Trans. Proc. Palaeont. Soc. Japan, N. S., No. 115, pp. 135-142, pls. 19, 20, Sept. 30, 1979

706. SOME INTERESTING FOSSILS FROM THE UPPER PALEOZOIC IN CHAPARRA AREA, SOUTHWEST PERU*

NOBUO YAMAGIWA

Department of Earth Science, Osaka Kyoiku University, Osaka 543

and

CÉSAR RANGEL Z.

Instituto de Geologia y Mineria, Jesus Maria, Lima, Peru

Abstract. Four fusulinid species and one new coral species described in this article were found from the Upper Paleozoic at the south of Pampa Lobos, Chaparra area, Southwest Peru. Judging from the paleontological data, the present fossil assemblage indicates an early Wolfcampian age.

Introduction

Some fusulinid and coral specimens were found in a rock fragment collected by Eng. ORCHAUSKI from the Upper Paleozoic limestone exposed at the south of Pampa Lobos, Chaparra area, Southwest Peru (15°58′ S. Lat., 73°50′ W. Long.). In this article, the following four fusulinids and one new coral are described, and their age is discussed.

Fusulinids: *Triticites cellamagnus* THOMPSON & BISSELL
T. meeki (MÖLLER)
T. sp. A
T. sp. B
Coral: *Durhamina? andensis* n. sp.

Triticites cellamagnus was originally described from the Lower Wolfcampian part of the Oquirrh Formation, Central Utah (THOMPSON and BISSELL in THOMPSON, 1954); it is associated with *Schubertella kingi*, *Pseudofusulinella utahensis*, *Dunbarinella hughsensis* and *Schwagerina* ? sp. Some specimens referred to it with a query were found in the Lower Wolfcampian Bursum Formation of Hueco mountains, Texas (THOMPSON and BISSELL in THOMPSON, 1954); they are associated with *Schwagerina* sp. Later *Triticites cellamagnus* was found from the Lower Wolfcampian part of the Earp Formation in Southeast Arizona (SABINS and ROSS, 1963) together with *T. meeki* and *Schwagerina compacta*. THOMPSON, DODGE and YOUNGQUIST (1958) and SLADE (1961) also reported it from the Lower Wolfcampian of Idaho and Nevada.

According to THOMPSON (1954) and SLADE (1961), *Triticites meeki* occurs in the Lower Wolfcampian of Kansas, Nebraska, Oklahoma, Texas, Arizona, Nevada and Wyoming. It was also found from the Lower Wolfcampian part of the Earp Formation, Southeast Arizona (SABINS

* Received Dec. 12, 1978; read June 3, 1978 at Tsukuba University.

and ROSS, 1963) together with *Schubertella kingi, Triticites creekensis, T. cellamagnus* and *Schwagerina grandensis.* It closely resembles *Triticites pajerensis* and *T.* cf. *victoriensis* described by ROBERTS in NEWELL, CHRONIC and ROBERTS (1953) from the *Silvaseptopora* zone of the Lower Wolfcampian part of the Copacabana Group in Peru.

Triticites sp. A resembles *T. californicus* and *T. pinguis. Triticites californicus* has been found from the Wolfcampian part of the Bird Spring Formation, California (THOMPSON and HAZZARD in THOMPSON, WHEELER and HAZZARD, 1946), where it occurs in association with *Schwagerina proutdens, Dunbarinella concisa, Pseudoschwagerina voeseleri, Schubertella kingi* and *S. masoni.* It also occurs in the Lower Wolfcampian of the Great Basin region, North America, according to BRILL (1963). *Triticites pinguis* was originally described from the Lower Wolfcampian in Texas (DUNBAR and SKINNER, 1937). Later it was discovered from the Lower Wolfcampian Neal Ranch Formation, Texas (ROSS, 1963) and from the Lower Wolfcampian part of the Earp Formation, Southeast Arizona (SABINS and ROSS, 1963).

Triticites sp. B somewhat resembles such specimens as *T. titicacaensis* and *T.* aff. *titicacaensis* described from the Wolfcampian part of the Copacabana Group in Peru (ROBERTS in NEWELL, CHRONIC and ROBERTS, 1953; MAEDA, YAMAGIWA, BELLIDO and RANGEL, 1974). However, the former is distinct from the latter two in some important characters (see description).

On the other hand, one new coral species, *Durhamina? andensis* n. sp. resembles *D.? uddeni* (ROSS and ROSS, 1963; MINATO and KATO, 1965) from the Virgilian Gaptunk Formation of Texas and *D. hessensis* (ROSS and ROSS, 1962; MINATO and KATO, 1965) from the Upper Wolfcampian Lenox Hills Formation, Texas.

