

***Nestoria sikeshuensis* (spinicaudatan), a new clam shrimp species from the Tugulu Group in Junggar Basin, northwestern China**

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Abstract

A new species, *Nestoria sikeshuensis* Teng and Li sp. nov., is described from the core of the bore hole Ai2 in the Junggar Basin, northwestern China. These specimens were collected from the Lower Cretaceous Tugulu Group. In Xinjiang, only three species and two undetermined species of *Nestoria* have been reported in the literature before.

Key words: Clam shrimp, *Nestoria*, Tugulu Group, Lower Cretaceous, Junggar Basin.

Introduction

In the original description of the clam shrimp genus *Nestoria*, growth bands are only ornamented by large reticulation (Krasinetz, 1963; Zhang et al., 1976; Chen and Wei, 1985). However, some workers (Wang, 1976; Wang, 1981; Wang et al., 1984; Niu, 2008; Wang, 2013) believe that, there are a few transitional growth bands near antero-ventral region, postero-ventral region or ventral region with reticulate and radial lirae sculptures, in spite of large reticulation is the primary sculpture pattern on growth bands, after the examination of specimens of *Nestoria* from the Dabeigou Formation in Inner Mongolia, northern Hebei, and contemporaneous horizons.

Nestoria krasinetsi (Novojilov, 1958) Krasinetz, 1963, the type species, was recovered in

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(Manuscript received 25 January, 2016; accepted 12 March, 2016)

