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# Distribution of the Bajocian–Bathonian ammonites in the South–West chains of Hissar Range

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(With 2 figures and 9 plates)

The stratigraphical distribution of the Bajocian and Bathonian ammonitids in the South–West Hissar range (Central Asia) is reviewed. The figures of the major taxas, including types of species, described on the local material, are given.

## Introduction

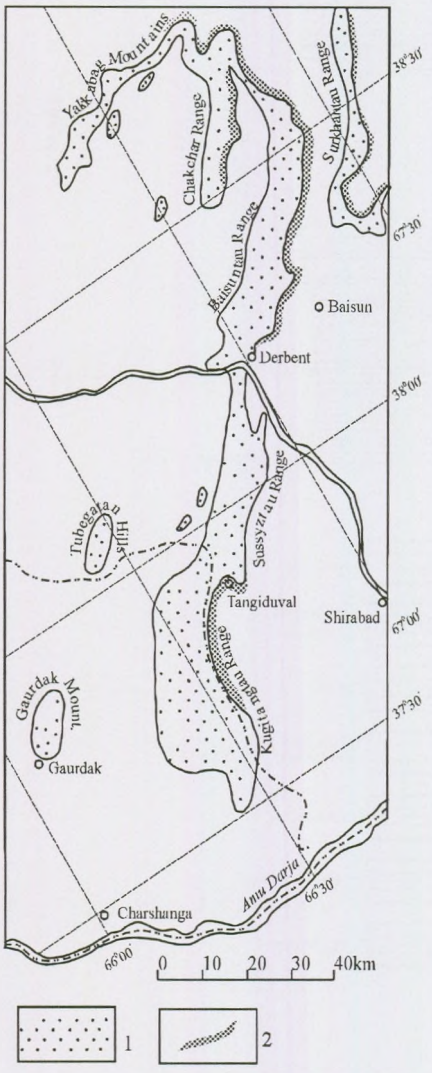


Fig. 1 Jurassic outcrops in the South–West chains of Hissar range: 1 – Callovian and Upper Jurassic, 2 – Bajocian and Bathonian.

Hissar range is located in Central Asia. It crosses through the territory of three states: Uzbekistan, Turkmenistan and Tadzhikistan. The South–West chains of Hissar range are mostly located in Uzbekistan and consist of the Yakkabag mountains, the Chakchar Range, the Baisuntau Range, the Surkhantau Range and the Sussyztau Range. The border between Uzbekistan and Turkmenistan follows the ridge of the southern range – Kugitangtau Range. Gaurdak Mountains and Tubegatan Mountains are located to the west from the Kugitangtau Range (Fig. 1).

The South–West chains of Hissar Range is one of the unique places in the world where we can observe a thick continuous section of the Middle Jurassic deposits. The Bajocian and specially the Bathonian rocks are represented here by predominantly marine carbonate deposits, which contain ammonites (Fig. 2).

The first description of Jurassic ammonites from the South–West Hissar Range was made by NIKITIN (1889) – *"Perisphinctes" bucharicus* [= *Procerites (Siemiradzkia) bucharicus* (Nikitin). This ammonite, initially considered as Callovian, appeared to be from Bathonian, as it was shown by AMANNIYAZOV (1967).

Subsequently Jurassic ammonites of South–West Hissar for a long time practically were not subjected to monographics analysis. Only in the second half of the XXth century, when in the Republic of Turkestan republics of the former USSR the extensive geologic works were unrolled, geologists had paid their attention to the Jurassic deposits of this region.

There were a few publications on the Bajocian–Bathonian ammonites of the South–West Hissar. Descriptions and figures of the separate taxas were published in small papers: KRYMHOLTS & ZAKHAROV 1971; KUTUZOVA 1975; BESNOSOV & KUTUZOVA 1975; 1982;

BESNOSOV 1982. But quality of illustrations was often unsatisfactory.