Judging from these fossils the present assemblage shows an affinity with those from the Lower Wolfcampian in North America and Peru. The writers consider that the present fossils also indicate an early Wolfcampian age.

Triticites sp. A, *T.* sp. B and *T.* sp. C were formerly discovered and illustrated by BELLIDO and NARVAEZ (1960) from the Upper Paleozoic in Atico area, Southwest Peru. According to them, the fusulinids indicate a Pennsylvanian age. However, the writers consider that the fusulinids may be related to the present fauna in specific assemblage and may indicate an early Wolfcampian age.

Acknowledgements

The writers wish to express their hearty thanks to Eng. E. ORCHAUSI (Instituto de Geologia y Mineria, Lima) who perimitted them to study the present interesting materials, to Prof. Emeritus H. FUJIMOTO (Tokyo University of Education), Prof. S. MAEDA (Chiba University) and ex-director E. BELLIDO (Instituto de Geologia y Mineria, Lima) for their kind suggestions and to Dr. Y. TAKEI (Geological Survey of Japan) for his assistance in consulting many needful references. Photographic work was done by Mr. K. NARUHASHI (Osaka Kyoiku University) to whom the writers extend their thanks.

Description of Species

Superfamily Fusulinacea
von MÖLLER, 1878

Family Fusulinidae von MÖLLER, 1878

Subfamily Schwagerininae DUNBAR
and HENBEST, 1930

Genus *Triticites* GIRTY, 1904

Triticites cellamagnus THOMPSON and BISSELL

Plate 19, fig. 1

1954. *Triticites cellamagnus* THOMPSON and BISSELL in THOMPSON, p. 43, pl. 11, figs. 1-12.
1954. *Triticites cellamagnus* (?), THOMPSON and BISSELL in THOMPSON, p. 43, pl. 10, figs. 14-17.
1958. *Triticites cellamagnus*: THOMPSON, DODGE and YOUNGQUIST, p. 121, pl. 19, figs. 13-15.
1961. *Triticites cellamagnus*: SLADE, p. 72, pl. 10, fig. 2.
1963. *Triticites cellamagnus*: SABINS and ROSS, p. 345, pl. 36, figs. 13-15.

Shell is medium in size, fusiform, with straight axis of coiling and bluntly pointed poles. Lateral slopes of mature shell are slightly convex and nearly straight. The first volution is subspherical in shape; beyond the first volution, the shapes gradually become elongate. A specimen having five volutions (pl. 19, fig. 1) is 6.0 mm in length and 2.8 mm in width, giving a form ratio of about 2.1. Proloculus is large in size, spherical in shape. Its outside diameter is 0.42 mm. Height of chambers in the first to the fifth volution of the above mentioned specimen is 0.09, 0.14, 0.16, 0.22 and 0.25 mm, respectively. Spirotheca is thick, composed of a tectum and coarse alveolar keriotheca. Its thickness in the first to the fifth volution of the above mentioned one is 0.04, 0.06, 0.07, 0.10 and 0.11 mm, respectively. Septa are strongly fluted in extreme polar regions, but gradually decreasing in fluting towards the center of shell, and almost unfluted above tunnel. Chomata are distinct and massive throughout the shell except the last volution. Tunnel angles in the first to the fourth volution of the above mentioned one are 25, 28, 30 and 35 degrees, respectively.

Remarks: The distinct characters of the present form are its large proloculus, fusiform shell of medium size, thick spirotheca and loosely coiled shell. The features mentioned above practically agree with those of the original specimens of *Triticites cellamagnus* and *T. cellamagnus* (?) described by THOMPSON and BISSELL in THOMPSON (1954). The present form resembles *Triticites* sp. A in this article in many respects, but the former differs from the latter in having larger proloculus. It is also similar to *Triticites meeki* (MÖLLER). However, the former has larger proloculus and shorter shell. It is distinguishable from *Triticites creekensis* THOMPSON (1954, p. 42, pl. 9, figs. 21-26, pl. 10, figs. 1-13; SLADE, 1961, p. 73, pl. 10, fig. 4; CASSITY and LANGENHEIM, 1966, p. 951, pl. 113, figs. 19-22; STEINER and WILLIAMS, 1968, p. 56, pl. 11, figs. 1-5) in having larger proloculus and convex or straight lateral slopes.

Occurrence: Limestone at the south of Pampa Lobos, Chaparra area, Southwest Peru. The present form is associated with *Triticites meeki*, *T.* sp. A, *T.* sp. B and *Durhamina? andensis* n. sp.

