			7	19			4		3	2			+	+					+							
*D. euglyphus**				2									+	+										+			
*D. kudrjavzevi**				7										+	+					+							
*D. lavaschensis**	20		1	16	54															+							
D. levigatus			2											+													
*D. luppovi**					1					1	1		+	+													
*D. michailovae**				1										+	+												
*D. pappi**	2													+													
D. robustocostatus				1																+							
D. semenovi sp. nov.*	1		3	13	29	2																					
D. terminalis		1													+												
D. cf. *wiltshirei**	8	1									1														+		
*Dufrenoya furcata**	3		2	4							1					+					+					+	
*Dufrenoya dufrenoyi**	9		4	10												+											
*D. subfurcata**				15	2											+					+						
*D. fursovae**			1													+											
*Cheloniceras cornuelianum**	10		23	5	13		4	1						+	+	+				+							
*Ch. quadrarium**			1								1														+	+	
Ch. sinzowi sp. nov.*	15		4	10	7			3	3																		
Sanmartinoceras sp.					1																						
Tropaeum sp. indet.					1																						

Mangyshlak sections: (1) Chirchili; (2) Sorbulak; (3) Karashimrau (western); (4) Shair; (5) Kogozbulak; (6) Airakty; (7) Karashimrau (eastern); (8) Tushchibek; (9) Karaduan; (10) Ondy; (11) Karasyaz'; figures in each column indicate amount of collected specimens. Ammonite zones in Turkmenistan (Bogdanova, 1978): (1) *Turkmeniceras turkmenicum*, upper Barremian; (2) *Deshayesites tuarkyricus*; (3) *D. weissi*; (4) *D. deshayesi*; (5) *Dufrenoya furcata*, lower Aptian zones 2–5; (6) *Epicheloniceras subnodosocostatum*, middle Aptian. Ammonite zones of northern Caucasus (Drushchits and Mikhailova, 1966): (1) *Heteroceras astierianum–Imerites giraudi–Colchidites securiformis*, upper Barremian; (2) *Deshayesites weissi-Prochelonicerasalbrechtiaustriae*; (3) *D. dechyi-D. deshayesi*; (4) *Dufrenoya furcata–D. subfurcata*, lower Aptian zones 2–4; (5) *Cheloniceras subnodosocostatum-Colombiceras crassicostatum*, upper Aptian. Ammonite zones of southern England (Casey, 1961): (1) *Prodeshayesites fissicostatus*; (2) *Deshayesites forbesi*; (3) *D. deshayesi*; (4) *Tropaeum bower* banki, lower Aptian zones 1–4; (5) Cheloniceras martinoides, upper Aptian.

Table 2. Correlated lower Aptian ammonite zonations

Stage, substage	England (Casey, 1961)		Northern Caucasus (Drushchits *et al.*, 1986)	Mangyshlak	Turkmenistan (Bogdanova, 1978)
Lower Aptian	*Tropaeum bowerbanki*	*Cheloniceras meyendorfi*	*Dufrenoya furcata*	*Dufrenoya furcata*	*Dufrenoya furcata*
		Dufrenoya transitoria			
	Deshayesites deshayesi	*Deshayesites grandis*	*Deshayesites deshayesi*	*Deshayesites deshayesi*	*Deshayesites deshayesi*
		Cheloniceras parinodum			
	Deshayesites forbesi	*Deshayesites callidiscus*	*Deshayesites weissi – Procheloniceras albrechti–austriae*	*Deshayesites weissi*	*Deshayesites weissi*
		Deshayesites kiliani			
		Deshayesites fittoni			
	Prodeshayesites fissiocostatus	*Prodeshayesites obsoletus*		Kugusem Formation	*Deshayesites tuarkyricus*
		Prodeshayesites bodei			
Barremian	Weld		*Turkmeniceras turkmenicum–Matheronites ridzewsky*		*Turkmeniceras turkmenicum*

Tropaeum, *Toxoceratoides*, and *Ancyloceras* forms undeterminable at the species level. In many sections of the Aptian "plate" of the Karatau Range, the distribution of zonal index species is indistinct. Nonetheless, when the "plate" is divisible into several beds, one may observe the following distribution patterns: the basal conglomerate is always barren of ammonites (Karashimrau and Kogozbulak localities); the bed above it includes rare degesitid forms (Kogozbulak locality, Bed 2); genera *Deshayesites* and *Dufrenoya* coexist in the middle bed, and the uppermost bed bears the assemblage of *Dufrenoya* and *Cheloniceras* species (Kogozbulak locality, Bed 4; Kugusem locality, beds 2 and 4).

