

## On Some Fossil Echinoids from Kyusyu, Japan

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### Abstract

This article contains the descriptions of 7 species in 7 genera from Kyusyu Cretaceous and Tertiary. Of these 7 forms two are new species: *Schizaster miyazakiensis* and *Palmeraster japonicus*.

With regard to the fossil echinoids of Kyusyu, only *Echinodiscus chikuzenensis*, *Echinarachnius nipponicus* and *Linthia praenipponica* are known according to NAGAO. Recently the author described *Archaeopneustes cf. hystrix* from the Tertiary of Miyazaki Prefecture. Having had an opportunity to observe many specimens in Kyusyu University and others, he is now able to add 5 species in 5 genera containing 2 new species: *Schizaster miyazakiensis* and *Palmeraster japonicus*. The majority of these specimens were obtained from the Palaeogene and they seem to be very valuable to the historical geology of Japan. *Schizaster miyazakiensis* is fairly well preserved as compared with *Schizaster* of Honsyu. Therefore the specimens of this new species are very helpful for the research of this genus in general. The other new species belongs to the genus *Palmeraster* only known ever in the Upper Eocene of Cuba.

A list of fossil echinoids of Kyusyu is given here with.

Genus <i>Plesiaster</i> POMEL	
<i>Plesiaster Peini</i> (COQUAND)	Cretaceous
Genus <i>Echinarachnius</i> GRAY	
<i>Echinarachnius nipponicus</i> (NAGAO)	Oligocene
Genus <i>Echinodiscus</i> LESKE	
<i>Echinodiscus chikuzenensis</i> NAGAO	Oligocene
Genus <i>Palmeraster</i> ROIG	
<i>Palmeraster japonicus</i> sp. nov.	Oligocene
Genus <i>Pericosmus</i> AGASSIZ et DESOR	
<i>Pericosmus cf. spatangoides</i> LORIOU	Oligocene
Genus <i>Linthia</i> DESOR	
<i>Linthia praenipponica</i> NAGAO	Oligocene

Genus <i>Nudobrissus</i> LAMBERT	
<i>Nudobrissus</i> sp.	Oligocene
Genus <i>Schizaster</i> AGASSIZ	
<i>Schizaster miyazakiensis</i> sp. nov.	Miocene
Genus <i>Archaeopneustes</i> GREGORY	
<i>Archaeopneustes</i> cf. <i>hystrix</i> (AGASSIZ)	Pliocene

### Description of Species

#### Genus *Echinodiscus* LESKE

##### *Echinodiscus chikuzenensis* NAGAO

1928 NAGAO, T., Sci. Rep. Tohoku Univ., 2nd ser., 12, p. 17, pl. 1, figs. 15-17

The specimen is an outer mould of the abactinal side, lacking the margin of test except the interambulacra IV and V. Accordingly, only the lunule of ambulacrum V is under observation. The size of test is smaller than the type specimen of Nagao.

#### Measurements.—

Longitudinal diameter	ca. 56 mm.
Transverse diameter	ca. 64 mm.
Length of petal III	14 mm.
: petal IV	12.6mm.
: petal V	12.5mm.
Width of petal III	6.3mm.
: petal IV	6.2mm.
: petal V	6.0mm.
Length of lunule	11.3mm.
Width :	6.3mm.
Distance of petal and lunule	3.0mm.

Geological Horizon.— Nichinan Group. (Oligocene)

Locality.— Nango-mura, Minami-naka-gun, Miyazaki Prefecture.  
(Long. E-131° 20', Lat. N-31° 30', No. GK-L4739,  
deposited in Geol. Inst. Kyusyu Univ.)

Matrix.— Coarse sandstone.

#### Genus *Palmeraster* ROIG

##### *Palmeraster japonicus* sp. nov

(Pl. 2, figs. 1a-c)

The test represents a small form, remarkably heart-shaped, broad anteriorly, with broad but faint frontal notch. It tends to be narrow posteriorly and depressed. The posterior end is truncate. The actinal side is convex. The apical system is anteriorly eccentric apparently.

All ambulacra are petaloid and slightly sunken. The odd ambulacral petal is the broadest, and its pores are small. The paired ambulacral petals are rather narrow and closed distally. The anterior paired ambulacral petals are somewhat longer than the posterior ones, and curved outwards. The odd posterior interambulacrum is carinate slightly.