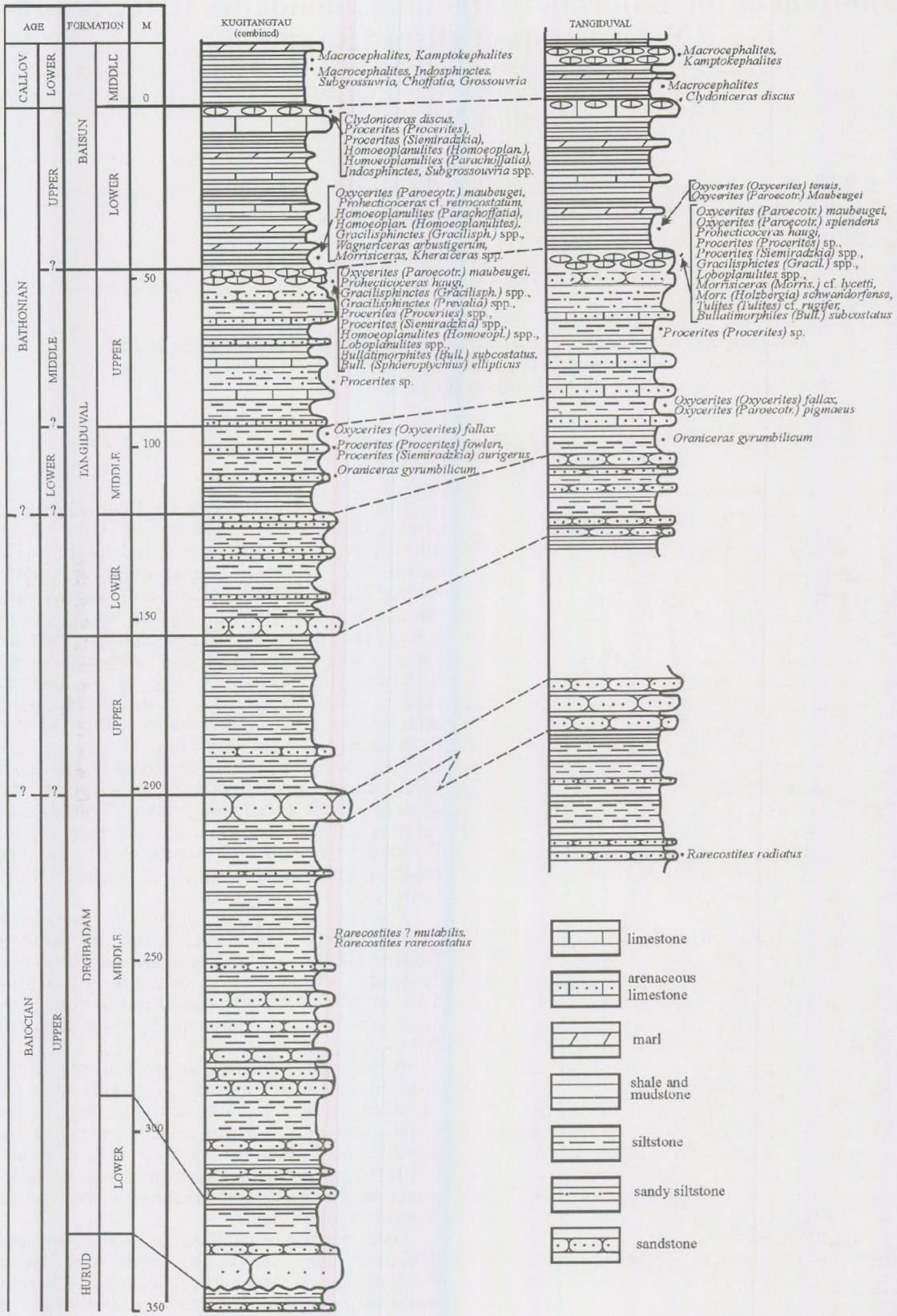


Fig. 2. Distribution of Bajocian and Bathonian ammonitids in the key sections of South–West Hissar: Kugitangtau range (combined) and Tangiduval village.

From the end of 60s to the beginning of 90s collections of Jurassic ammonites of Central Asia predominantly were concentrated in VNIGNI. These are collectings of collaborators of the Institute – N.V. BESNOSOV, V.V. KUTUZOVA, N.K. FORTUNATOVA, I.G. MIKHEEV, V.V. MITTA, and also geologists from Turkmenistan and Uzbekistan, first of all by V.V. KURBATOV from Tashkent and others, who sent ammonites for study and identification to the Institute. Thus, when the author together with the late N.V. BESNOSOV initiated the monographic treating of the Bajocian–Bathonian ammonites of Central Asia, in our disposal there were the richest collections from this area. As a result we published the monograph on the Upper Bajocian and Bathonian ammonitids of Central Asia and Northern Caucasus (BESNOSOV & MITTA 1993). The considerable large part of this work is compounded with ammonites from South–West Hissar. Unfortunately, poor quality of the images and numerous misprints decrease the value of this publication.