Repository: Reg. no. NSM-MPC 1844 (National Science Museum).

Triticites meeki (MÖLLER)

Plate 19, figs. 5-7

1858. *Fusulina cylindrica* var. *ventricosa*: MEEK and HAYDEN (part), p. 261.
1865. *Fusulina cylindrica*: MEEK and HAYDEN (part), p. 14, pl. 1, fig. 6a.
1879. *Fusulina ventricosa* var. *meeki*: MÖLLER (part), p. 4.
1928. *Triticites ventricosus*: DUNBAR and CONDRA (part), p. 84, pl. 1, fig. 2, pl. 3, fig. 1, pl. 4, fig. 4.
1954. *Triticites meeki*: THOMPSON (part), p. 39, pl. 12, figs. 1-11, pl. 13, figs. 1-12.

1961. *Triticites meeki*: SLADE, p. 72, pl. 10, fig. 3.
1963. *Triticites meeki*: SABINS and ROSS, p. 339, pl. 36, figs. 4-5.

Shell is elongate fusiform in shape, with bluntly pointed poles. Axis of coiling is almost straight. Lateral slopes are convex to slightly concave. A mature specimen having seven volutions (pl. 19, fig. 6) is 4.3 mm in half length and 1.4 mm in half width, giving a form ratio of about 3.1. Proloculus is medium in size, spherical in shape, having outside diameter of 0.22 to 0.24 mm. Average height of chambers in the third to the seventh volution is 0.10, 0.14, 0.19, 0.24 and 0.27 mm, respectively. Spirotheca is relatively thick, composed of a tectum and coarse alveolar keriotheca. Its average thickness is 0.02, 0.04, 0.05, 0.06, 0.08, 0.11 and 0.09 mm in the first to the seventh volution, respectively. Septa are strongly fluted in polar regions and weakly fluted in central part. Chomata are distinct and asymmetrical in shape. Average tunnel angles in the second to the sixth volution are 18, 20, 29, 38 and 36 degrees, respectively. Septal counts in the second to the sixth volution of a specimen illustrated as fig. 7 on plate 19 are 16, 18, 20, 21 and 23, respectively.

Remarks: The present specimens are characterized by their elongate fusiform outline, less inflated central area, medium size of proloculus and mode of septal fluting. These features practically agree with those of *Triticites meeki* (MÖLLER). *Triticites meeki* is very similar to *T. pajerensis* ROBERTS in NEWELL, CHRONIC and ROBERTS (1953, p. 186, pl. 37, figs. 3-5) and *T.* cf. *victoriensis* DUNBAR and SKINNER by ROBERTS in NEWELL, CHRONIC and ROBERTS (1953, p. 191, pl. 37, fig. 8). However, it seems to have more weakly fluted septa than the two species. They may belong to *Triticites meeki*.

Occurrence: Limestone at the south of Pampa Lobos, Chaparra area, Southwest Peru. The associated fossils are *Triticites cellamagnus*, *T.* sp. A, *T.* sp. B and *Durhamina? andensis* n. sp.

Repository: Reg. nos. NSM-MPC 1848-1850 (National Science Museum).

Triticites sp. A

Plate 19, figs. 2-4

Shell is medium in size, inflated fusiform in shape, with bluntly pointed poles, straight axis of coiling and convex lateral slopes. A specimen illustrated as fig. 2 on plate 19 having five and a half volutions is 5.7 mm in length and 3.3 mm in width, with a form ratio of about 1.7. Proloculus is medium in size, subspherical in shape, with outside diameter of 0.24 to 0.26 mm. Average height of chambers in the first to the seventh volution is 0.07, 0.09, 0.13, 0.18, 0.26, 0.28 and 0.29 mm. respectively. Spirotheca consists of a tectum and keriotheca with coarse alveoli. Average thickness of the spirotheca in the first to the sixth volution is 0.03, 0.05, 0.08, 0.09, 0.10 and 0.11 mm, respectively. Septa are strongly fluted in polar regions, but weakly fluted in central portion. Septal counts in the second to the sixth volution for one specimen (pl. 19, fig. 4) are 20, 21, 22, 21 and 23, respectively. Average tunnel angles in the second to the fifth volution are 23, 22, 27 and 30 degrees, respectively. Chomata are generally asymmetrical in shape, but indistinct in outer volutions.

