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Kitamura et al.

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(54) **MUSHROOM PLANT NAMED ‘GRIFON 120’**

(50) Latin Name: *Grifola frondosa*
Varietal Denomination: **Grifon 120**

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(57) **ABSTRACT**

A new and distinct variety of mushroom, named ‘Grifon 120’, is described, which mushroom is characterized by its cap with thick flesh and delicious-looking whitish undersurface, good qualitative character and appearance, good keeping quality and storage life and delicious tasting. The mushroom can be cultivated by gathering and repeated breeding of fungal strains having dominant traits and is exquisite in stability, reproducibility and uniformity when being produced.

8 Drawing Sheets

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Latin name: *Grifola frondosa* (Fr.) S.F. Gray
Varietal denomination: ‘Grifon 120’.

FIELD OF THE INVENTION

The present invention relates to a new and distinct cultivar of mushroom plant, named ‘Grifon 120’, of the species *Grifola frondosa*.

BACKGROUND OF THE INVENTION

Grifola frondosa, also known as Maitake, has been richly cultivated artificially in Japan for a long time and known familiarly as healthy ingredient. In recent years, the demand of Maitake comestible as supplement is increasing because the hot water extract from Maitake is considered as effective against cancer. So, growth in demand of Maitake in the form of fresh food is expected. Ease of cultivation and improvement in productivity of the mushroom are required for expedite sales.

It is critical element that the appearance, taste, preservative quality and tempting color of *Grifola frondosa* broth to be accepted in a market. About the broth, it is pointed out that *Grifola frondosa* broth is deep in color with variety.

On the other hand, *Grifola frondosa* had been cultivated based on wild mushroom tissue disaggregation. However, it has been so far difficult to control the postplanting environment for *Grifola frondosa* artificially, and mass-produce the mushroom. Thus, a new mushroom species was bred by cross-breeding techniques. For example, there has been a new variety of *Grifola frondosa* named ‘Hokuto NT-100’ as disclosed in U.S. Plant Pat. 17,984, which features ease of cultivating, fine flavor and improved storage stability. However,

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the aforementioned ‘Hokuto NT-100’ still has room for improvement in coloration and keeping quality.

SUMMARY OF THE INVENTION

5 In view of the foregoing, the present invention provides a new and distinct variety of mushroom characterized particularly by its cap with thick flesh and delicious-looking whitish undersurface, good qualitative character and appearance,
10 good keeping quality and storage life and delicious tasting, which can be cultivated by gathering and repeated breeding of fungal strains having dominant traits and is exquisite in stability, reproducibility and uniformity when being produced. This novel and distinct variety of mushroom is identified as
15 ‘Grifon 120’.

BRIEF DESCRIPTION OF THE FIGURES

20 The accompanying photographic drawings illustrate the new variety, with the color being as nearly true as is possible with color illustrations of this type.

FIGS. 1(A) and 1(B) are photographs showing top and bottom of dual culture in which a pair of ‘Grifon 120’ strains of the invention are placed alongside.

25 FIGS. 2(A) and 2(B) are photographs showing top and bottom of dual culture in which ‘Grifon 120’ strain and parent strain ‘HOKUTO NT-100’ are placed alongside.

FIGS. 3(A) and 3(B) are photographs showing top and bottom of dual culture in which ‘Grifon 120’ strain and parent strain ‘HOKUTO MY-95’ are placed alongside.

30 FIGS. 4(A) and 4(B) are photographs showing top and bottom of dual culture in which ‘Grifon 120’ strain and control strain ‘MH182011’ are placed alongside.

35 FIG. 5 is a photograph showing the mazaedium of ‘Grifon 120’ of the invention.

FIG. 6 is a photograph showing the mazaedium of the parent strain ‘HOKUTO NT-100’.

FIG. 7 is a photograph showing the mazaedium of the parent strain 'HOKUTO MY-95'.

FIG. 8 is a photograph showing the mazaedium of the control strain 'MH182011'.

FIGS. 9(A) through 9(D) are photographs showing the cap gills of the strains 'Grifon 120' (FIG. 9(A)), 'HOKUTO NT-100' (FIG. 9(B)), 'HOKUTO MY-95' (FIG. 9(C)) and 'MH182011' (FIG. 9(D)).

FIG. 10 is a comparative photograph showing the strains 'Grifon 120', 'HOKUTO NT-100', 'HOKUTO MY-95' and 'MH182011' placed abreast in order.

FIG. 11 is a comparative photograph showing four cups of broth of strains 'Grifon 120' (upper left), 'HOKUTO NT-100' (upper right), 'HOKUTO MY-95' (lower left) and 'MH182011' (lower right).

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a new and distinct variety of mushroom, Maitake named 'Grifon 120', characterized particularly by its cap with thick flesh and delicious-looking whitish undersurface, good qualitative character and appearance, good keeping quality and storage life and delicious tasting.

The Maitake 'Grifon 120' of the invention is cultivated by bringing indigenous fungal strains and commonly-available fungal strains. An example of the cultivation of the Maitake 'Grifon 120' will be described hereinafter. In this cultivation, the following fungal strains similar to 'Grifon 120' in variety were used as parent varieties.