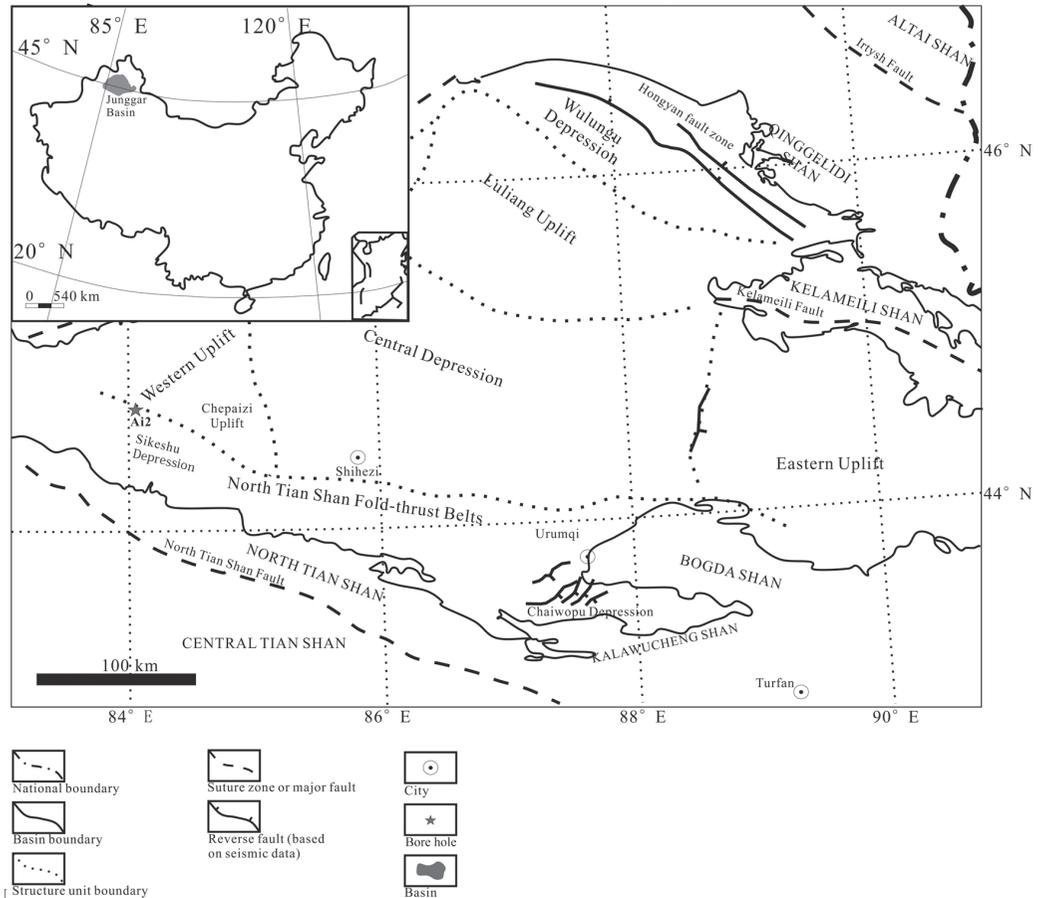


Fig. 1. Sketch map of the Junggar Basin, showing locality of the bore hole Ai2 (after Yang et al., 2015).

the Lower Cretaceous of Russia. While most *Nestoria* bearing strata in China were assigned to the Upper Jurassic (Zhang et al., 1976; Wang, 1976; Wu, 1983; Wang et al., 1984; Niu, 2008). In Xinjiang, only a few species of this genus had been reported (Chen and Wei, 1985; Wang, 2013). They are *Nestoria* sp. 1, *N.* sp. 2, *N. jungarensis* Wang, 2013, *N. shawanensis* Wang, 2013, and *N. donggouensis* Wang, 2013. All of them are recovered in the Lower Cretaceous Qingshuihe Formation at Ziniquanzi, Shihezi City. Here a new species, *Nestoria sikeshuensis* Teng and Li, is described from the bore hole Ai2 of the Tugulu Group in the southwestern Junggar Basin.

Material and method

The specimens are deposited in the collection of the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPCAS). They were collected from the Lower Cretaceous Tugulu Group, the drilling core of the bore hole Ai2 (Fig. 1), at the depth

of 2849.65–2853.35 m, in the Sikesu Depression of the Junggar Basin, Xinjiang Uygur Autonomous Region, China (Chen, 1988; Eberth et al., 2001; Deng et al., 2015; Li and Matsuoka, 2015; Yang et al., 2015).

Specimens are examined by a LEO 1530 VP Scanning Electron Microscope (SEM) and a Zeiss V20 Stereomicroscope.

Systematic palaeontology

Class: Branchiopoda Latreille, 1817

Subclass: Phyllopoda Preuss, 1951

Order: Diplostraca Gerstaecker, 1866

Suborder: Spinicaudata Linder, 1945

Superfamily: Eosestherioidea Zhang and Chen in Zhang et al., 1976

Family: Nestoriidae Shen and Chen, 1984

Genus *Nestoria* Krasinetz, 1963

1963 *Nestoria* Krasinetz gen. nov., p. 43–45.

1976 *Nestoria* Krasinetz; Zhang et al., p. 147.

1976 *Nestoria* Krasinetz; Wang, p. 49.

1981 *Nestoria* Krasinetz; Wang, p. 107.

1983 *Nestoria* Krasinetz; Wu, p. 193.

1984 *Nestoria* Krasinetz; Shen and Chen, p. 316.

1984 *Nestoria* Krasinetz; Wang et al., p. 97.

1985 *Nestoria* Krasinetz; Chen and Wei, p. 132–133.

