図 9-1 The distribute map of the lava caves
Fig. 9-1 at Cheju Island, Korea

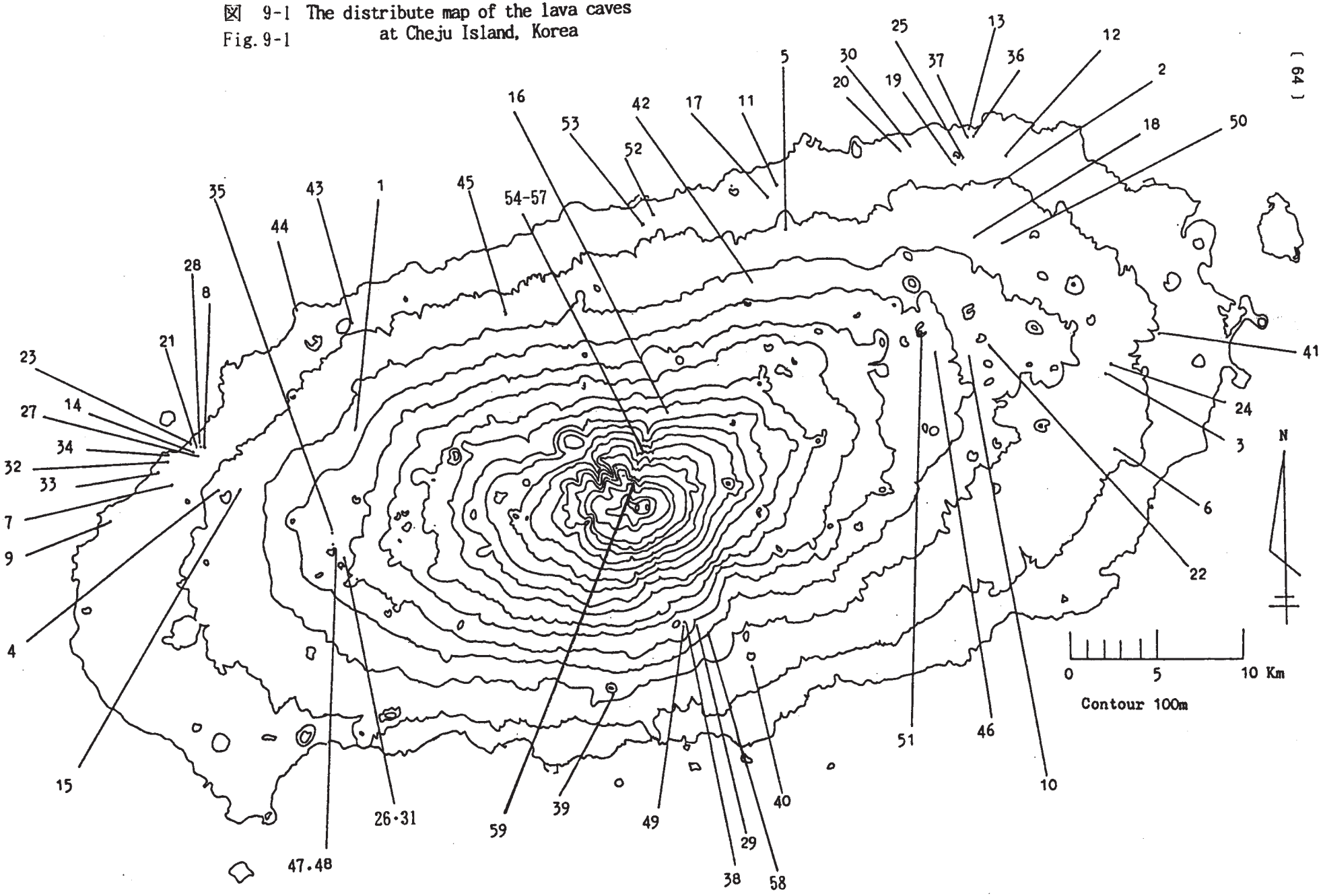


Table: 9-1 The List Of Lava Caves at Cheju Island (1988·10·5)