Remarks: The present species resembles *Triticites californicus* THOMPON and HAZZARD in THOMPSON, WHEELER and HAZZARD (1946, p. 42, pl. 10, figs. 10-14) in inflated fusiform shape, medium size of proloculus, mode of septal fluting, narrow tunnel angles and asymmetrical chomata. However, the former differs from the latter as follows. (1) The septal counts of the former are less numerous than the latter. (2) The former shows smaller form ratio than the latter. (3) The chomata of the former in outer volutions are indistinct. The present specimens are also similar to the original specimens of *Triticites pinguis* DUNBAR and CONDRA (1937, p. 620, pl. 47, figs. 12–19), but differs from them in having less numerous septal counts, indistinct chomata in outer volutions, larger form ratio and smaller proloculus. They are somewhat related to *Triticites pinguis* by SABINS and ROSS (1963, p. 343, pl. 36, figs. 6–12) and ROSS (1963, p. 109, pl. 6, figs. 1, 3–4). However, they have more loosely coiled shell and indistinct chomata in outer volutions. They are distinguished from *Triticites* cf. *plummeri* DUNBAR and CONDRA (SABINS and ROSS, 1963, p. 347, pl. 36, fig. 7) in having more loosely coiled shell and broader tunnel angles.

Occurrence: Limestone at the south of Pampa Lobos, Chaparra area, Southwest Peru. The present specimens are associated with *Triticites cellamagnus*, *T. meeki*, *T.* sp. B and *Durhamina? andensis* n. sp.

Repository: Reg. nos. NSM-MPC 1845, 1846, 1847 (National Science Museum).

Triticites sp. B

Plate 19, fig. 8

Shell is small in size, inflated fusiform in shape, with straight axis of coiling and bluntly pointed poles. Lateral slopes of mature shell slightly convex. A specimen (pl. 19, fig. 8) of five and a half volutions is 2.9 mm in length and 1.7 mm in width, giving a form ratio of about 1.7. Proloculus is spherical in shape, with outside diameter of 0.18 mm. Height of chambers in the second to fifth volution is 0.07, 0.08, 0.12 and 0.12 mm, respectively. Spirotheca consists of a tectum and keriotheca. Its thickness in the third to fifth volution is 0.03, 0.04 and 0.06 mm, respectively. Septa are highly fluted in polar regions, but they become weakly fluted towards the middle portion. Chomata asymmetrical in shape, but indistinct in outer volutions. Tunnel angles in the second to the fourth volution are 12, 20 and 23 degrees, respectively.

Remarks: This form is represented only by one axial section. It somewhat resembles the specimens described as *Triticites titicacaensis* by ROBERTS in NEWELL, CHRONIC and ROBERTS (1953, p. 182, pl. 36, figs. 19–20) and as *T.* aff. *titicacaensis* by MAEDA, YAMAGIWA, BELLIDO and RANGEL (1974, p. 9, pl. 1, fig. 4). However, those specimens have more distinct chomata than the present specimen. Six original specimens of *Triticites titicacaensis* described by DUNBAR and NEWELL (1946, p. 479, pl. 11, figs. 1–6) distinctly differs from the above mentioned specimens containing the present one in having strongly fluted septa throughout the shell. Therefore, the latter specimens must be excluded from *Triticites titicacaensis.* The original specimens of *Triticites titicacaensis* were formerly transferred to the genus *Schwagerina* by the strongly fluted septa (THOMPSON and MILLER, 1949, p. 3). But the writers consider that they may belong to the genus *Dunbarinella* than the genus *Schwagerina* in view of the distinct chomata and strongly fluted septa.

Occurrence: Limestone at the south of Pampa Lobos, Chaparra area, Southwest Peru. This form is associated with *Triticites cellamagnus*, *T. meeki*, *T.* sp. A and *Durhamina? andensis* n. sp.

Repository: Reg. no. NSM-MPC 1851 (National Science Museum).

Order Rugosa MILNE-EDWARDS and HAIME, 1850

Family Durhaminidae MINATO and KATO, 1965

Genus *Durhamina* WILSON and LANGENHEIM, 1962

Durhamina? andensis n. sp.

Plate 20, figs. 1–6

Corallum is compound and fasciculate. Corallites are in contact in many points.