The main purpose of the present paper is to publish the valid images of the major taxas of ammonites, first of all of types of species, and to give representation of their vertical distribution. All errors and misprints in the monograph mentioned above, including designations of the types of species, are refined here.

The author carried out the field works in Central Asia (including the South–West chains of Hissar Range) in 1987–1991. However, five field seasons are not enough for complete stratigraphic study of Jurassic deposits of this territory, which is very complicated in geological sense. So not all the presented data are the achievements of the author. However it represents the recent state of our knowledge on ammonites biostratigraphy of the Bajocian–Bathonian deposits of South–West chains of Hissar Range.

## Bajocian–Bathonian Formations and ammonites in South–West Hissar

Lithostratigraphic subdivisions are the most suitable units for geologists working on Mesozoic of Central Asia. If we take in account that the determinable ammonites are connected with few levels of thick sections, we may consider that it is also very suitable for biostratigraphers.

The Bathonian and partly the Bajocian, deposits of South–West Hissar are exposed as interrupted chain of outcrops in the eastern slopes of Kugitangtau Range, Baisuntau Range, Surkhantau Range and Chakchar Range and also in the northern part of the Yakkabag Mountains.

The deposits of our interest belong to three Formations: Degibadam, Tangiduval and Baisun. Each of them is divided onto three members.

The Degibadam Formation (Upper Bajocian and possibly the lowest Bathonian) is laying with washout on continental deposits of the Hurud Formation. In places, where the later one is absent, the former one is transgressively covered under Jurassic deposits.

The Lower Degibadam Member is represented by alternation of marine–coastal and continental–coastal slightly coal–bearing sandstone, aleurolite and argillite with thickness up to 25–30 metres. Ammonites have not been found here.

The Middle Degibadam Member is built by marine, laminated aleurolite with interbeds and benches of argillite and fine–grained sandstone in the south. Shelf covering sandstone with thickness up to 10 metres are laying in the roof of the Member. It gradually replaces strata of the Member from the south towards the North and transgressively covers the Hurud Formation and under Jurassic deposits. The Member's thickness is up to 150 m. Middle Degibadam Member contains ammonites of the Garantiana zone and possibly of the lower part of the Parkinsoni zone, Upper Bajocian:

*Rarecostites rarecostatus* (BUCKMAN)
*R. radiatum* (RENZ)
*R.* (?) *mutabilis* (NICOLESCO)

The endemic genus *Djanaliparkinsonia* KUTUZOVA, consisted of species *D. lutshnikovi* (KUTUZOVA), *D. tuadaensis* (KUTUZOVA), have been also described from Middle Degibadam Member in the south Baisuntau Range.

The Upper Degibadam Member (suggestively the Parkinsoni Zone) is represented by slightly coal–bearing continental–coastal aleurolite with interbeds of sandstone and argillite. Its thickness is up to 100 m. There are not any ammonites in it.

The Tangiduval Formation (Lower Bathonian – Lowest Upper Bathonian) is laying conformal or with washout on the Degibadam Formation with its different levels.

The Lower Tangiduval Member is represented by fine and irregular alternating fine–grained sandstone, aleurolite and argillite, which was accumulated in coastal flood plain environment. The Member is developed only in the South of the territory and it is pinching out towards the north. Its thickness is up to 25 m. Ammonites have not been found in it.

The Middle Tangiduval Member is made by argillite and argillaceous aleurolite with rare beds of calcareous sandstone and arenaceous detrital limestone with ammonites from the Zigzag Zone (the Macrescens Subzone) of the Lower Bathonian:

*Oxycerites (Oxycerites) fallax* (GUERANGER)
*O. (Paroecotraustes) pygmaeus* (ARKELL)
*Procerites (Procerites) fowleri* ARKELL
*P. (Siemiradzkia) aurigerus* (OPPEL)
*Oraniceras gyrumbilicum* (QUENSTEDT)

The Member's thickness is up to 40 m.