- 1. Fungal strain: Maitake named 'Hokuto MY-95' registered as a new plant variety under Reg. No. 8624 by the Ministry of Agriculture, Forestry and Fisheries of Japan on Dec. 22, 2000.
- 2. Fungal strain: Maitake named 'Hokuto NT-100' registered as a new plant variety under Reg. No. 14031 by the Ministry of Agriculture, Forestry and Fisheries of Japan on Mar. 9, 2006. This strain has been patented under U.S. Plant Pat. 17,984.

The aforementioned fungal strains were all developed and duly registered as new variety of mushroom by the assignee's company in Japan.

The record of actually bringing the 'Grifon 120' of the invention into cultivation is described below. The cultivating record is of help to understand the cultivation method of 'Grifon 120' of the invention to recreate the invention.

- 1. (Jan. 1993): 'Hokuto MY-95' was cultivated.
- 2. (Jan. 2002): 'Hokuto NT-100' was cultivated.
- 3. (Sep. 2002): Fungal hyphae was separated from Maitake (*Grifola frondosa*) gathered from the wild in Yamagata, Japan, to obtain a fungal strain named 'MH182099'.
- 4. (Feb. 2004): From fungal strains obtained by crossing 'Hokuto MY-95' and 'MH182099', there was sorted out a fungal strain having a cap with whitish undersurface as intended, which was named 'MH182188'.
- 5. (Aug. 2006): A quality fungal strain (Specimen Maitake #G060383) conformable to the breeding objective was obtained by crossing 'Hokuto NT-100' and 'MH182188'. As the result of repeating the cultivation experiment, identification and productive stability and uniformity of the obtained Maitake #G060383 could be confirmed, thus to name the Maitake 'Grifon 120'.
- 6. (Aug. 2007) An application for plant variety registration for 'Grifon 120' was filed with the Ministry of Agriculture, Forestry and Fisheries of Japan.

(1) Comparison of Maitake 'Grifon 120' with existing varieties in dual culture:

For identifying specific characteristics of the 'Grifon 120', dual culture using commercially available cultivars as parent controls was performed to investigate idiosyncrasy of fungi showing a reluctance to touch others.

The investigation was conducted by seeding the fungal strains of 'Grifon 120' and other control fungi upon a potato dextrose agar medium in such a manner that the fungal strains of 'Grifon 120' are confronted with the control fungi at intervals of 3 cm, cultivating the strains at 25 degrees C. for 28 days, and then, determining whether the strains show the reluctance to touch others.

The fungal strains used in the comparative experiments are as follows:

- 1. 'Grifon 120': (Maitake #G060383) Strain according to the invention.
- 2. 'Hokuto NT-100': Parent variety similar to 'Grifon 120', as described above.
- 3. 'Hokuto MY-95': Similar variety to 'Grifon 120', as described above.
- 4. 'MH182011': Common cultivar available commercially in Japan, which was used as a control strain.

In the result, the comparative experiments thus performed revealed that 'Grifon 120' of the invention shows the reluctance to touch all the other strains (see Table 1 and FIGS. 1 to 4). Consequently, it is evident from the experiments that 'Grifon 120' is a new variety of *Grifola frondosa*.

TABLE 1

	Results of Dual Culture		
	Similar Variety		Commercial Strain
	NT-100	MY-95	MH082011
'Grifon 120'	+	+	+

* Strains 'Grifon 120' have no reluctance to touch each other.

(2) Cultural characteristics of 'Grifon 120':

- 1. 'Grifon 120' cultivated on the potato dextrose agar medium has the following characteristics. The mycelial color is white, shape of the surface of the colony is smooth, shape of colony edge is irregular, colony thickness is thick, and density of hyphae is sparse (see Tables 2-4).
- 2. The optimal temperature for hyphal growth was approximately 26 degrees C. (see Tables 2-4).

TABLE 2

Characteristics	Characteristic Code of Filed Variety								
	01	02	03	04	05	06	07	08	09
Genetic	-								+
Dual Culture									
Reluctance-to-touch									
Physiology	20	22	24	26	28	30			
Mycelial Growth									
Optimum Temperature (° C.)									
Growth Rate									

10° C.
15° C.