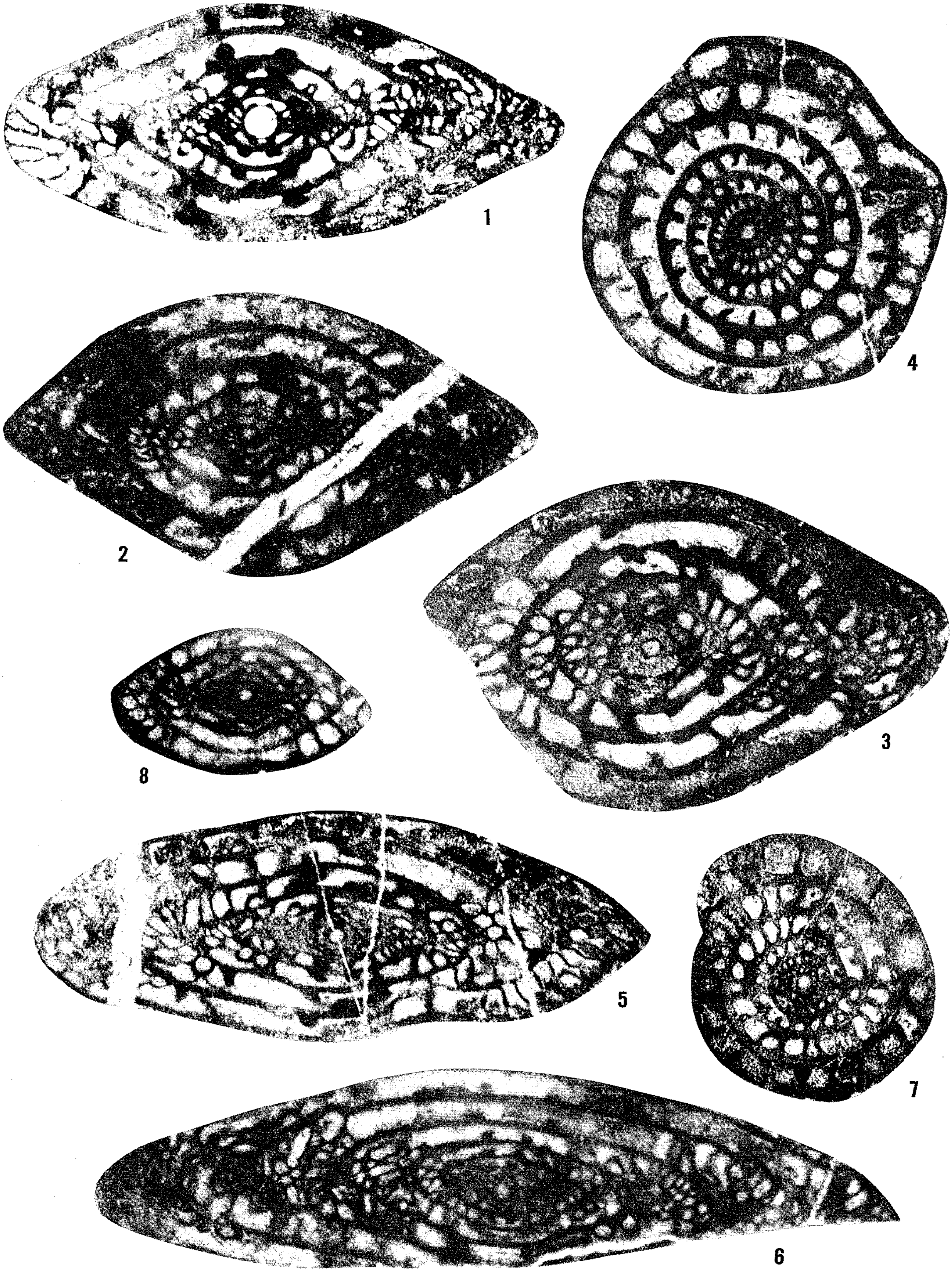
In transverse section, the corallites show round to subpolygonal outlines owing to their contactness to the neighboring ones (pl. 20, figs. 4–6). Mature specimens are often more than 15.0 mm in diameter (pl. 20, fig. 1). External wall is relatively thin. Sapta are in two orders, major and minor, alternating, showing more or less sinuous or nearly straight. They show the diffuso-trabeqular or the fibro-normal types under microscope. Major ones are about 30 in number in mature stage (pl. 20, fig. 1), but 20 to 28 in number in early mature ones (pl. 20, figs. 2, 4–6); they are thick in middle part and thinner towards both ends, but become thick at proximal end. Minor ones are very short, sometimes lacking. Dissepimentarium is rather narrow and generally arranged in pseudoherring bone dissepiments, but sometimes in concentric ones and rarely in lonsdaleoid ones. It is very narrow in early mature ones. Inner wall is often seen around the inner part of the dissepimentarium. In mature stage, axial structure is cobweb structure in shape and small in size, about 1/6 the diameter of a corallite. It is composed of a few septal lamellae, axial tabellae and a long median plate. The septal lamellae in contact with the major ones. In early mature stage, the axial structure is simple and irregular; septal lamellae mostly unite with some major ones.