All fascioles do not present. The periproct is situated on the truncate posterior end. The peristome is near the anterior margin of test and transversely oval form with a prominent lip.

Measurements.—

Length	25 mm.
Width	28 mm.
Height	9 mm.
Length of anterior paired petals	11 mm.
Width of anterior paired petals	2.7mm.
Length of posterior paired petals	8.5mm.
Width of posterior paired petals	2.7mm.

Remarks.—

This specimen is identified to *Palmeraster*, *Toxasteridae*, *Amphisternata*, mainly by its shape of test without fasciole. Only one species of *Palmeraster*, *Palmeraster palmeri* ROIG has been known from the Upper Eocene of Cuba. This species differs from *palmeraster palmeri* in its smaller depressed form, and anteriorly eccentric apical system.

Geological Horizon.— Ashiya Group. (Oligocene)

Locality.— Yamaga-cho, Onga-gun, Fukuoka Prefecture ?  
(No. GK-L4740, deposited in Geol. Inst., Kyusyu Univ.)

Genus *Pericosmus* AGASSIZ et DESOR

*Pericosmus cf. spatangoides* LORIOI

(Pl. 1, figs. 2-3)

1875 LORIOI, P. D., Mem. Soc. Paléon. Suisse, 2, p. 112, pl. 19, fig. 1, pl. 20, fig. 1

The test is rather large, subcircular in outline and gently sloped from the apex to the margin. The apical system is subcentral. The number of genital pores is uncertain.

Each ambulacrum is petaloid, in a shallow groove, and the anterior paired petals are longer than the posterior paired ones.

The anterior paired petals are almost straight and its number of pore-pairs is 35. The posterior paired petals are slightly curved outwards and its number of pore-pairs is 30. The interporiferous area of paired petals is a little narrower than its poriferous area.

Observations.—

The specimens from Tsushima are crowded on the matrix and considerably deformed. All of them are the moulds of the abactinal side. The peripetalous fasciole is re-entrant between the anterior and posterior paired petals, and the subanal fasciole is above the periproct that is on the truncate posterior end, semi-circular in its shape,

Remarks.—

This species is closely allied to *Pericosmus petasatus* LAMBERT (LAMBERT 1908, p. 87, pl. 6, fig. 3) and *Pericosmus granulatus* HERKLOTS (JEANNET ū MARTIN 1937, p. 285), but is different from these two species in its shorter ambulacral petals and in the shallower grooves.

Geological Horizon.— Taisyu Group. (Oligocene ?)

Localities.— Yarikawa (Long. E-129°20', Lat. N-34°25'), Nii-mura and Saraura (Long. E-129°20', Lat. N-34°15'), Mitsushima-cho, Shimoagata-gun, Nagasaki Prefecture.  
(Tsushima, No. GK-L4732-4738, deposited in Geol. Inst., Kyushu Univ.)

Matrix.— Dark gray coloured siltstone.

Genus *Linthia* DESOR

*Linthia prae nipponica* NAGAO

(Pl. 2. figs. 2a-d)

1928 NAGAO, T., Sci. Rep. Tohoku Univ., 2nd ser., 12, p. 18, pl. 1, figs. 1-4

1949 MINATO, M., Shinseidai-no-Kenkyu, 1, p. 14

1950 MINATO, M., Jour. Geol. Soc. Japan, 56, p. 158

The test is moderate in size, heart-shaped, forming a conspicuous notch in the frontal edge of test, and slightly broader than length. The abactinal side is regularly arched from the margin to the apex. Its profile is rather pyramidal. The largest width is measured along a line between a little posterior point of the anterior paired ambulacra. The posterior part is narrow, not very high, and its end truncate. The actinal side is slightly concave. The apical system is more or less eccentric anteriorly from the centre of test.

The anterior odd ambulacrum is in a deep groove, and its small pores are in a regular single series. The paired ambulacra in the deep grooves are petaloid, narrow, straight and slightly open at the extremities. The anterior paired petals are longer than the posterior paired ones, and reach to the margin of test.

The peripetalous fasciole is re-entrant in the postero-lateral interambulacral areas. The peristome is lying near the frontal margin and semilunar. The periproct is on the truncated posterior end of test.