	Cave Name	Location	Length	Elev.	Ltitude (N)	Longitude (E)
1	Billemot Gul	Buk Cheju Kun, Aewol Eub, Eoum 2 Ri	11,749.0m	70m	33°24'01"	126°24'08"
2	Man Jang Gul	" " , Kucha Eub, Dong kumryeong Ri	8,924.0m	120m	33°31'26"	126°46'18"
3	Susan Gul	Nam " , Seongsan Eub, Susan Ri	4,674.0m	140m	33°25'30"	126°50'37"
4	Sochon Gul	Buk " , Hanlim Eub, Hyopche Ri	* 2,980.0m	130m	33°21'53"	126°15'38"
5	Wahol Gul	" " , Chocheon Eub, Wahol Ri	* 2,066.0m	130m	33°30'10"	126°38'10"
6	Michon Gul	Nam " , Seongsan Eub, Samdal Ri	1,695.0m	100m	33°23'03"	126°50'27"
7	Handul Gul	Buk " , Hanlim Eub, Kumryeong Ri	* 1,400.0m	30m	33°22'28"	126°13'56"
8	Chogi Wat Gul	" " , Hanlim Eub, Hyopche Ri	1,289.0m	50m	33°22'56"	126°14'50"
9	Shin Chang Gul	" " , Hankyeong Myun, Shinchang Ri	850.0m	20m	33°20'48"	126°11'20"
10	Song Dang Gul	" " , Kucha Eub, Songdang Ri	* 850.0m	265m	33°26'22"	126°45'31"
11	Yukutiki Gul	" " , Chocheon Eub, Shinchon Ri	* 800.0m	70m	33°31'36"	126°37'27"
12	Kumryeong Sa Gul	" " , Kucha Eub, Dong kumryeong Ri	705.0m	60m	33°32'26"	126°46'38"
13	Keuset Gul	" " , Kucha Eub , Seo kumryeong Ri	* 414.0m	10m	33°33'09"	126°45'22"
14	Ssang Ryong Gul	" " , Hanlim Eub, Hyopche Ri	392.3m	30m	33°23'00"	126°14'38"
15	Oksan Gul	" " , Hanlim Eub, Myongwol Ri	391.0m	140m	33°21'58"	126°16'34"
16	Kulin Gul	Cheju Si, Oteung Dong	380.0m	760m	33°24'19"	126°32'45"
17	Imolu Gul	Buk Cheju Kun, Chocheon Eub, Shinchon Ri	* 350.0m	70m	33°31'25"	126°37'26"
18	Kun Gout Gul	" " , Kucha Eub, Dukchun Ri	232.0m	155m	33°29'52"	126°45'30"
19	Koenegi Gul	" " , Kucha Eub, Seo Kumryeong Ri	* 200.0m	30m	33°32'18"	126°44'58"
20	Keyomol Gul	" " " , Kucha Eub, Dongbok Ri	* 170.0m	10m	33°32'38"	126°42'57"
21	Hwang Kum Gul	" " " , Hanlim Eub, Hyopche Ri	* 140.0m	35m	33°22'59"	126°14'39"
22	Sang Dang Gul (2)	" " , Kucha Eub, Dongbok Ri	138.0m	255m	33°26'39"	126°45'58"
23	Cheam Chon Gul	" " , Hanlim Eub, Hyopche Ri	114.0m	10m	33°23'19"	126°14'28"
24	Susan Gul (2)	Nam Cheju Kun, Seongsan Eub, Susan Ri	* 100.0m	150m	33°25'57"	126°50'21"
25	Pognam Mol Gul	Buk " , Kucha Eub, Dong Kumryeong Ri	* 100.0m	150m	33°32'24"	126°45'09"
26	Dang Olm Gul (2)	Nam " , Anduk Myun, Dongkwang Ri	90.6m	434m	33°19'48"	126°20'19"
27	Hyopche Gul	Buk " , Hanlim Eub, Hyopche Ri	89.8m	20m	33°22'59"	126°14'38"
28	Sol Rim Gul	" " , Hanlim Eub, Hyopche Ri	367.4m	30m	33°22'58"	126°14'44"