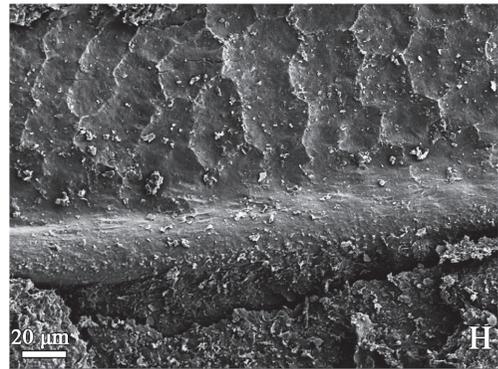
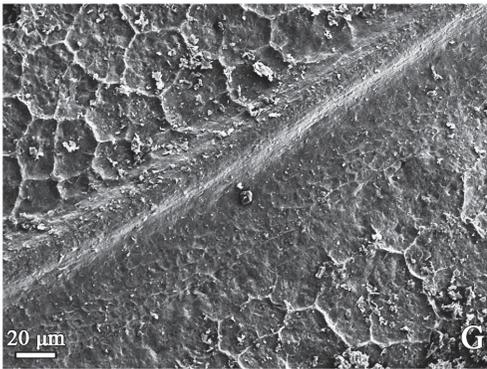
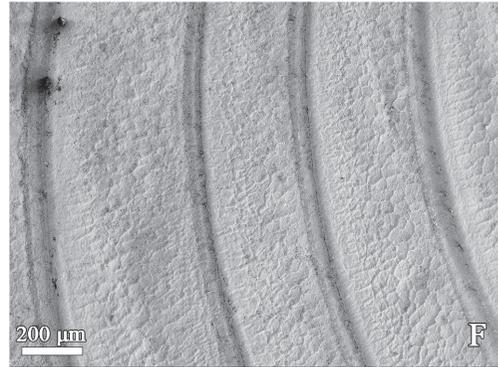
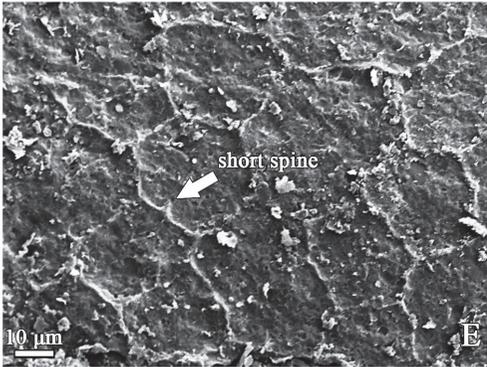
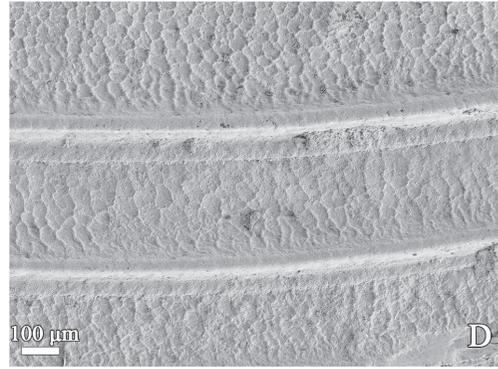
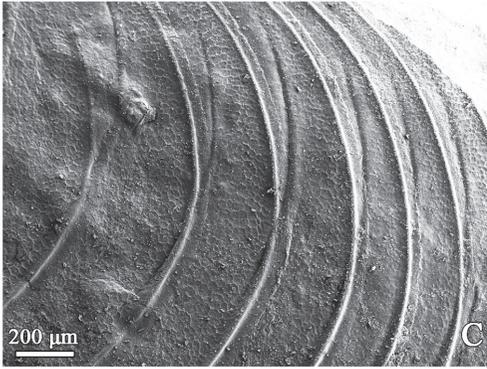
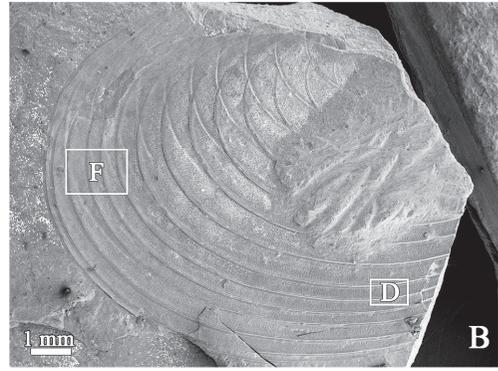
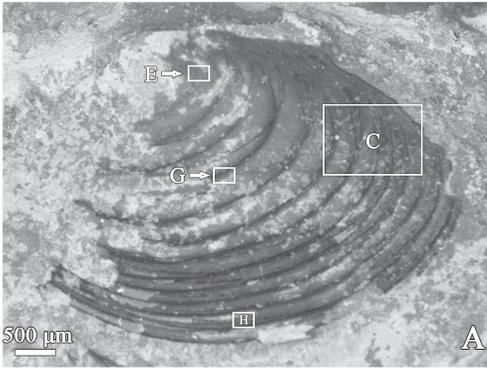
1985 *Nestoria* Krasinetz; Chen and Shen, p. 108–109.