The studied ammonite assemblage and lower Aptian faunas from Turkmenistan (Bogdanova, 1979, 1991) include many species in common. The lower *Deshayesites tuarkyricus* Zone of the Mangyshlak plate yielded both *Deshayesites luppovi* and *D. euglyphus*, whose stratigraphic range in Turkmenistan is wider than this zone. *D. oglanlensis* and index species *D. tuarkyricus*, occurring within the zone only, have not been encountered in the Mangyshlak Mountains, and it is unclear whether this lower Aptian zone is present here or not. It appears that the onset of marine sedimentation in the Mangyshlak region was after the earliest Aptian time. The *Deshayesites wiltshirei* species characteristic of the *grandis* Subzone of the *D. deshayesi* Zone in southern England (Casey, 1964) is established to occur also in Mangyshlak. This fact is of particular interest, because in the Transcaspian areas located southward (Tuarkyr, Greater Balkhan, Kubadag) this part of the Aptian sequence is usually eroded. Other ammonites from Mangyshlak, except local species *Deshayesites semenovi* and *Cheloniceras sinzowi*, are well-known and widespread in many distribution areas of the lower Aptian deposits.

At present, there are two schemes of the lower Aptian ammonite zonation in the Boreal and Tethyan provinces (Table 2). The scheme elaborated by Casey (1961) for southern England exemplifies the boreal zonations, whereas the scheme established in Turkmenistan is accepted as a standard of ammonite zonations in Tethyan regions (Bogdanova, 1978; Hoedemaeker *et al.*, 1993). The lower Aptian ammonite zonation suggested for Mangyshlak (Table 2) is very tentative, because the proper zonal assemblages have not been identified here. Many species available in the Mangyshlak "plate" allow me to believe that they characterize here the zonal units of Turkmenistan and northern Caucasus. At the same time, the lack of the majority of species typical of southern England exclude any chance to apply zonations of the boreal type in the study region. Only two common species, *D. wiltshirei* and *Ch. quadrarium*, both missing from the Transcaspian sections probably because of erosion, characterize the *deshayesi* Zone in both the Mangyshlak region and southern England. The ammonite assemblages of the *furcata* time were very different in the Mangyshlak and England basins. The heteromorphic ammonites, for instance, the genus *Tropaeum*, were dominant at that time in the latter, whereas their abundance in the Mangyshlak and Transcaspian areas is extremely low. The *Tropaeum* remains from basal beds of the septarium clay represent most likely the middle Aptian species of the genus, since they coexist with ammonites of the genus *Luppovia* characteristic of this stratigraphic level in Transcaspian areas.

Judging from the structure of the Aptian "plate" and its faunal remains, there was the following succession of events responsible for the "plate" formation. After the accumulation of the Kugusem Formation in the Hauterivian–Barremian freshwater basin that periodically experienced salinization (Klycheva and

Yakunitskaya, 1963), there was a commencement of the early Aptian transgression. The sea of that time surrounded islands of the flooded Karatau Range. Sediments of the "plate" accumulated in marginal parts of that sea basin and represented a kind of shallow shelf condensation under conditions of frequently alternating sedimentation and erosion phases.