29	Kwan Um Gul	Seoguipo Si, Topyong Ri	* 80.0m	280m	33°17'32"	126°34'43"
30	Dote Pognan Gul	Buk Cheju Kun, Kucha Eub, Dongbok Ri	* 80.0m	30m	33°32'45"	126°43'36"
31	Dang Olm Gul (1)	Nam " , Anduk Myun, Dongkwang Ri	57.7m	434m	33°19'48"	126°20'19"
32	Cholyong Gul	Buk " , Hanlim Eub, Kumreung Ri	* 50.0m	30m	33°22'38"	126°13'39"
33	Kum Reung Gul	" " , Hanlim Eub, Kumreung Ri	*	10m	33°23'00"	126°13'43"
34	Pat Gul	" " , Hanlim Eub, Kumreung Ri	*	10m	33°22'58"	126°13'42"
35	Kum Ak Gul	" " , Hanlim Eub, Kumreung Ri	* 100.0m	350m	33°31'20"	126°19'50"
36	Kumryeong Pat Gul	" " , Kucha Eub, Dong Kumryeong Ri	*	10m	33°33'04"	126°45'27"
37	Kumryeong Jol Gul	" " , Kucha Eub, Dong Kumryeong Ri	*	10m	33°33'04"	126°45'22"
38	Mi Ak San Gul (1)	Seoguipo Si, Topyong Ri	41.3m	425m	33°17'53"	126°33'54"
39	Keng Sengi Gul	" " Seoho Ri	* 45.0m	280m	33°15'39"	126°30'57"
40	Yeo Woo Gul	" " Shinhyo Ri	*	50m	33°15'41"	126°36'28"
41	Mu Myong Gul	Nam Cheju Kun, Seongsan Eub, Susan Ri	*	* 100m	33°25' "	126°54' "
42	Konaen Gi Sul Gul	Cheju Si, Bonggae Dong	*	210m	33°28'39"	126°36'22"
43	Konaebong Gul	Buk Cheju Kun, Aewol Eub, Haka Ri	*	* 70m	33°27'12"	126°20'45"
44	Han Dam Gul	" " Aewol Eub, Aewol Ri	*	* 10m	33°27'36"	126°18'42"
45	Pheng Namu Gul	Cheju Si, Haean Dong	*	* 140m	33°27'34"	126°26'53"
46	Pujong Gul	Buk Cheju Kun, Chocheon Eub, Wasan Ri	* 200.0m	* 300m	33°25'57"	126°43'00"
47	Chong Mul Gul (1)	" " , Hanlim Eub, Kumak Ri	18.5m	350m	33°20'12"	126°20'03"
48	Chong Mul Gul (2)	" " , Hanlim Eub, Kumak Ri	5.6m	350m	33°20'12"	126°20'03"
49	Mi Ak San Gul (2)	Seoguipo Si, Topyong Dong	16.1m	420m	33°17'50"	126°33'54"
50	Tok Chon Gul	Buk Cheju Kun, Kucha Eub, Dukchun Ri	*	160m	33°29'40"	126°46'10"
51	Komun Olum Gul	" " , Chocheon Eub, Gyorae Ri	Depth -25m	350m	33°27'02"	126°43'19"
52	Namchongmul Olum Gul	Cheju Si, Bonggae Dong	* 60.0m	15m	33°29'55"	126°27'37"
53	Dot Lyanug Gul	" " , 1 To 2 Dong	* 70.0m	15m	33°23'45"	126°33'45"
54	Sang Kwae Gul	" " , Oteung Dong	*	* 1,450m	33°24' "	126°33' "
55	Neolbunsang Kwae Gul	" " , Oteung Dong	*	* 1,700m	33°24' "	126°33' "
56	Phyong Kwae Gul	" " , Oteung Dong	*	* 1,600m	33°24' "	126°33' "
57	Dung Tojin Kwae Gul	" " , Oteung Dong	*	* 1,750m	33°24' "	126°33' "
58	Mosimol Gul	Seoguipo Si, Sanghyo Dong	*	310m	33°17'15"	126°33'00"
59	Tong Kwae Gul	Cheju Si, Oteung Dong	*	* 1,600m	33°23'00"	126°34'43"
60						