## Measurements.—

Length	66 mm.
Width	70 mm.
Height	25 mm.
Length of anterior paired petals	30.6mm.
Width of anterior paired petals	6 mm.
Length of posterior paired petals	22.2mm.
Width of posterior paired petals	5.5mm.

## Remarks.—

Three fossil species of *Linthia* are known in Japan: *Linthia nipponica* YOSHIWARA, *Linthia yessoensis* MINATO and *Linthia praenipponica* NAGAO. MINATO reports the well-marked difference of the three species, that is the bending degree of peripetalous fasciole in the posterior part of test. (MINATO 1949, p. 14–17) Judging by observation, *Linthia praenipponica* seems to differ from *Linthia nipponica* in its much pyramidal test, (namely in the thinner margin of test compared with the swollen tests of the other species) deeper ambulacral grooves and narrower posterior part.

Geological Horizon.— Ashiya Group. (Oligocene)  
Kijima Group. (Oligocene)

Localities.— Sakihario-mura, Higashisonoki-gun, Nagasaki Prefecture.  
(Long. E-129°45', Lat. N-33°5', No. JC750006, deposited  
in Geol. Inst., Kyoto Univ.)  
Kamihhasami-cho, Higashisonoki-gun, Nagasaki Prefecture.  
(Long. E-129°55', Lat. N-33°10', No. GK-L4731, deposited  
in Geol. Inst., Kyusyu Univ.)

Matrix.— Sandstone.

Genus *Schizaster* AGASSIZ

*Schizaster miyazakiensis* sp. nov.

(Pl. 3, figs. 1a-d, 2a-d, Pl. 4, figs. 1a-d)

The test is small or medium size, elongately oval in marginal outline, and deeply notched by the anterior sulcus. The vertex situates near the posterior margin. The abactinal surface slopes gradually from the vertex to the anterior margin, and the posterior margin is truncate vertically. The odd posterior interambulacrum makes a keel-like ridge. The actinal surface is almost flat. The apical system is eccentric posteriorly (17mm. from the posterior margin in the case of length 44mm.), and small in size. The number of genital pores is indistinct.

The odd anterior ambulacrum is in a deep and rather broad groove which is rounded in a floor. It is widest in the middle part, showing a tendency to be narrowed towards the anterior margin. The poriferous areas are not on the side walls, but on the floor. They are considerably narrow, and the number of pore-pairs is 30. The pores are small and round.

The paired ambulacra are petaloid and in the deep grooves. The anterior paired petals are long and gently curved outwards in the middle parts. They are forming an angle of 90° each other at the apical system, and slightly open at the extremities. The width of poriferous areas is almost same as the interporiferous areas. The number of pore-pairs are about 23.

The posterior paired petals are shorter (less than 1/2 of anterior paired ones), and more or less curved inwards. They are forming an angle of 60° each other at the apical system, and slightly open at the extremities. The width of poriferous area is rather broader than the interporiferous area. The number of pore-pairs is about 14.

Every anterior paired interambulacrum make a sharply keel-like ridge near the apical system and its narrow ridge is related with the deep grooves of petals.

The peripetalous and lateral fascioles are present. The former is traceable with re-entrant angles in the lateral interambulacra.

The plastron is broad and not so much elevated. The peristome is very eccentric anteriorly, lunular in shape and somewhat depressed. The periproct is placed at the summit of posterior truncation which is concave.

#### Measurements.—

	Holotype	Paratype-1	Paratype-2
Length	44mm.	54mm.	53mm.
Width	40mm.	49mm.	51mm.
Height	32mm.	36mm.	34mm.
Length of odd petal	19mm.	23mm.	24mm.
Width of odd petal	5mm.	5.5mm.	5mm.
Length of anterior paired petals	16.5mm.	18.7mm.	18.5mm.
Width of anterior paired petals	4mm.	4.5mm.	4.5mm.
Length of posterior paired petals	8mm.	9mm.	10.5mm.
Width of posterior paired petals	3.5mm.	3.8mm.	4.2mm.

#### Remarks —

This species is one of the most common fossils from the Miyazaki Group. Twelve specimens at the disposal are not in good condition, but for the holotype and two paratypes. Though the three specimens are somewhat deformed, well manifest the above-described characters themselves.