Deposits similar to the lower Aptian "plate" and composed of thin sandstone and conglomerate beds with phosphorite gravel and pebbles are described in many publications, where they are referred to as the condensed beds. For instance, Sapozhnikov and Tashliev (1969) reported about the phosphorite bed of the Gyaurs-Dag locality (Turkmenistan) that yielded fauna of seven Albian zones. They interpreted this bed as a sedimentary unit accumulated after a deep washout of older deposits and under conditions of repeated erosion and sedimentation episodes. In their opinion, the sequence of events led to phosphatization of faunal remains and to formation of pebbles consisting of several phosphate generations. In shoal settings with predominant sedimentation phases, the phosphate beds could be intercalated with sediments of another type, and the same situation seems to be characteristic of the Mangyshlak sections. For example, the described "plate" is locally represented by a thin bed (up to 0.5 m) of phosphorite sandstone bearing mixed fossils of the lower Aptian (Chirchili locality), or the lower and lowermost middle Aptian zones (Besokty locality). In other areas (Kogozbulak locality), the accumulation of sedimentary material above the basal conglomerate dominated over its erosion, as it is evident from the greater thickness of the "plate" (up 1.5 m) and from concentration of older degesitids (genus *Deshayesites*) in its lower part (Bed 2) and younger ammonites in the upper Bed 4. Finally, the condensation and erosion in the Kugusem area took place at the time of the *weissi* and *deshayesi* zones of the lower Aptian, whereas the *furcata* Zone corresponded in time to a period of normal marine sedimentation (clay) in shallow and quiet settings of the past basin. The sequence of events ended with an erosion phase at the early–middle Aptian boundary time. As a result, the condensed conglomerate beds turned out to be split by the intercalated clay.

The suggested model of the lower Aptian "plate" formation certainly needs a verification on the basis of additional lithological and sedimentological data. Nonetheless, the presented data on ammonite distribution in this lithologic unit elucidate to some extent the early Aptian geological history of the region.

The lower Aptian sections similar to those of Mangyshlak are also studied in nearby areas of the northern Caucasus and Dagestan (Rengarten, 1961; Mordvilko, 1962). In Rengarten's opinion, the commencement of transgression induced the strong currents, which washed out the sedimentary material and load off the organic remains, the ammonite shells in particular, thus mixing faunas of different ages. According to data of Rengarten and Mordvilko, the condensed beds of the northern Caucasus include fossil assemblages of two (Tsmur-Chai and Gergebil localities) or three (Levashi and Andiiskoe Koisu localities) lower Aptian zones.[1] Later on, Kakabadze *et al.*, (1978), who additionally investigated the localities in Dagestan, reported that the "load" bed of the Levashi section yielded ammonites of the *dechyi–deshayesi* and *furcata* zones of the lower Aptian mixed with the fossils of the *subnodosocostatum–crassicostatum* Zone of the middle Aptian. The combined Barremian and Aptian faunas were recovered by Sharikadze (1974) near the village of Tsipa from a single conglomerate bed of the Molity syncline, however it is unclear whether this bed is of the condensed type.

The ammonite fauna studied in this work indicate that the transgression in the Mangyshlak region commenced not from the beginning of the degesitid time, but later in the period of the *weissi* Zone. According to data of Mordvilko (1962), the most remarkable stratigraphic level of "coarse sand facies" and condensed beds in Dagestan also corresponds to the upper degesitid zones, and the late Aptian geological history of both regions apparently was similar.

Amid the studied ammonites, there are two new species described below. The collection of ammonites no. 12927 is stored at the Chernyshov Museum of the Central Research Institute of Geological Exploration, St. Petersburg. The original and duplicate parts of this collection include all ammonite species mentioned here in Table 1.

Order Ammonitida

Suborder Ancyloceratina

Superfamily Deshayesitaceae

Family Deshayesitidae Stoyanov, 1949

Genus *Deshayesites* Kasansky, 1914

Deshayesites semenovi[2] Bogdanova, sp. nov.

Plate I, images 1–3

Hoplites weissi Semenov, 1899, p. 112, Plate 3, figs. 12a and 12b

Holotype: no. 1/13927, the Chernyshov Museum, St. Petersburg; Mangyshlak, western Karatau Range, Kogozbulak locality; lower Aptian.

Material: 49 specimens at different stages of evolution.

Description. Large compressed shells displaying the moderate to quick convolution rate. The outer side is narrow, convex, with a smooth outer inflection; lateral sides are slightly convex (whorls are most thick in the lower third of their height); umbilical walls are low and steep in the early whorls, but become more gentle by the growth; umbilical inflection is smooth. In general, the whorl sections are rectangular-oval to triangular-oval. Umbilicus is moderately narrow and stepwise.

[1] I quote here stratigraphic ranges of the beds as they are defined in the author's zonation.

[2] The species name is given in honor of V.P. Semenov, the investigator of Mangyshlak.