9. Korea

Fifty nine lava caves are known in Cheju Island but some of them have not yet been scientifically surveyed (Fig. 9-1. Table 9-1).

Most of the caves exist in Pyoseonri lava, the largest scale Mt. Halla early stage lava distributes to the eastern and western parts of the island. Thickness of the Pyoseonri lava reaches to 120 m at around Man Jang Gul, 28 km from the summit of Mt. Halla.

Man Jang Gul

A total length of 8,927 m ranks this cave at the fifth, and probably its cave volume is the greatest among the world lava caves. Three caves make a cave on the cave system, and the lower major cave mearures 5,164 m, the upper two are 2,031 m and 1,733 m (Fig. 9-2). This cave makes up the world's, second longest cave system with Kumryeong Sa Gul, Pat Gul, Jol Gul, and Keuset Gul, with the total length of 13,268 m (Fig. 9-3).

At the upper stream of the upper cave, there are four floor holes which make passages to the main cave at the lower level. There are large scale lava bridges at the lower reaches of the upper cave. Twenty one lava balls were found in the main cave, and some are also found in the upper cave. The lava balls are left on the floor probably because of the slow movement of floor lava flow or due to the thinnes of the lava. It is clarified that the upper end of the cave is 125m while the lower end is 80m above sea level, and height difference between the ends which are 6 km apart is only 45 m, meaning the average slope is 0.4° . This near horizontal gentle slope must be a reason in forming such a large scale cave.

"Tortoise rock" is a large lava ball on a terrace, which has an eminent streak on its sede and indicates the lowering of the lava level when the ball was carried down.

There is a small "tube in tube" formation on the floor, and two places are the lavacicles. A 7.6 m large lava pillar was probably formed by lava dripping from the upper level cave. There is only a width of 2 m but an interesting ripple wave mark, formed when a strong gas blow occurred from a pressurised gas-filled cavity.

At two localities, in the middle and lower reaches of the main cave, there are xenoliths of obsidian and quartz rock in the lava.