In longitudinal section, dissepimentarium is narrow and composed of globose and elongate dissepiments with their convex sides inwards. Tabularium is broad, consists of tabulae and axial structure. Tabulae are incomplete and composed mostly of long vesicles with their convex sides generally upwards and outwards, ascending to the axial structure. Clinotabulae rarely present. In axial structure, dome-like axial tabellae, edges of septal lamellae and a median plate are seen.

Remarks: The present form is very similar to the species of the genus *Heritschioides* in having tabulae composed

Explanation of Plate 19

Fig. 1. *Triticites cellamagnus* THOMPSON and BISSEL
 1. Axial section .... ×13.0 (NSM-MPC 1844)
Figs. 2–4. *Triticites* sp. A
 2. Axial section .... ×13.0 (NSM-MPC 1845)
 3. Axial section .... ×13.0 (NSM-MPC 1846)
 4. Sagittal section .... ×13.0 (NSM-MPC 1847)
Figs. 5–7. *Triticites meeki* (MÖLLER)
 5. Axial section .... ×13.0 (NSM-MPC 1848)
 6. Axial section .... ×13.0 (NSM-MPC 1849)
 7. Sagittal section .... ×13.0 (NSM-MPC 1850)
Fig. 8. *Triticites* sp. B
 8. Axial section .... ×13.0 (NSM-MPC 1851)


1
2
3
4
5
6
7
8

of vesicles with their convex sides upwards and outwards in longitudinal section. However, it may beleng to the genus *Durhamina* then the genue *Heritschioides* in having simple axial structure in early mature stage, narrow dissepimentarium, lonsdaleoid dissepiments and very short minor septa. It closely resembles *Durhamina? uddeni* (ROSS and ROSS, 1963, p. 415, pl. 49, figs. 5–9; MINATO and KATO, 1965, p. 38) in the following characters. (1) Medium size of corallites. (2) Long median plate in axial structure in mature stage. (3) Neighboring corallites are often in contact. (4) Pseudoherring bone dissepiments present. (5) Tabulae ascending to the axial structure in longitudinal section. However, the former is distinguishable from the latter in having inner wall around the inner part of the dissepimentarium and shorter minor septa. It is also similar to *Durhamina hessensis* (ROSS and ROSS, 1962, p. 1175, pl. 162, fig. 12, pl. 163, figs. 1–3, text-fig. 4L; MINATO and KATO, 1965, p. 43, pl. 1, text-figs. 9–10) in many respects, but the former differs from the latter in having long median plate in axial structure and tabulae ascending to the axial structure in longitudinal section. According to ROWETT (1971), the species belonging to the family Durhaminidae occurs in the Lower Permian in Peru, but is not yet described.

Occurrence: Limestone at the south of Pampa Lobos, Chaparra area, Southwest Peru. The associated fossils are *Triticites cellamagnus*, *T. meeki*, *T.* sp. A and *T.* sp. B.

Repository: Reg. nos. NSM-PA 11999 (holotype), 12000, 12001 (National Science Museum).

References

BELLIDO, E. and NARVAEZ, S. (1960): Geologia del Cuadrangulo de Atico. *Com. Cart. Geol Nac.*, vol. 1, no. 2, p. 1–59.

BRILL, K. G. (1963): Permo-Pennsylvanian stratigraphy of western Colorado Plateau and eastern Great Basin regions. *Geol. Soc. America, Bull.* vol. 74, p. 307–330, 1 pl., 17 figs.

CASSITY, P. E. and LANGENHEIM, R. L. (1966): Pennsylvanian and Permian fusulinids of the Bird Spring Group from Arrow Canyon, Clark County, Nevada. *Jour. Paleontology*, vol. 40, p. 931–968, pls. 110–114, 6 figs.

DUNBAR, C. O. and CONDRA, G. E. (1927): The fusulinidae of the Pennsylvanian System in Nebraska. *Nebr. Geol. Survey, 2nd ser., Bull.* 2, 135 p., 15 pls., 13 figs.

DUNBAR, C. O. and NEWELL, N. D. (1946): Marine early Permian of the central Andes and its fusuline faunas. *Amer. Jour. Sci.*, vol. 244, p. 377–402, 457–491, pls. 1–12.

DUNBAR, C. O. and SKINNER, J. W. (1937): Permian Fusulinidae of Texas *in* The Geology of Texas. *Univ. Texas, Bull.* 3701, p. 517–825, pls. 42–81, figs. 89–97.