In the Kugitangtau Range the Upper Tangiduval Member is formed by calcareous sandy–argillaceous aleurolite with interbeds of detrital limestone and with coquina–lenses consisted of pelecypods and ammonites. To the north aleurolite changes to fine–grained calcareous sandstone. The later one changes to irregularly alternating of sandstone, sandy limestone, conglomerate and coquina–beds. The Member's thickness is up to 80 m.

Only poorly preserved Perisphinctidae have been found in the larger lower part of the Member. Abundant Middle Bathonian ammonites have been

discovered in the upper 5–6 metres of the Upper Tangiduval Member. The following forms have been determined among them:

*Oxycerites (Oxycerites) oxus* (BUCKMAN)
*O. (Oxycerites) tenuis* MITTA
*O. (Paroecotraustes) formosus* (ARKELL)
*O. (Paroecotraustes) splendens* (ARKELL)
*O.(Paroecotraustes) subtenuis* MITTA
*Prohecticoceras haugi* (POPOVICI–HATZEG)
*Cadomites (Cadomites) orbignyi* GROSSOUVRE
*C. (Cadomites) zlatarskii* STEPHANOV
*Procerites (Procerites) lissajousi* BESNOSOV
*P. (Siemiradzkia) bucharicus* (NIKITIN)
*Gracilisphinctes (Gracilisphinctes) imitator* (BUCKMAN)
*G. (Gracilisphinctes) densidecoratus* (GALÁCZ)
*G. (Gracilisphinctes) evolutus* BESNOSOV
*G. (Gracilisphinctes) kysylalmensis* BESNOSOV
*G. (Gracilisphinctes) paragracilis* BESNOSOV
*G. (Gracilisphinctes) pseudoimitator* BESNOSOV
*G. (Prevalia) stephanovi* BESNOSOV
*Loboplanulites subcranaiformis* BESNOSOV
*L. cerealiformis* BESNOSOV
*L. zakharovi* BESNOSOV
*L. choffatiaformis* BESNOSOV
*Homoeoplanulites (Homoeoplanulites) evolutus* BESNOSOV
*H. (Homoeoplanulites) paradifficilis* BESNOSOV
*Tulites* cf. *rugifer* (BUCKMAN)
*Morrisiceras (Morrisiceras)* cf. *lycetti* (ARKELL)
*M. (Holzbergia) schwandorfense* (ARKELL)
*Bullatimorphites (Bullatimorphites) subcostatus* BESNOSOV

etc. The burials of ammonites are confined to coquina–lenses in calcareous aleurolite and sandy limestone. In the most cases sampling have not been made enough detailed for determining range of species, which are usually refer to the Subcontractus Zone and the Morrisi Zone and to the lowest Upper Bathonian also. The following forms have been determined from the roof of the Member:

*Oxycerites (Paroecotraustes) maubeugei* (STEPHANOV)
*Gracilisphinctes (Gracilisphinctes) suprapalatinus* ARKELL
*G. (Prevalia) thressa* (STEPHANOV)
*G. (Prevalia) verciacensis* (LISSAJOUS)
*Homoeoplanulites (Homoeoplanulites) rotundatus* (ROEMER)
*Bullatimorphites (Sphaeroptychius) ellipticus* (KRYSTYN)
*Kheraiceras (Kheraiceras)* cf. *subcosmopolita* (LISSAJOUS).

The Baisun Formation (Upper Bathonian – Lower Callovian) is laying conformal on the Tangiduval Formation. To the north it is transgressively covering more and more ancient beds down to the under Jurassic deposits in the northern part of the territory.

The Lower Baisun Member (Upper Bathonian, Hodsoni – Discus Zones) is represented by marl–clay with interbeds of marl, pelitomorphic and detrital oncolitic limestone in the south. Its roof is build up of regular bench of detrital oncolitic limestone with thickness 5–10 metres. The total thickness of the Member is 40–60 m. To the north from the Baisun Settlement the limestone laying in the Member's roof changes to calcareous sandstone, and the thickness of the larger lower clayey part of the Member decreases to 10 metres and even less. Two consequent fauna complexes may be determined in the Lower Baisun Member. Its lower part (possibly the Hodsoni Zone) contains:

*Oxycerites (Oxycerites)* aff. *tenuis* MITTA
*O. (Paroecotraustes) maubeugei* (STEPHANOV)
*Prohecticoceras haugi* (POPOVICI–HATZEG)
*Gracilisphinctes (Gracilisphinctes) twinhoensis* (ARKELL)
*Homoeoplanulites (Parachoffatia) vandobensis* BESNOSOV
*Subgrossouvria* sp.
*Choffatia* sp.
*Wagnericeras arbustigerum* (D'ORBIGNY)
*Wagnericeras* aff. *wagneri* (OPPEL)
*Kheraiceras (Kheraiceras)* cf. *subcosmopolita* (LISSAJOUS).