This species is closely related to *Schizaster jeanneti* MARTIN from the Pliocene of East Indies (JEANNET u MARTIN 1937, p. 293, Abb. 63, 64), but differs from the latter in the higher test, the form of anterior paired petals, the shorter

posterior paired petals and the peristome being much far from the anterior margin.

The most important features of this new species are that all the ambulacra are in the deep grooves and the anterior paired petals are curved outwards.

Geological Horizon.— Miyazaki Group. (Miocene)

Locality.— Tano-cho, Miyazaki-gun, Miyazaki Prefecture.

(Long. E-131°15', Lat. N-31°50', No. CK-L4710 (Holotype),  
GK-L4711, (Paratype), deposited in Geol. Inst., Kyushu Univ.  
JC 750007 (Paratype), deposited in Geol. Inst., Kyoto Univ.

Matrix.— Medium sandstone.

### Genus *Plesiaster* POMEL

#### *Plesiaster Peini* (COQUAND)

(Pl. 1, fig. 1, Pl. 4, fig. 3)

1893 BITTNER, A., Verhandl. Geol. Reichsanst., 11, p. 258-261

1907 LAMBERT, J., Mem. Soc. Paléon. Suisse, 34, p. 94

1951 MORTENSEN, TH., Monogr., V<sub>2</sub>, p. 368, fig. 174

The test is large, low and rounded oval in outline.

The apical system is subcentral or slightly posteriorly eccentric. All ambulacra are petaloid and in deep grooves. The anterior paired petals are well-developed and straight. The posterior paired petals are not so much shorter than the anterior paired ones. The all interambulacral areas are swollen.

The peripetalous and latero-anal fascioles are indistinct.

#### Measurements.—

	Koshiki-jima	Amakusa
Length	ca. 65mm.	64.4mm.
Width	ca. 60mm.	ca. 62mm.
Height	ca. 13mm.	ca. 18mm.
Length of odd petal	28mm.	
Width of odd petal	7mm.	
Length of anterior paired petals	25mm.	26mm.
Width of anterior paired petals	7.5mm.	7.3mm.
Length of posterior paired petals	21mm.	23mm.
Width of posterior paired petals	7.5mm.	8.2mm

#### Remarks.—

The anterior right margin and posterior half are destroyed in the material of Koshiki-jima, so the frontal edge and the posterior end of test are unknown; also, the actinal side on the matrix cannot be seen. The specimen from Amakusa is a mould of the abactinal side and impress the right half of test (Petal I, II

and V). Therefore its actinal side and Petals III, IV are unknown. The test is more or less depressed, as that the actual height may be a little larger than the measured value.

According to TH. MORTENSEN, *Plesiaster* appears to be like *Micraster* in its general form, but it differs from the latter in the presence of a peripetalous fasciole and in that the pores of frontal ambulacrum is like those of the other paired petals. A peripetalous fasciole is indistinct in this specimen, but the odd anterior ambulacrum little differs from the paired ones.

*Plesiaster* is known from the Upper Cretaceous (Santonian-Campanian) of Europe, North Africa and North America.

Geological Horizon.— Cretaceous.

Localities.— Coast of Kamakuraura, Nakakoshi-jima, Satsuma-gun, Kagoshima Prefecture. (Long. E-129°50', Lat. N-31°45')

Fukami-cho, Ushifuka City, Kumamoto Prefecture. (Amakusa, Long. E-130°, Lat. N-32°) deposited in Geol. Inst., Kagoshima Univ.

Matrix.— Dark gray shale.

#### Genus *Nudobrissus* LAMBERT

*Nudobrissus* sp. *indet.*

(Pl. 4, fig. 2)

1951 MORTENSEN, TH., Monogr., V<sub>2</sub>, p. 81, fig. 40

The test is medium in size, almost oval in outline and apparently low. Its posterior end is not truncated. The frontal depression is shallow. The apical system is subcentral or slightly anteriorly eccentric. The odd ambulacrum is broad, but the paired ambulacra are narrow, petaloid, long and sunken.

The examined specimen is missing the posterior part of test, so the interambulacrum V and the actinal side on the matrix were not observed. *Nudobrissus* is known from the Upper Tertiary (Helvetian) of Italy.