2008 *Nestoria* Krasinetz; Niu, p. 338.

2013 *Nestoria* Krasinetz; Wang, p. 960–963.

Type species. *Nestoria krasinetzi* (Novojilov, 1958) Krasinetz, 1963

Occurrence. Lower Cretaceous, Chita region, Trans-Baikal, Russia; Barremian–lower Aptian Jianchang Formation, eastern Inner Mongolia Autonomous Region, northeastern China; Hauterivian Dabeigou Formation, northern Hebei Province, northeastern China; Upper Jurassic, western Liaoning Province, northeastern China; Lower Cretaceous Qingshuihe Formation, Shihezi, Xinjiang Uygur Autonomous Region, northwestern China; Lower Cretaceous Tugulu Group of the bore hole Ai2, Sikesu Depression, Junggar Basin, Xinjiang Uygur Autonomous Region, northwestern China.



Diagnosis. Carapace valve moderate or relatively large in size, elliptical to subcircular in outline; growth lines stout and convex; growth bands broad, flattened and relatively few in number, ornamented with large polygonal reticulum; mesh irregularly polygonal; mesh wall thin, mesh base shallow and flattened, diameter of mesh being around 0.1 mm; growth bands near antero-ventral region, postero-ventral region or ventral region ornamented by medium reticulation, and change to radial lirae gradually.

Nestoria sikeshuensis Teng and Li sp. nov.

Fig. 2.

Etymology. The figured clam shrimp specimens are from a drilling core sample of the bore hole Ai2, located in the Sikeshu Depression.

Type material. Holotype, NIGPCAS 163720, paratypes, NIGPCAS 163716-19, 21.

Dimensions. In order: Specimen no., number of growth lines, length of carapace (mm), height of carapace (mm), ratio of height/length: NIGPCAS 163716, 14, 11.7, 8.0, 0.68; NIGPCAS 163717, >12, 9.4, 6.1, 0.65; NIGPCAS 163718, >12, 5.2, 3.5, 0.67; NIGPCAS 163719, >10, 10.2, 6.8, 0.67; NIGPCAS 163720, >13, >4.1, 4.0, <0.98; NIGPCAS 163721, >13, >10.8, 8.3, <0.77.

Type locality and horizon. At the depth of 2849.65–2853.35 m, from the bore hole Ai2, locality at Sikeshu Depression, Junggar Basin, Xinjiang Uygur Autonomous Region, northwestern China; Lower Cretaceous Tugulu Group.

Diagnosis. Carapace valve moderate in size, oval in outline; umbo narrow and small; growth lines approximately 14 in total, stout and convex, ornamented with small reticulation; growth bands ornamented by medium polygonal reticulation; a few transitional growth bands near antero-ventral region, postero-ventral region or ventral region with reticulate and radial lirae sculptures.

Description. Carapace valve moderate in size, oval in outline; dorsal margin straight, umbo

← **Fig. 2.** *Nestoria sikeshuensis*. A is a light microscope photograph, B–H are SEM images. **A**, NIGPCAS 163720, holotype, a left valve. **B**, NIGPCAS 163721, a right valve. **C**, shallow and medium reticulation on growth bands near the posterior margin of the carapace. **D**, growth bands near ventral region with reticulate and radial lirae sculptures. **E**, growth band near the umbo ornamented with medium reticulation, and showing the short spine on the polygon side. **F**, growth bands near postero-ventral region with reticulate and radial lirae sculptures. **G**, stout and convex growth line, ornamented with very shallow and minute reticulation. **H**, growth bands near ventral region ornamented with reticulation and radial lirae.

