Spirula mizunamiensis, a New Fossil Sepiida from the Miocene Mizunami Group, Central Japan

Susumu TOMIDA* and Junji ITOIGAWA**

瑞浪層群産新種 *Spirula mizunamiensis*（トグロコウイカ類）

冨田　進*・糸魚川淳二**

（要　　旨）

岐阜県瑞浪市土岐町奥名に露出する中新統瑞浪層群生俵累層の基底に相当する名滝礫岩層から，1977年に楓達也は *Spirula* 属（トグロコウイカ類）の化石を採集した．日本からはこれまでにこの類の化石の記載はなく，現生種が熱帯海域から日本へ漂着した例が稀に報告されるにすぎない．この標本は現生種の *Spirula spirula*（トグロコウイカ）によく類似するが，次の特徴によって明らかに区別される．すなわち，かなり小型であるにも拘らず，最終室に近づくに従って巻が解けること，房錐断面がより偏平であること，巻数が少ないこと，巻の増大率が大きいことなどである．

その他の特徴も総合して，新種 *Spirula mizunamiensis*（ミズナミトグロコウイカ）として記載する．

この類は熱帯および亜熱帯海域の外洋中層浮遊種であることから模式地が生息当時亜熱帯地域であったか，あるいは熱帯地域からの外洋水すなわち古黒潮の流入が考えられる．

In 1977, a specimen of the fossil *Spirula* was collected by Tatsuya KAEDE from the Miocene Nataki conglomerate in Okuna, Mizunami City, Gifu Pref., Japan. Then, he had let the senior author look at this specimen in order to know its true character. At a glance this was recognized as the genus *Spirula*, however, having a suspicion that this is a new species, this was ripe for researches under the authors. The preservation is not necessarily good but it is enough to determine the taxonomic position. As a result of the study, the authors propose a new specific name, *Spirula mizunamiensis* for this specimen and describe in following lines after a critical comparison. This is the first description on the Cenozoic Sepiida in Japan.

The authors wish to express their hearty thanks to Dr. Yasumitsu KANIE of the Yokosuka City Museum for his kind advice, and to Mr. Yoshitsugu OKUMURA of the Mizunami Fossil Museum for his aid with photographs. Thanks are also due to Mr. Tatsuya KAEDE, a student of Tajimi-kôgyô High School for his offering of this new specimen.

---

* Chûkyô Junior College, Mizunami　中京短期大学
** Department of Earth Sciences, Nagoya University, Nagoya　名古屋大学理学部地球科学教室
Received October 5, 1981.

Spirula mizunamiensis new species
(Pl. 5, Figs. 1-3)

Phragmocone small in this genus ; shell nacreous, without living chamber. Coiling loosely of evolute; not overlaped, with slight constrictions between each chamber. Siphuncle rather thick, consisted in the ventral side of phragmocone; septal neck holochoanoidal. Whorl depressed and oval in section, coming fatter and coiled more loosely toward the last chamber. Septum formed into saucer with a shallow convex surface curved out backward. Septal suture being concave on the lateral side.

Dimensions : dimensions of each chamber preserved are as follows;

	Width (mm)	Height (mm)	(H/W ×100)	Length (dorsal side) (mm)
chamber a	1.65	1.35	81.8	0.70
b	1.95	1.60	82.1	0.85
c	2.20	1.85	84.1	1.00
d	2.40	2.00	83.3	1.15
e	2.65	2.15	81.1	1.30
f	2.85	2.30	80.7	1.40
g	3.15	2.65	84.1	1.45
h	3.40	2.85	83.8	1.60
i	3.60	?	(deformed)	1.95
j	ca.3.7	?	(deformed)	2.05

index number of expansion rate of width on 10 chambers; 2.24……the mean value of H/W ×100 ; 82.6

minimum and maximum of H/W ×100; 80.7-84.1

Dimensions of 10 specimens of the living *Spirula spirula* from Ndrauni Is. of Fiji: index number of expansion rate of width on 10 chambers in nearly same sizes to the fossil; 1.72-2.22

mean value of H/W ×100; 89.9

minimum and maximum of H/W ×100; 85.0-97.9

Holotype: MFM 10080

Remarks: The specimen is preserved incompletely without protoconch and early chambers, and the uppermost layer of shell comes off all over the surface. The last two chambers of this specimen are slightly deformed. According to the oral information of Dr. Yasumitsu KANIE, a specimen of the fossil *Spirula* was found in the Miocene bed in Itsukaichi of Tokyo, but that is not described yet.

This new species is closely related with living *Spirula spirula* LINNAEUS, but is distinguished from the latter by having a weakly coiled small shell, shallowly convexed septa and coiling fatter toward the last chamber. This specimen looks like a juvenile owing to its small size, but it may be an adult because its coil becomes more loosely toward the last chamber like as in fully grown-up *Spirula spirula*. This is another distinction with *Spirula spirula*.