Plate I

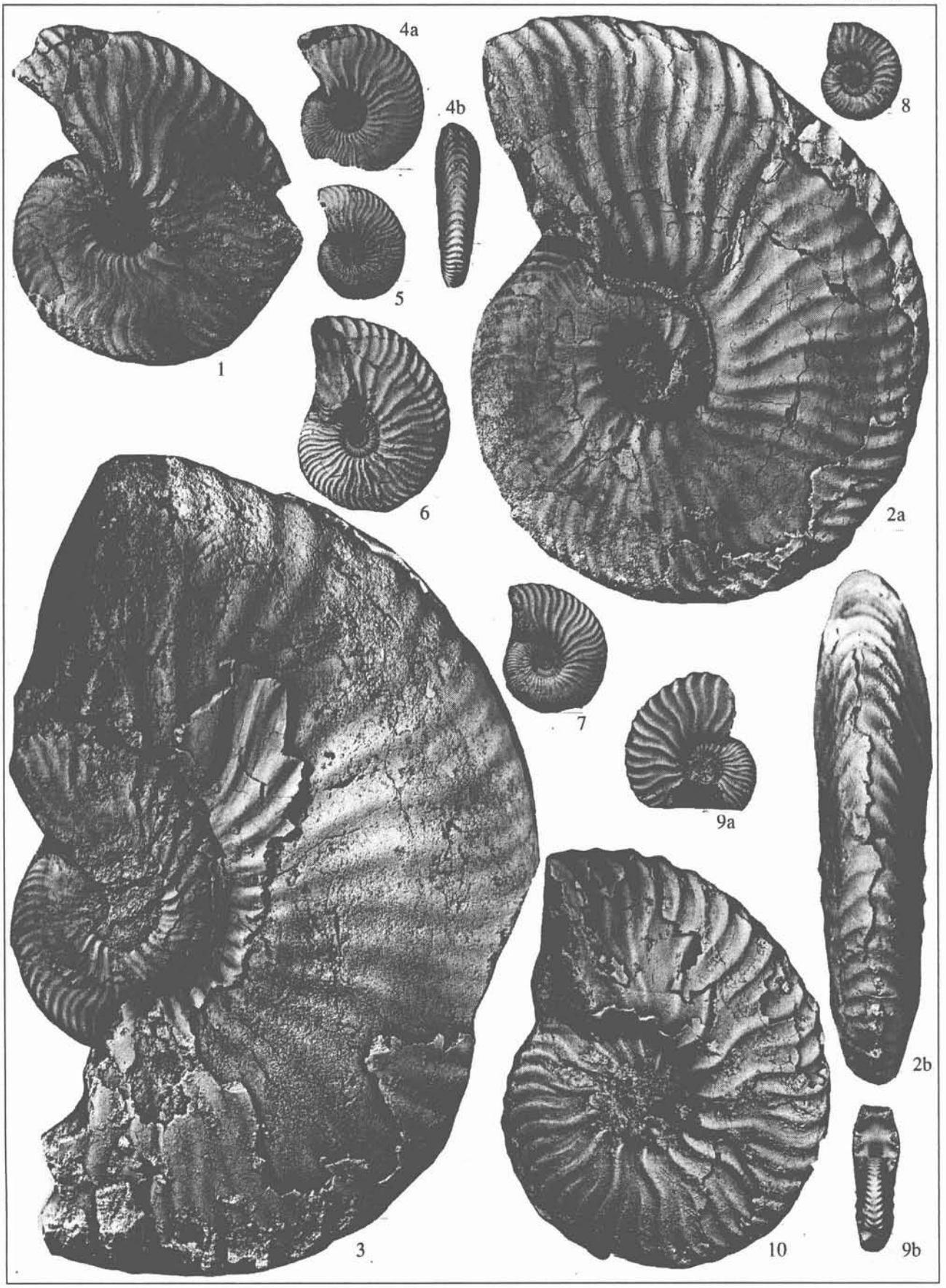

Plate I. Early Aptian ammonites from the Mangyshlak Mountains.
(1–3) *Deshayesites semenovi* Bogdanova, sp. nov.: (1) 2/12927, lateral side; (2) 3/12927, lateral (a) and external (b) sides; (3) holotype 1/12927, lateral side; western Karatau Range, Kogozbulak (talus of beds 3 and 4); lower Aptian. (4–7)*Deshayesites lavaschensis* Kasansky: (4) 10/12927, lateral (a) and external (b) sides, western Karatau Range, Chirchili, lower Aptian; (5) 12/12927, lateral side; (6) 11/12927, lateral side; (7) 13/12927, lateral side, western Karatau Range, Kogozbulak (bed 3); lower Aptian. (8)*Deshayesites pappi* Bogdanova, 11612927, lateral side, western Karatau Range, Chirchili, lower Aptian. (9) *Deshayesites babaschensis* Bogdanova, 14/12927, lateral (a) and apertural (b) sides, western Karatau Range, Kogozbulak (talus of beds 3 and 4), lower Aptian. (10) *Deshayesites luppovi* Bogdanova, 15/12927, lateral side, western Karatau Range, Kogozbulak (talus of beds 3 and 4), lower Aptian.

Shells are ornamented with plentiful major and intermediate ribs arranged in a radial manner and changing in shape with the shell growth. When the whorl diameter is less than 30–40 mm, major S-shaped ribs frequently alternate with pairs of intermediate ribs, one of which originates near the umbilical inflection, and another one takes its origin higher, but below the middle of the whorl. Major ribs grow from the basis of umbilical side, extend though the umbilical inflection unchanged in shape, but are less distinct on the outer side of the shell. In whorls greater than 40–70 mm in diameter, the ribs have distinct umbilical crests, and then they become flattened and streaming. Intermediate ribs take their origin at this level (approximately in the middle of the whorl height), and some of them are branching from major ribs. In the upper half, the ribs are distinct and have a shape of flat streaming bands with very