MAEDA, S., YAMAGIWA, N., BELLIDO, E. and RANGEL, C. (1974): Some fusulinids from the Copacabana Group at Ambo, Peru, South America. *Palaeontological study of the Andes (Geol. Labor., Fac. Sci., Chiba Univ.)*, p. 1–13, pl. 1.

MEEK, F. B. and HAYDEN, F. V. (1858): Remarks on the Lower Cretaceous beds of Kansas and Nebraska, together with descriptions of some new species of Carboniferous fossils from the valley of the Kansas River. *Acad. Nat. Sci. Phila., Proc.*, vol. 10, p. 256–266.

MEEK, F. B. and HAYDEN, F. V. (1865): Paleontology of the Upper Missouri. *Smithsonian Contr. Knowledge*, vol. 14, p. 1–135, pls. 1–5.

MINATO, M. and KATO, M. (1965): Durhaminidae. *Jour. Fac. Sci., Hokkaido Univ.*, ser. 4, vol. 13, no. 1, p. 11–86, pls. 1–5.

MÖLLER, Valerian von (1879): Die Foraminiferen des russischen Kohlenkalks. *Akad. Imp. Sci. St. Petersbourg Mem.*, 7e ser., vol. 27, 131 p., 7 pls., 6 figs.

NEWELL, N. D., CHRONIC, J. and ROBERTS, T. G. (1953): Upper Paleozoic of Peru.

Geol. Soc. America. Mem. 58, 276 p., 44 pls., 43 figs.

ROWETT, C.L. (1971): Paleogeography of early Permian Waagenophyllid and Durhaminid corals. *Pacific Geology*, 4, p. 31-37.

ROSS, C.A. (1963): Standard Wolfcampian Series (Permian), Glass mountains, Texas. *Geol. Soc. America*, Mem. 88, 205 p., 29 pls., 11 figs.

ROSS, C.A. and ROSS, J.P. (1962): Pennsylvanian, Permian rugose corals, Glass mountains, Texas. *Jour. Paleontology*, vol. 36, p. 1163-1188, pls. 160-163.

ROSS, J.P. and ROSS, C.A. (1963): Late Paleozoic rugose corals, Glass mountains, Texas. *Jour. Paleontology*, vol. 37, p. 409-420, pls. 48-50.

SABINS, F.F. and ROSS, C.A. (1963): Late Pennsylvanian-early Permian fusulinids from southeast Arizona. *Jour. Paleontology*, vol. 37, p. 323-365, pls. 35-40, 4 figs.

SLADE, M.L. (1961): Pennsylvanian and Permian fusulinids of the Ferguson mountain area, Elko County, Nevada. *Birgham Young Univ. Geol. Studies*, vol. 8, p. 55-92, pls. 7-16, 2 figs.

STEINER, M.B. and WILLIAMS, T.E. (1968): Fusulinidae of the Laborcita Formation (Lower Permian), Sacramento mountains, New Mexico. *Jour. Paleontology*, vol. 42, p. 51-60, pls. 11-13.

THOMPSON, M.L. (1954): American Wolfcampian fusulinids. *Kansas Univ. Paleont. Contr., Protozoa*, art. 5, 226 p., 52 pls., 14 figs.

THOMPSON, M.L., DODGE, H.W. and YOUNGQUIST, W. (1958): Fusulinids from the Sublett range, Idaho. *Jour. Paleontology*, vol. 32, p. 113-125, pls. 17-20, 1 fig.

THOMPSON, M.L. and MILLER, A.K. (1949): Permian fusulinids and cephalopods from the vicinity of the Maracaibo basin in northern South America. *Jour. Paleontology*, vol. 23, p. 1-24.

THOMPSON, M.L., WHEELER, H.E. and HAZZARD, J.C. (1946): Permian fusulinids of California. *Geol. Soc. America*, Mem. 17, 77 p., 18 pls., 4 textfigs.