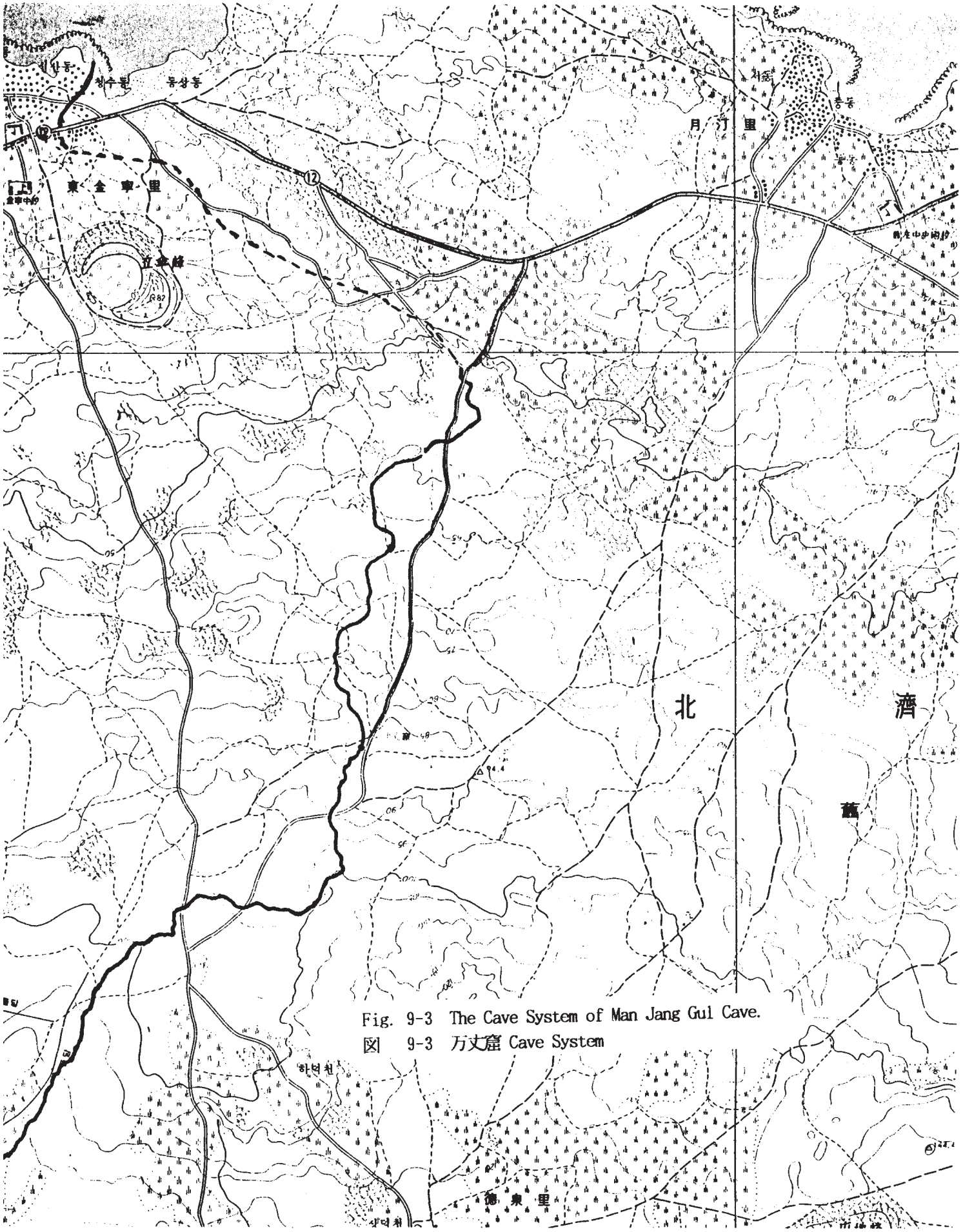


Fig. 9-3 The Cave System of Man Jang Gul Cave.
図 9-3 万丈窟 Cave System

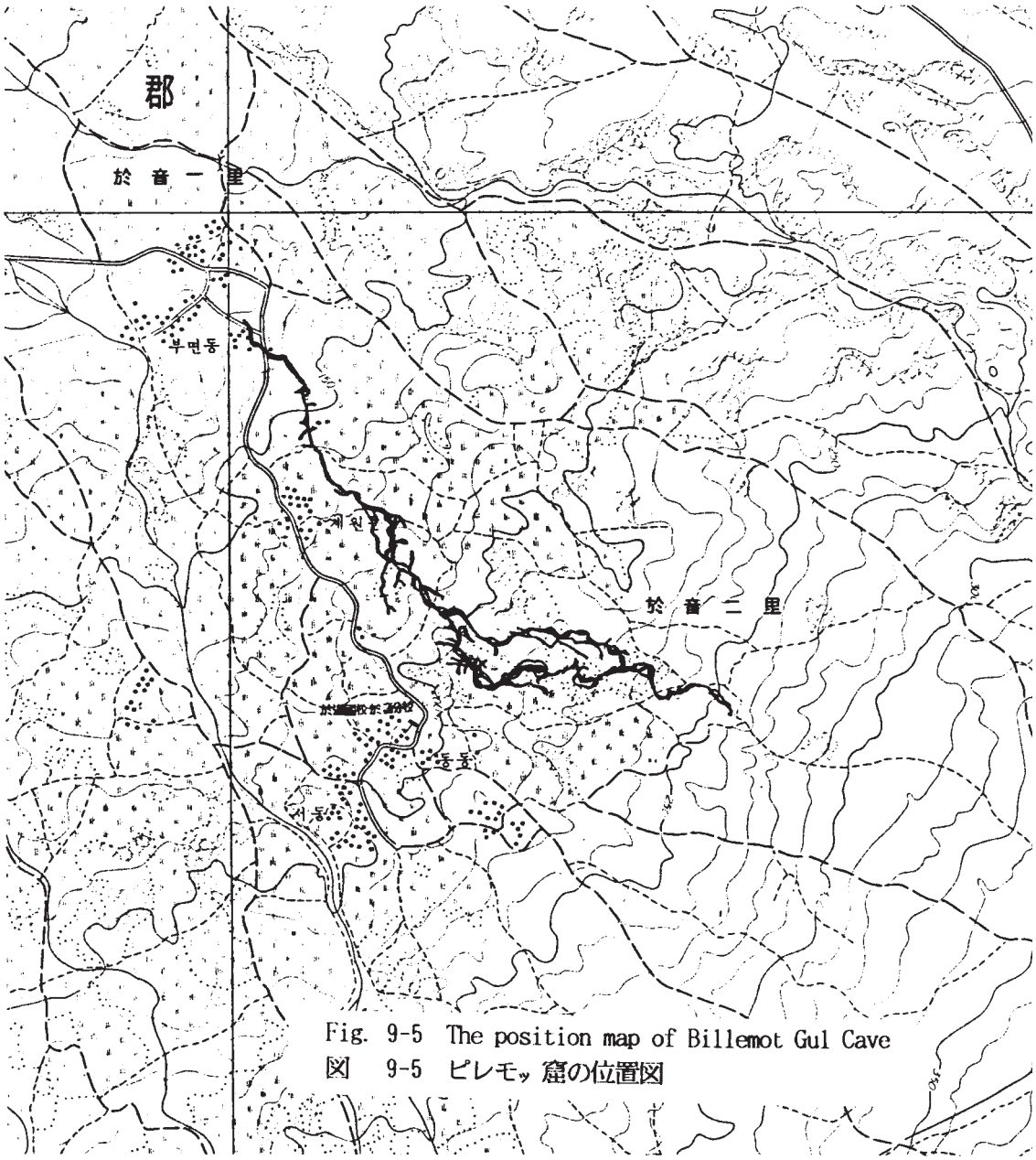


Fig. 9-5 The position map of Billemot Gul Cave
図 9-5 ピレモッ窟の位置図

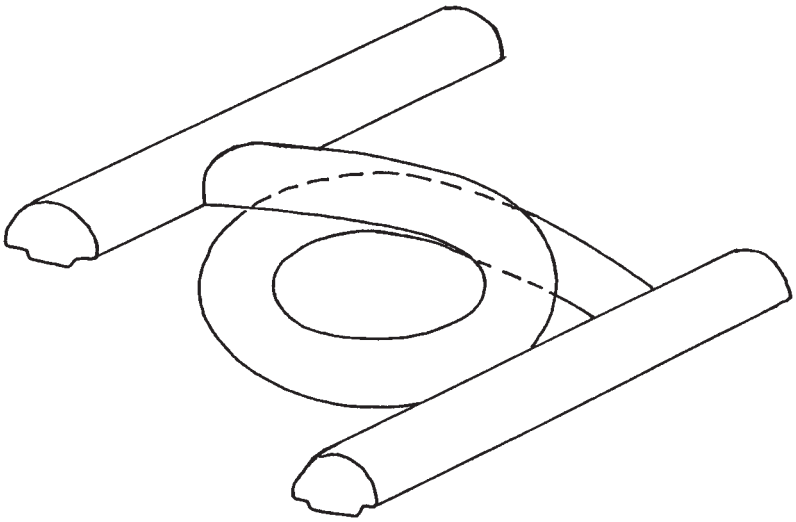


Fig. 9-6 The idial diagram of the spilal part in Billemot Gul lava cave .
図 9-6 ピレモッ窟の螺旋部の模式図。

Kumryeong Sa Gul

The down stream floor lava of the Man Jang Gul came into the upper end of this cavewhich choked the passage between. A large lava ball in the upper stream of this cave is likely to have dawned up the lava flow that contributed to the blockage of the passage.

The lower reaches of this cave are affected by the shell sand, and the dissolved calcium carbonate from it has seeped into the ceiling and coated walls with calcium carbonate, creating a pseudo-limestone cave, and anthodite growing at the ceiling.

Billemot Gul

The Japan Korean co-operative survey in 1982 clarified this cave to be the third longest lava cave in the world(Table 9-2). The main cave is only 2,917 m long but the length of the complexly developed branch cave system is 8,832m and makes the total length of 11,749 m (Fig. 9-4).

This cave is developed in the Sihungri lava where the lava flowed against a ridge of Pyoseongri lava and stagnated (Fig. 9-5). The narrow entrance barely allows a people to go through but leads to grand halls, and an extremely complex cave system of branching and crossing horizontally as well as in vertically. There is even a spiral passage between upper and lower parallel caves (Fig. 9-6).