The present species is distinguished from *Spirulirostra bellardii* (MICH.) and *Spir-*

ulirostrina lovisatoi CANAVARI, Tertiary species, by its phragmocone coiled loosely of evolute, because the latter two species have the phragmocone being straight toward the last chamber and hooked at the earlier chamber.

Type locality : Okuna, Toki-chô, Mizunami City, Gifu Prefecture, Locality no. 62 of the Mizunami Fossil Museum (ITOIGAWA, 1980)

Occurrence : Type locality —— Nataki conglomerate, Oidawara formation, Mizunami group

Associated forms: *Scapharca abdita* MAKIYAMA, *Cucullaea toyamaensis* TSUDA, *Glycymeris cisshuensis* MAKIYAMA, *Chlamys minoensis* ITOIGAWA, *Aequipecten yanagawaensis* (NOMURA *et* JIMBO), *Placopecten* sp., *Chama fragum* REEVE, *Phacosoma suketoensis* (OTUKA), *Oxyperas osawanoensis* TSUDA, *Fissidentalium* cf. *yokoyamai* (MAKIYAMA), *Antalis* sp., *Tristichotrochus takeharai* ITOIGAWA *et* SHIBATA, *Protorotella shukuborensis* ITOIGAWA, *Marmorostoma minoensis* ITOIGAWA, *Turritella* sp., *Neverita coticazae* MAKIYAMA, *Olivella iwakiensis* NOMURA *et* HATAI, *Chelyconus* sp., *Architectonica kurodae* TSUDA, *Oculina* sp., *Deltocyathus* sp., *etc*.

Discussion: The living *Spirula* is bathypelagic floating form in the tropical or subtropical ocean, and its shell is floatable after death and drifts rarely ashore in Japan now. Therefore it is considered that the pelagic current called the proto-Kuroshio flowed from the tropical area. After the examination on the assemblage of fossil mollusca and the fossil corals, it is considered that it has been rather warmer than the Temperate Zone at that type of locality where there may have been subtropical area. Concerning sedimentary environment of the Nataki conglomerate at the type locality , the fossil assemblage and the lithofacies indicate a sea with a gravel bottom in 0 m to 20 m depth. By the discovery of this new specimen, it is expected that more numerous Cenozoic specimens even in fragments may be found all over Japan.

References

DENTON, E. J. and GILPIN-BROWN, J. B. (1973), Floatation Mechanisms in Modern and Fossil Cephalopods. *Adv. mar. Biol.*, **11**, 197-268.

FUKUDA, Y., OBATA, I., TANABE, K. and KANIE, Y. (1979), Scanning electron microscope observation on the whorl surface of *Spirula spirula* (in Japanese). *Sci. Rep. Yokosuka City Mus.*, no. 26, 9-12, pls. 3,4.

ITOIGAWA, J. (1960), Paleoecological studies of the Miocene Mizunami Group, Central Japan. *Jour. Earth Sci., Nagoya Univ.*, 8 (2), 246-300.

——— (1974a), Geology of the Mizunami Group (in Japanese). *Bull. Mizunami Fossil Mus.* no.1, 9-42.

——— (1974b), The Mizunami Group and the First Setouchi Series (in Japanese).*ibid*., no. 1, 353-364.

——— (1974c), Paleoecology, Paleogeography and Geohistory of the Mizunami Group (in Japanese). *ibid.*, no. 1, 365-368.

——— (1978), Evidence of Subtropical Environments in the Miocene of Japan. *ibid.*, no. 5, 7-21.

——— (1980), Geological map of the Mizunami district, central Japan (in Japanese). *Monogr. Mizunami Fossil Mus.*, no. 1, 1-50.

——— and SHIBATA, H. (1973), Paleoenvironmental change and correlation based on molluscan assemblages (in Japanese). *Chishitsugakuronshû*, no.8, 125-135.

——— and ——— (1981), Miocene paleobiogeography of the Setouchi geologic province, with special reference to molluscan faunas (in Japanese). *Fossils*, no. 30, 17-29.

———, ———, NISHIMOTO, H. and OKUMURA, Y. (1981), Miocene fossils of the Mizunami group, central Japan. 2. Molluscs (in Japanese). *Monog. Mizunami Fossil Mus.*, no. 3-A, 1-53, pls.1-52.

OKADA, Y. (1955), The Soft Part of *Spirula* (in Japanese). *Jap. Malac. Jour.*, 4 (2), 144, 145, Text-fig.1.

SHIBATA, H. and ITOIGAWA, J. (1980), Miocene Paleogeography of the Setouchi Province, Japan (in Japanese). *Bull. Mizunami Fossil Mus.*, no.7, 1-49.

Explanation of Plate

Plate 5

Spirula mizunamiensis new species

Fig. 1. lateral side ×4
Fig. 2. dorsal side ×3.2
Fig. 3. anterior view of septum ×10

Spirula spirula LINNAEUS

Fig. 4. lateral side ×2.5
Fig. 5. anterior view ×1.5


1
2
3
4
5