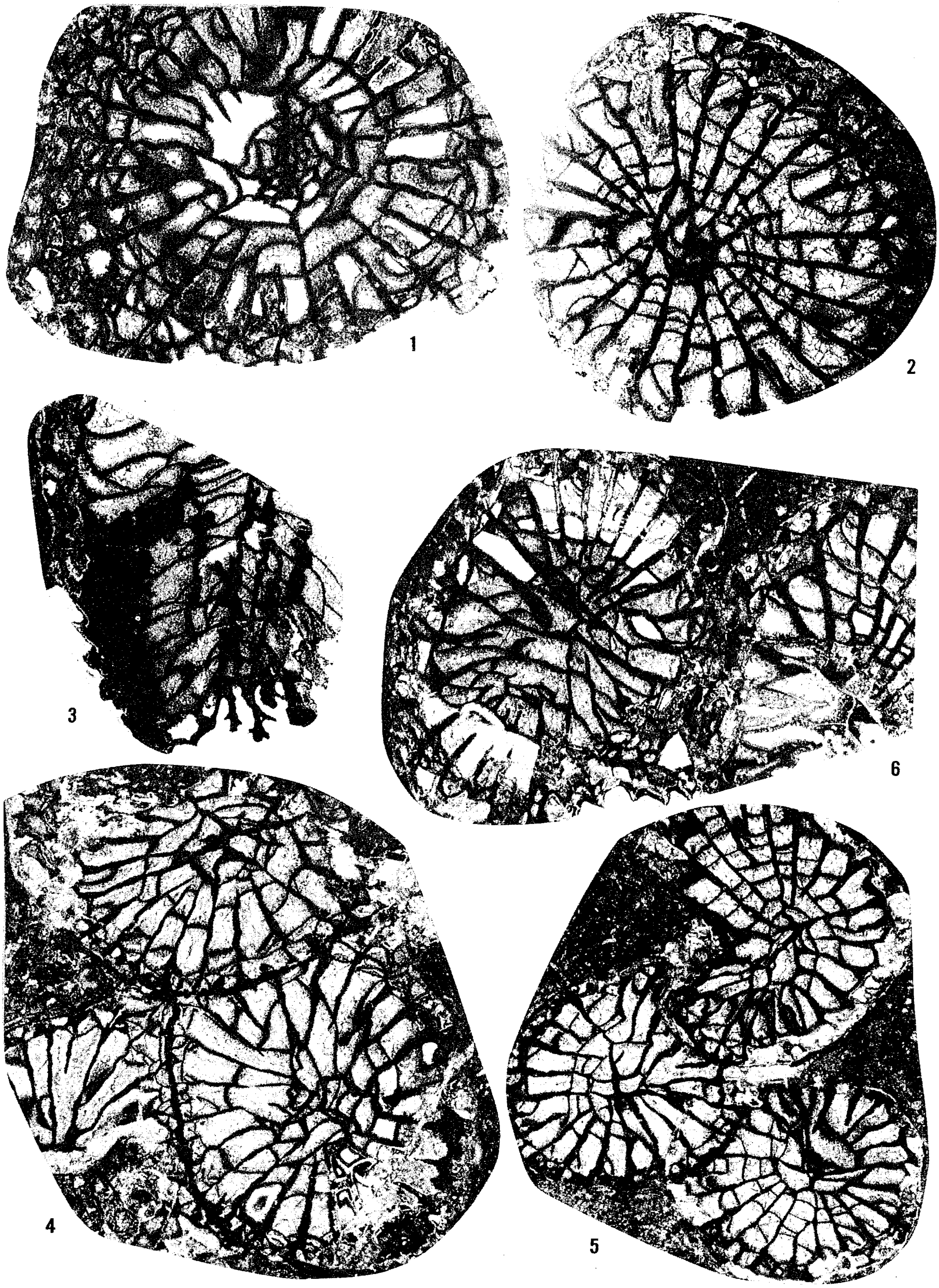
ペルー西南部，チヤパラ地域に分布する上部古生界産出の紡錘虫および珊瑚化石について：今回，筆者等はペルー西南部，チヤパラ地域のパンパロボス南方に分布する上部古生界中の石灰岩から，ORCHAUSKI 技師によって採集された保存良好な紡錘虫および珊瑚化石を研究した。その結果，紡錘虫化石として *Triticites cellamagnus*, *T. meeki*, *T.* sp. A および *T.* sp. B, 珊瑚化石として *Durhamina* ? *andensis* n. sp. を発見，記載報告すると共に，それらの化石群集の時代が初期 Wolfcampian 階をしめすことを論述した。

山際延夫・C. RANGEL

Explanation of Plate 20

Figs. 1-6. *Durhamina? andensis* n. sp.

1. Transverse section .... ×5.0 (NSM-PA 11999a)
2. Transverse section .... ×5.0 (NSM-PA 11999b)
3. Longitudinal section .... ×5.0 (NSM-PA 11999c)
4. Transverse section .... ×5.0 (NSM-PA 12000a)
5. Transverse section .... ×5.0 (NSM-PA 12000b)
6. Transverse section .... ×5.0 (NSM-PA 12001)


1
2
3
6
4
5