The bench of detrital oncolitic limestone in the Lower Baisun Formation's roof is considered to be the Discus Zone. It contains:

*Clydoniceras (Clydoniceras) discus* (SOWERBY)
*C. (Delecticeras) delectum* (ARKELL)
*Procerites (Procerites)* sp.
*Procerites? (Siemiradzkia?)* sp.
*Homoeoplanulites (Parachoffatia) arisphinctoides* BESNOSOV
*H. (Homoeoplanulites) rambertensis* (MANGOLD)
[M] *Subgrossouvria* sp.
[m] *Subgrossouvria hodjaikanensis* BESNOSOV
*Indosphinctes* sp.
*Morrisiceras* sp.

The Middle Baisun Member (the lowest part of the Hoyeri zone, Lower Callovian) is laying conformal on the Lower Baisun Member. There is a marl–clay with thickness 15–20 metres in the base of the Member in the southern part of the territory. It changes upward to fine alternation (10–15 centimetres) of marl–clay, marl and angle–laminated limestone with abundant bivalve's shells and detrital matter (thickness is up to 50 m). The Member's roof is built up of detrital oncolitic limestone bench with thickness up to 5 m. To the north of the territory this upper limestone bench (together with the Upper Baisun Member) is included into the Zarmass Formation. The biggest lower part of the Middle Baisun Member is represented there by clay with beds of calcareous sandstone and sandy limestone.

The Upper Baisun Member (the Hoyeri Zone, Lower Callovian) in the Kugitangtau Range is laying conformal on the Middle Member. It is represented by angle–laminated thinly flagged clayey limestone with a lot of detrital matter, and with delaminated intercalations and rare beds of marl. Total thickness is 40 m. To the north of the territory Upper Baisun Member is changed into gently flagged detrital and oolitic limestone of Kugitang series and could it not be determined.

The following forms have been found in the Middle and Upper Baisun Members: *Macrocephalites* ex gr. *compressus* (QUENSTEDT) – *lamellosus* (SOWERBY), *Kamptokephalites, Indosphinctes, Subgrossouvria, Choffatia, Grossouvria, Kheraiceras (Bomburites)* spp.

Thus we can consider that almost all zones of the standard ammonite scale are present in the Bathonian deposits of the South–West Hissar range. However in the recent time poor study of these deposits makes it impossible to constrain accurate boundaries of these zones.

## Acknowledgements

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## References

AMANNIYAZOV, K. (1967): On the stratigraphical position of the ammonite *Perisphinctes bucharicus* Nik. – *Izvestija Acad. Sci. of Turkmenistan, ser geol. sci.*, 3, 108–112. [in Russian]

BESNOSOV, N.V & KUTUZOVA, V V. (1975): *Parkinsonia (Oraniceras)* from Lower Bathonian of Central Asia and Northern Caucasus. *In. New data on a stratigraphy of the Mezozoic deposits in oil & gas – bearing regions of the South USSR, Transact. of VNIGNI*, 171, 96–104, 5 pls. [in Russian]

BESNOSOV, N.V. & KUTUZOVA, V.V. (1982): The systematics of the Parkinsoniids (Ammonitida). – *Palaeontol. Journ.*, 3, 41–52, 2 pls. [in Russian]

BESNOSOV, N.V. & MITTA, V.V. (1993): [*Late Bajocian – Bathonian ammonites from Northern Caucasus and Central Asia*]. – Moscow, Nedra, 347 p., 59 pls. [in Russian]

BESNOSOV, N.V. (1982): On the systematics of the perisphinctids (Ammonoidea). – *Palaeontol. Journ.*, 1, 54–64, 2 pls. [in Russian]