narrow and small, located in anterior part of the dorsal margin; growth lines stout and convex, around 14 in total, ornamented with very shallow and minute reticulation (Fig. 2G), mesh irregularly pentagonal or hexagonal, diameter of mesh being 0.006–0.008 mm; growth bands narrow in dorsal part, wider in the middle part, and narrow again near the ventral part; growth bands ornamented by shallow and medium reticulation (Fig. 2B, C, D, G); mesh irregularly pentagonal or hexagonal, and the middle of the side with a short spine (Fig. 2E); mesh wall thin, mesh base shallow, diameter of mesh being 0.03–0.06 mm; growth bands near antero-ventral region, postero-ventral region or ventral region, some reticulation gradually change to radial lirae, the distance between adjacent lirae is about 0.03–0.04 mm (Fig. 2D, F, H).

Discussion. Wang (2013) described three species of *Nestoria* from the Lower Cretaceous Qingshuihe Formation of Ziniquanzi, Shihezi City of Xinjiang. The medium reticulation sculpture on growth bands separates *N. sikeshuensis* from species of *Yanjiestheria* and many species of *Nestoria* (Zhang et al., 1976; Wang, 1976; Wang, 1981; Wu, 1983; Wang et al., 1984; Li et al., 2007; Niu, 2008; Wang, 2013). It is easily distinguished from the other three species of *Nestoria* known from the Junggar Basin. Both *N. shawanensis* and *N. donggouensis* with a relatively large umbo, the umbo of *N. sikeshuensis* is narrow and small; while *N. jungarensis* is of an elliptical outline, adjacent lirae are at a distance of 0.03 mm. *N. sikeshuensis* is oval in outline, and the distance between adjacent lirae is about 0.03–0.04 mm.

Acknowledgements

We are thankful to Dr. T. Sasaki of the University of Tokyo for his constructive comments on the manuscript. This study was supported by the Major Basic Research Projects of the Ministry of Science and Technology, China (National 973 Project 2012CB822004), National Natural Science Foundation of China (41172010, 41572006, 91514302), China University of Geosciences (Wuhan) Students' Innovation and Entrepreneurship Training Program (No. 201610491103 to Y. Zhang) and Chinese Academy of Sciences' Students Innovation and Entrepreneurship Training Program (No. Y521070001 to Y. Zhang).

References

- Chen, P. J., 1988, Distribution and migration of Jehol Fauna with reference to the nonmarine Jurassic/Cretaceous boundary in China. *Acta Palaeont. Sinica*, **27**, 659–683 (in Chinese with English abstract).
Chen, P. J. and Shen, Y. B., 1985, Fossil Conchostracans. Science Press, Beijing, 1–241, 26 pls. (in Chinese).
Chen, P. J. and Wei, J. M., 1985, Lower Cretaceous conchostracans from the Tuguru Group of Xinjiang. *In* Geological Bureau of Xinjiang, Institute of Geology Sciences, ed., Collection on geologic study of Xinjiang. Xinjiang People's Publishing House, Urumqi, 131–138 (in Chinese with English abstract).
Deng, S. H., Wang, S. E., Yang, Z. Y., Lu, Y. Z., Li, X., Hu, Q. Y., An, C. Z., Xi, D. P. and Wan, X. Q., 2015,