Measurements.—

Length	ca. 34 mm.
Width	33 mm.
Height	6 mm.
Length of posterior paired petals	14 mm.
Width of posterior paired petals	3 mm.

Geological Horizon.— Ashiya Group. (Oligocene)

Locality.— Yamaga-cho, Onga-gun, Fukuoka Prefecture?

(No. GK-L4741, deposited in Geol. Inst., Kyushu Univ.)

Matrix.— Medium sandstone.



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### Explanation of Plate I

(All figures in natural size)

#### *Plesiaster Peini* (COQUAND)

Fig. 1 Specimen from Fukami-cho, Ushifuka City, Kumamoto Prefecture. Cast of abactinal side.

#### *Pericosmus cf. spatangoides* LORIOU

Fig. 2 Specimen from Saraura, Mitsushima-cho, Shimoagata-gun, Nagasaki Prefecture. Abactinal side.

Fig. 3 Specimen from Yarikawa, Nii-mura, Shimoagata-gun, Nagasaki Prefecture. Cast of abactinal side.

### Explanation of Plate 2

(All figures in natural size)

*Palmeraster japonicus* sp. nov.

Figs. 1a-c a: Abactinal side. b: Actinal side. c: Anterior side.

*Linthia prae nipponica* NAGAO

Figs. 2a-d Specimen from Sakihario-mura, Higashisonoki-gun, Nagasaki Prefecture.  
a: Abactinal side. b: Actinal side. c: Lateral side. d: Anterior side.

### Explanation of Plate 3

(All figures in natural size)

*Schizaster miyazakiensis* sp. nov.

Figs. 1a-d Holotype. a: Abactinal side. b: Actinal side. c: Anterior side.  
d: Lateral side.

Figs. 2a-d Paratype. a: Abactinal side. b: Actinal side. c: Anterior side.  
d: Lateral side.

### Explanation of Plate 4

(All figures in natural size)

*Schizaster miyazakiensis* sp. nov.

Figs. 1a-d Paratype. a: Abactinal side. b: Actinal side. c: Anterior side.  
d: Lateral side.

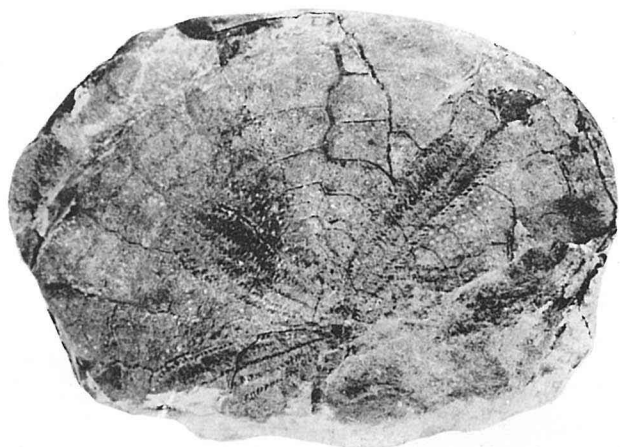
*Nudobrissus* sp.

Fig. 2 Abactinal side.

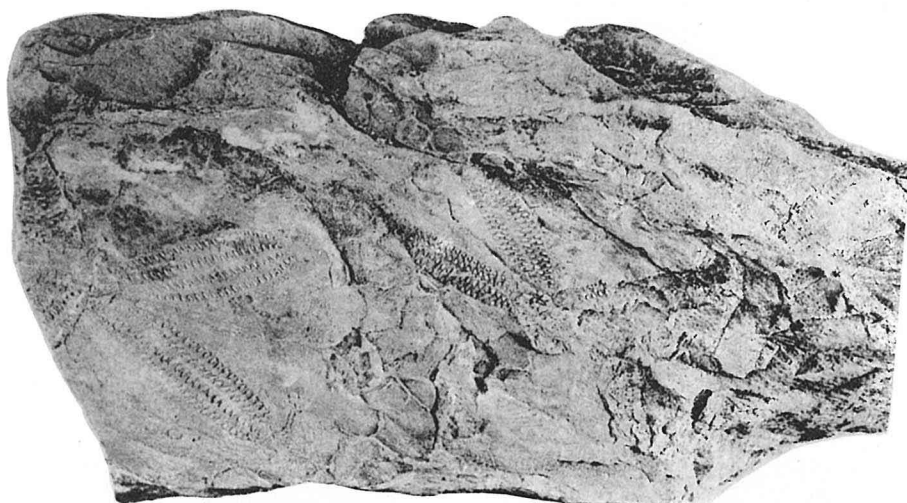
*Plesiaster Peini* (COQUAND)

Fig. 3 Specimen from Kamakuraura, Nakakoshiki-jima, Satsuma-gun, Kagoshima Prefecture. Abactinal side.