KRYMHOLTS, G.J. & ZAKHAROV, E.F. (1971): Bathonian ammonites of Kugitang. *In. Paleontological grounds of the key sections of the Jurassic system in Uzbekistan and contiguous regions,* Leningrad, Nedra, 4–40, 13 pls. [in Russian]

KUTUZOVA, V V. (1975): *Djanaliparkinsonia* – the new subgenus of the genus *Parkinsonia* Bayle from the Upper Bajocian in South–West Hissar. *In: New data on a stratigraphy of the Mezozoic deposits in oil & gas –bearing regions of the South USSR, Transact. of VNIGNI,* 171, 89–92, 4 pls. [in Russian]

NIKITIN, S. (1889): Notes sur les dépôts jurassiques de Himalaya et de l'Asie centrale. – *Bull. du Comité Géol. St.–Petersbourg,* 8/3, 53–86, 1 pl. [in Russian]

# Plates

## Plate 1

Figs 1–3. *Clydoniceras (Clydoniceras) discus* (SOWERBY).
Fig. 1– N 115/9241, Kugitangtau, Vandob.
Fig. 2– N 115/165, Kugitangtau, Derbent.
Fig. 3– N 115/3403, Kugitangtau, Kazanbulak. The upper part of the Lower Baisun Member.

Fig. 4. *Clydoniceras (Delecticeras) delectum* (ARKELL), N 115/9243, Kugitangtau, Savakbulak. Upper part of the Lower Baisun Member.

Fig. 5. *Oxycerites (Oxycerites) oxus* (BUCKMAN), N 115/3196, Kugitangtau, Vandob. Upper part of the Upper Tangiduval Member.

Figs 6, 7. *Oxycerites (Oxycerites) tenuis* MITTA.
Fig. 6– holotype N 115/3112,
Fig. 7– paratype N 115/3192; Kugitangtau, Vandob. Upper part of the Upper Tangiduval Member.

Fig. 8. *Oxycerites (Paroecotraustes) subtenuis* MITTA, holotype N 115/3162, Kugitangtau, Sarykamysh. Upper part of the Upper Tangiduval Member.

Fig. 9. *Oxycerites (Paroecotraustes) formosus* (ARKELL), N 115/7511, Tangiduval. Upper part of the Upper Tangiduval Member.

Fig. 10. *Oxycerites (Paroecotraustes) splendens* (ARKELL), N 115/3193, Kugitangtau, Vandob. Upper part of the Upper Tangiduval Member.

Fig. 11. *Oxycerites (Paroecotraustes) pygmaeus* (ARKELL), N 115/3097, Tangiduval. Middle Tangiduval Member.

Fig. 12. *Oxycerites (Paroecotraustes) maubeugei* (STEPHANOV). N 115/1206, Kugitangtau, Chashmabulak. Lower part of the Lower Baisun Member.

Fig. 13. *Oxycerites (Paroecotraustes)* aff. *maubeugei* (STEPHANOV), N 115/8030, South–West Hissar, borehole Berdykuduk–2P, depth 3307–3314. Lower part of the Lower Baisun Member.

Fig. 14. *Prohecticoceras* sp., N 115/3263, Tangiduval. Upper part of the Upper Tangiduval Member.

All figures natural size.

Plate 1


6b
6a
7a
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10a
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2b
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2c
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3b

## Plate 2

Fig. 1. *Gracilisphinctes (Gracilisphinctes) evolutus* BESNOSOV, holotype, N 115/3290, Tangiduval. Upper part of the Upper Tangiduval Member.

Fig. 2. *Procerites (Procerites) lissajousi* BESNOSOV, holotype, N 115/1229, Kugitangtau, Kysylalma. Upper part of the Upper Tangiduval Member.

Fig. 3. *Procerites (Siemiradzkia) bucharicus* (NIKITIN), N 115/3790, Tangiduval. Upper part of the Upper Tangiduval Member.

All figures natural size.

Plate 2

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## Plate 3

Fig. 1. *Gracilisphinctes (Gracilisphinctes) paragracilis* BESNOSOV, holotype, N 115/3385, Tangiduval. Upper part of the Upper Tangiduval Member.

Fig. 2. *Gracilisphinctes (Gracilisphinctes) kysylalmensis* BESNOSOV, holotype, N 115/1199, Kugitangtau, Kysylalma village. Upper part of the Upper Tangiduval Member.