narrow intervals between them. On the outer side, all ribs are arc-shaped, convex forward. The mature whorls are usually ornamented with coarse furcate or tripartite major ribs encircling one or two intermediate ribs. All ribs are wide, flattened, and narrow-spaced. Their branching usually begins below the middle of whorls. Origin of major ribs migrates during the evolution from the umbilical wall basis toward the umbilical inflection. All ribs of the outer side are smoothed.

Septal line of the outer side has elements $EIU_1U_3U_4U_{5?}$; lobes U_1 and U_3 are situated on the lateral wall, U_4 at the umbilical inflection, and $U_{5?}$ on the umbilical wall. Judging from the amount and arrangement of umbilical lobes, the species belongs to the *D. tuarkyricus* subgroup of the *D. tuarkyricus–D. oglanlensis* group (Bogdanova, 1979).

Size, mm:

		4/12927	5/12927	6/12927	2/12927
Shell diameter		26.6(100)	29.3(100)	36.2(100)	56.7(100)
Umbilicus diameter		4.7(18)	6.7(22)	7.0(19)	9.2(16)
Whorl height (B)		13.8(52)	14.0(47)	18.5(51)	28.7(50)
Whorl height (b)		6.6	8.5	11.6	18.6
Convolution rate (B/b)		2.1	1.6	1.6	1.5
Whorl width		7.6(29)	8.1(27)	9.6(27)	12.5(27)
Amount of ribs in a half of whorl:	external	29	28	30	26
	umbilical	11	15	10–11	12
		3/12927	7/12927	8/12927	9/12927
Shell diameter		75.8(100)	76.5(100)	80.6(100)	89.2(100)
Umbilicus diameter		16.6(22)	13.0(17)	15.1(19)	19.6(22)
Whorl height (B)		35.2(46)	40.6(53)	38.5(48)	41.6(47)
Whorl height (b)		23.2	24.1	23.5	30.0
Convolution rate (B/b)		1.5	1.7	1.6	1.4
Whorl width		19.0(25)	–	22.0(27)	27.5(31)
Amount of ribs in a half of whorl:	external	32	39	34	33
	umbilical	10	12	10	12
		7/12927	3/12927		
Shell diameter		115.8(100)	118.0(100)		
Umbilicus diameter		20.3(17)	24.0(20)		
Whorl height (B)		59.7(51)	50.3(46)		
Whorl height (b)		38.2	32.1		
Convolution rate (B/b)		1.6	1.6		
Whorl width		–	28.0(25)		
Amount of ribs in a half of whorl:	external	45	32		
	umbilical	14	14		

Plate II