- Comprehensive Study of Middle-Upper Jurassic strata in the Junggar Basin, Xinjiang. *Acta Geoscientica Sinica*, **35**, 559–574.
- Eberth, D. A., Brinkman, D. B., Chen, P. J., Yuan, F. T., Wu, S. Z., Li, G. and Cheng, X. S., 2001, Sequence stratigraphy, paleoclimate patterns, and vertebrate fossil preservation in Jurassic–Cretaceous strata of the Junggar Basin, Xinjiang Autonomous Region, People's Republic of China. *Can. J. Earth Sci.*, **38**, 1267–1644.
- Gerstaecker, A., 1866, Crustacea (Erste Halfe). In Bronn, H. G. ed., Die Klassen und Ordnungen der Thier-Reichs, **5** (Part I: Arthropoda), 1–1320.
- Krasinets, S. S., 1963, On the significance of bivalved phyllopod crustaceans (Conchostraca) for the stratigraphy of upper Mesozoic freshwater continental beds of eastern Transbaikalia. *Materials on the Geology and Mineral Resources in Chita Province*, **1**, 32–63 (in Russian).
- Latreille, P. A., 1817, Le Règne Animal, Tome III, Contenant les Crustacés, les Arachnides et les Insectes. A. Bedin, Paris, 1–653.
- Li, G. and Matsuoka, A., 2015, Searching for a non-marine Jurassic/Cretaceous boundary in northeastern China. *Jour. Geol. Soc. Japan.*, **121**, 109–122.
- Li, G., Shen, Y. B. and Batten, D. J., 2007, *Yanjiestheria*, *Yanshania* and the development of the *Eosestheria* conchostracan fauna of the Jehol Biota in China. *Cret. Res.*, **28**, 225–234.
- Linder, F., 1945, Affinities within the Branchiopoda with notes on some dubious fossils. *Arkiv för Zoologi*, **37A**, 1–28.
- Niu, S. W., 2008, Conchostracan biostratigraphy of Dabeigou Formation in the Luanping basin, northern Hebei, China and establishment of a Dabeigou-aged stratotype section. *Geol. Bull. China*, **27**, 326–344.
- Novojilov, N., 1958, Nouveaux Conchostraca du Mésozoïque de Transbaïkalie. *Extrait du C. R., Sommaire de Seances dela Soc. Geol. France*, **16**, 397–399.
- Preuss, G., 1951, Die Verwandtschaft der Anostraca und Phyllopora. *Zool. Anzeiger*, **147**, 50–63.
- Shen, Y. B. and Chen, P. J., 1984, Late Middle Jurassic conchostracans from the Tuchengzi Formation of Liaoning, NE China. *Bull. Nanjing Inst. Geol. Palaeont., Acad. Sinica*, **9**, 309–326, 8 pls. (in Chinese with English abstract).
- Wang, S. E., 1981, On Upper Jurassic phyllopods (Conchostraca) from northern Hebei and Daxinganling and their significance. *Bull. Geol. Inst., Chinese Acad. Geol. Sci.*, **3**, 97–117, 4 pls. (in Chinese with English abstract).
- Wang, S. E., 2013, The Late Jurassic-early Early Cretaceous new clam shrimps fossils from North China. *Geol. Bull. China*, **32**, 957–966.
- Wang, S. E., Liu, S. W. and Niu, S. W., 1984, Conchostraca. In Tianjin Institute of Geology and Mineral Resources, ed., Paleontological Atlas of North China 2, Mesozoic, Geological Publishing House, Beijing, 72–123 (in Chinese).
- Wang, W. L., 1976, Crustacea. In Geological Bureau of Inner Mongolia, Institute of Geological Sciences, northeast China, eds., Paleontological Atlas of North China, Inner Mongolia 2, Mesozoic, Geological Publishing House, Beijing, 44–59 (in Chinese).
- Wu, T. Y., 1983, New conchostracans from Upper Jurassic in Chifeng of Nei Monggol (Inner Mongolia). *Acta Palaeont. Sinica*, **2**, 73–131 (in Chinese).
- Yang, Y. T., Song, C. C. and He, S., 2015, Jurassic tectonostratigraphic evolution of the Junggar basin, NW China: A record of Mesozoic intraplate deformation in Central Asia. *Tectonics*, **34**, 86–115.
- Zhang, W. T., Chen, P. J. and Shen, Y. B., 1976, *Fossil Conchostraca of China*. Science Press, Beijing, 1–325 (in Chinese).