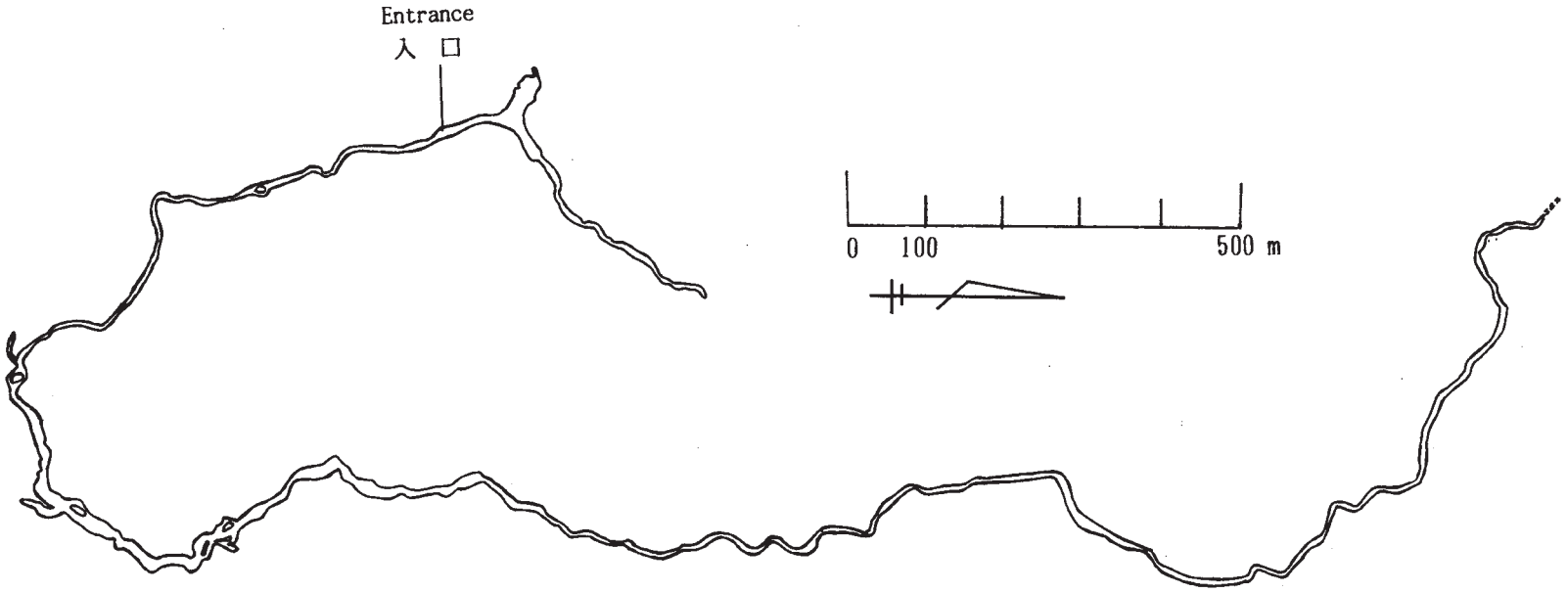
A 28 cm long silica pillar, and a 7 m × 5.2 m in size and 2.5 m high lava ball found in the cave are probably world largests of the sorts. The white wall coating mineral near the entrance may be gypsum.

Hyopche Gul

The cave is in Pyoseonri lava at the north-western coast. The cave system with Oksan Gul, Sochon Gul, Hwang Kum Gul and Ssang Ryong Gul make up the world's longest lava cave system. This coastal region is covered by calcareous shell sand and lower reaches of these caves are more or less affected with the seepage of calcareous water by dissolving the shell sand.

Hwang Kum Gul

This cave is intensely affected by the calcareous seepage and invasion of calcareous shell sand. Many calcareous stalactites and stalagmites make the cave a pseudo-limestone cave. Shell sand collected inside this cave has been dated by ^{14}C method with



Figuer 9-7 Susan Gul Cave

図 9-7 水 山 窟

the result 3820±90 y.BP. Distribution of the shell sand to a considerably high level from the coast may be explained by high sea water levels of the past or upheaval motion of the island in addition to the work of the strong wind. The Korean Government designated this cave as a Natural Monument and we are not allowed to examine the inside.

Ssang Ryong Gul

The cave is close to the Hyopche Gul but has more interesting features like a lava rose on the floor or partly collapsed lava shelf. Traces of initial stage cavities are observed on the ceiling suggesting the mechanism of the early formation stage.

Sochon Gul

A beautiful "tube in tube" and a "coffin" can be observed. Survey of this cave has not yet been completed.

Susan Gul

This cave has a U shape plan probably caused by a southerly flow prevented by an old volcanic cone and change in the flow direction to the north. There are many collapses at the bend and this may be related to the flow's directional change (Fig. 9-7).

Wahol Gul

The floor of this cave descends both to the upper and the down streams of the lava flow. There are distinctly different features in the upper stream and the lower reaches of the cave. There are large halls joined at the upper, while flat cavities joined by a tube cave at the lower reaches.