All figures natural size.

Plate 3

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1

## Plate 4

Fig. 1. *Gracilisphinctes (Gracilisphinctes) densidecoratus* (GALÁCZ), N 115/3310, Tangiduval. Upper part of the Upper Tangiduval Member.

Fig. 2. *Gracilisphinctes (Gracilisphinctes) pseudoimitator* BESNOSOV, holotype, N 115/1235, Kugitangtau, Kysylalma. Upper part of the Upper Tangiduval Member.

Fig. 3. *Gracilisphinctes (Prevalia) stephanovi* BESNOSOV, holotype, N 115/3186, Kugitangtau, Vandob. Upper part of the Upper Tangiduval Member.

Fig. 4. *Procerites (Siemiradzkia) aurigerus* (OPPEL), N 115/3051, Kugitangtau, Vandob. Middle Tangiduval Member.

All figures natural size.

Plate 4

2

3a

3b

1

4b

4a

## Plate 5

Fig. 1. *Loboplanulites subcranaiformis* BESNOSOV, holotype, N 115/3311, Tangiduval. Upper part of the Upper Tangiduval Member.

Fig. 2. *Loboplanulites cerealiformis* BESNOSOV, holotype, N 115/3287, Tangiduval. Upper part of the Upper Tangiduval Member.

All figures natural size.

Plate 5

## Plate 6

Fig. 1. *Loboplanulites choffatiaformis* BESNOSOV, holotype, N 115/488, Kugitangtau, Vandob. Upper part of the Upper Tangiduval Member.

Figs 2–3. *Homoeoplanulites (Homoeoplanulites) evolutus* BESNOSOV.
Fig. 2– holotype, N 115/3811;
Fig. 3– paratype N 115/3173; Kugitangtau, Vandob. Upper part of the Upper Tangiduval Member.

Fig. 4. *Homoeoplanulites (Homoeoplanulites) rambertensis* (MANGOLD), N 115/1342, Kugitangtau, Vandob. Upper part of the Lower Baisun Member.

All figures natural size.

Plate 6

All figures natural size.

## Plate 7

Fig. 1. *Loboplanulites zakharovi* BESNOSOV, N 115/9229, holotype, Kugitangtau. Upper part of the Upper Tangiduval Member.

Fig. 2 *Homoeoplanulites (Parachoffatia) vandobensis* BESNOSOV, holotype, N 115/769, Kugitangtau, Vandob. Lower part of the Lower Baisun Member.

Fig. 3. *Homoeoplanulites (Homoeoplanulites) paradifficilis* BESNOSOV, holotype, N 115/3126, Kugitangtau, Sarykamysh. Upper part of the Upper Tangiduval Member.

All figures natural size.

Plate 7

## Plate 8

Fig. 1. *Djanaliparkinsonia lutshnikovi* (KUTUZOVA), paratype, N 115/578, Baisuntau, Baisun. Middle Degibadam member. The holotype of this species is lost.

Fig. 2. *Djanaliparkinsonia tuadaensis* (KUTUZOVA), paratype, N 115/570, Baisuntau, Tuada. Middle Degibadam member. The holotype of this species is lost.

All figures natural size.

Plate 8

2a

2b

1a

1b

## Plate 9

Fig. 1. *Bullatimorphites (Bullatimorphites) subcostatus* BESNOSOV, holotype, N 115/9253, Tangiduval. Upper part of the Upper Tangiduval Member.

Fig. 2. *Bullatimorphites (Sphaeroptychius) ellipticus* (KRYSTYN), N 115/3130, Kugitangtau, Sarykamysh. Top of the Upper Tangiduval Member.

Fig. 3. *Kheraiceras (Kheraiceras)* cf. *subcosmopolita* (LISSAJOUS), N 115/2947, Kugitangtau. Lower part of the Lower Baisun Member.

Figs 4–5. *Morrisiceras (Holzbergia) schwandorfense* (ARKELL). 4– N 115/9234, 5– N 115/9235, Tangiduval. Upper part of the Upper Tangiduval Member.

Fig. 6. [m] *Subgrossouvria hodjaikanensis* BESNOSOV, holotype, N 115/1337, Kugitangtau, Kazanbulak. Upper part of the Lower Baisun Member.

All figures natural size.

Plate 9