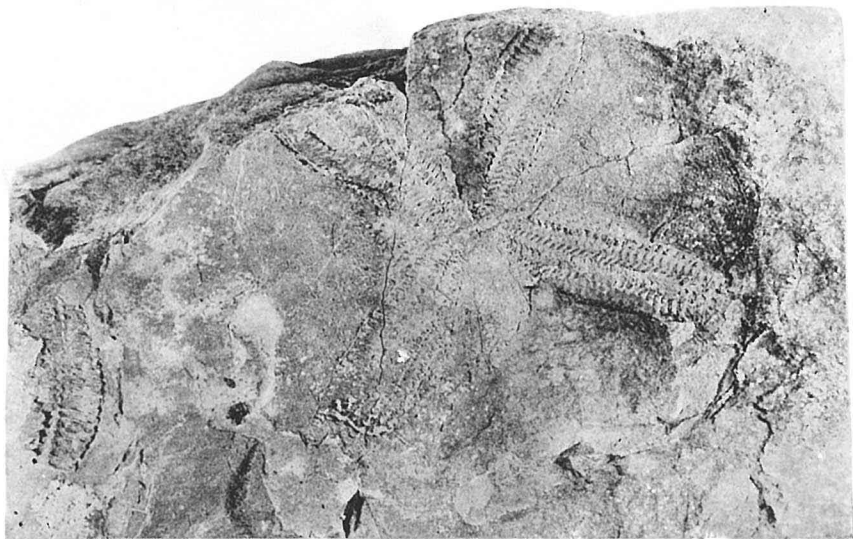
1



2



3



1a



1c



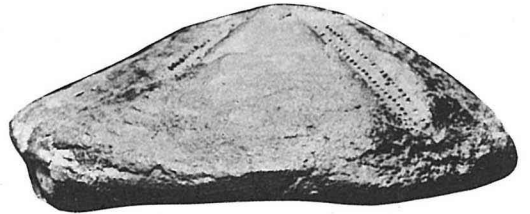
1b



2a



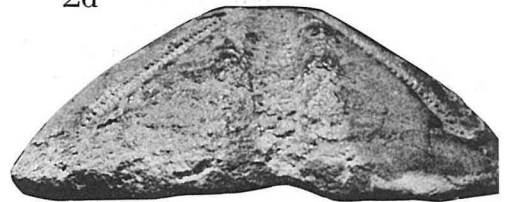
2c



2b



2d



1a



1b



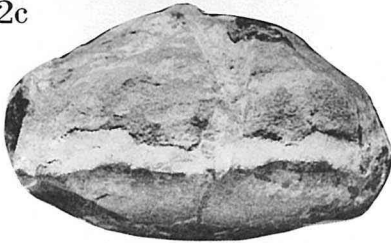
1c



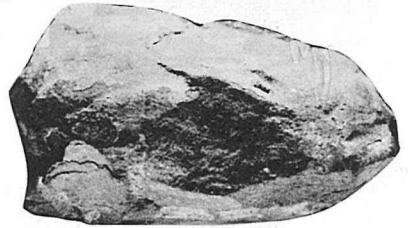
1d



2c



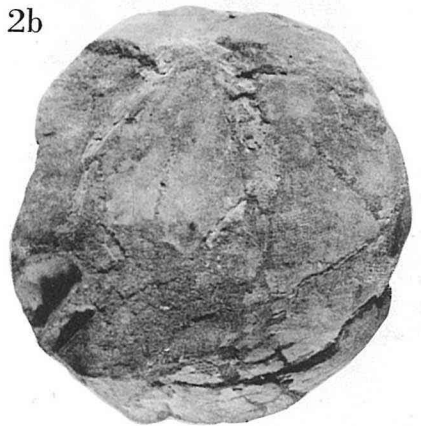
2d



2a



2b



1a



1b



1c



1b



2



3