TABLE 2-continued

20° C.					
25° C.					
30° C.					
35° C.					
Mycelial Color	White			Other	
Shape of Surface of Colony	Smooth	Laugh		Other	
		Parent Variety		Commercial	
Character-istics	Note (Data)	'Hokuto NT-100'	'Hokuto MY-95'	Strain 'MH082011'	
Genetic Dual Culture Reluctance-to-touch Physiology Mycelial Growth Optimum Temperature (° C.)	—	09	09	09	
Growth Rate (mm/day)	(mm/day)	(mm/day)	(mm/day)	(mm/day)	
10° C.	1.2	0.4	0.6	0.8	
15° C.	1.5	1.4	1.7	1.8	
20° C.	2.4	2.3	2.6	2.5	
25° C.	2.7	3.1	2.9	2.9	
30° C.	2.0	1.9	2.9	2.7	
35° C.	0.0	0.0	0.0	0.0	
Mycelial Color	01	01	01	01	
Shape of Surface of Colony	01	01	01	01	

TABLE 3

Character-istics	Characteristic Code of Filed Variety					
	01	02	03	04	05	06
Shape of Colony	Irre-regular					
Edge						
Colony Thickness			Thin		Me-dium	
Hypha Density			Sparse		Me-dium	
Cultivation Characteristics						
Capsule Formation			Little		Me-dium	
Capsule Coloration	None					
Length of Time until fruit body formation at optimal temperature (Days)	<30	31~40	41~50	51~60	61~70	>70
Optimal Develop-ment Temperature (° C.)	<15	15~20	20~25	>25		
Optimal Fruit Body Growth	<18	18~21	>21			

TABLE 3-continued

5	Temperature (° C.)						
	Budding period (Natural Cultivation)		Early		Normal		
	Yield (g/bottle)	400	450	500	550	600	650
10							
		Characteristic Code of Filed Variety				Note	
	Characteristics	07	08	09	(Data)		
15	Shape of Colony			Regular	01		
	Edge						
	Colony Thickness	Thick			07		
	Hypha Density	Dense			03		
20	Cultivation Characteristics						
	Capsule Formation	Much			05		
	Capsule Coloration			o	01		
	Length of Time until fruit body formation at optimal temperature (Days)				03		
25							
30	Optimal Development Temperature (° C.)				03		
	Optimal Fruit Body Growth Temperature (° C.)				02		
35							
	Budding period (Natural Cultivation)	Late			05		
	Yield (g/bottle)	700	750	800	07		
40							
		Parent Variety			Commercial		
	Characteristics	‘HOKUTO NT-100’	‘HOKUTO MY-95’	Strain ‘MH082011’			
45	Shape of Colony	01	01	09			
	Edge						
	Colony Thickness	05	05	03			
	Hypha Density	03	03	03			
	Cultivation Characteristics						
50	Capsule Formation	05	05	05			
	Capsule Coloration	01	01	09			
	Length of Time until fruit body formation at optimal temperature (Days)	03	03	06			
55							
	Optimal Development Temperature (° C.)	03	03	02			
60							
	Optimal Fruit Body Growth Temperature (° C.)	02	02	01			
65							

TABLE 3-continued

Budding period (Natural Cultivation)	05	05	05
Yield (g/bottle)	05	07	01

TABLE 4

Charac- teristics	Characteristic Code of Filed Variety							
	01	02	03	04	05	06	07	08
Morphology								
Cap Size			Small		Medi- um		Large	
Thick- ness			Thin		Medi- um		Thick	
Notch	None							
Cross	1	2	3					
sectional								
shape								
Face	W	G-W	D-G	B	D-B			
color								
Annulus	1	2	3	4				
Hair			Few		Medi- um		Many	
Shape of	1	2	3	4				
Tube Face								
Uneven- ness	None							
of cross								
sectional								
the tip of								
tube								
Tube	1	2	3					
Position								
Stipe Shape	1	2	3					

Characteristics	Characteristic Code of Filed Variety	Parent Variety		
		Variety 09	Note (Data)	'Hokuto NT-100' 'Hokuto 'MY-95'
Morphology				
Cap Size			07	07
Thickness			05	05
Notch	o		01	01
Cross sectional			02	02
shape				
Face color	Other		Royal Horticultural Society: RHS Color Chart	
			Grey- brown (199a)	Grey- brown (199b)
Annulus	Other		03	04
Hair			03	03
Shape of	Other		01	01
Tube Face				
Unevenness of	Present		01	01
cross sectional				
the tip of tube				
Tube Position	Other		03	03
Stipe Shape	Other		02	03

Commercial Strain 'MH082011'	
Characteristics	
Morphology	
Cap Size	07
Thickness	05
Notch	09
Cross sectional shape	02

TABLE 4-continued

Face color	Royal Horticultural Society: RHS Color Chart Grey-brown (199c)
Annulus	02
Hair	03
Shape of Tube Face	01
Unevenness of cross sectional the tip of tube	09
Tube Position	03
Stipe Shape	01

“Commercial Strain” means the commercially available strains used as control strains in contraposition to the instant mushrooms.

“Royal Horticultural Society (R.H.S. Color Chart)” The color codes described in the foregoing Tables matched with the R.H.S. Color Chart prescribed by Royal Horticultural Society, England. Namely, the code numbers 199a, 199b and 199c in parentheses in the row “Face Color” in Table 4 corresponds to the R.H.S. Color Chart.

“Characteristic Code of Filed Variety” The characteristics (traits) of the instant mushrooms ‘Grifon 120’ are rated on a scale of one (01) to nine (09) in this column of the tables. The aspects relevant to the traits of the mushrooms correspond to the scale numbers.

“Note (Data)” The characteristics of the instant mushrooms ‘Grifon 120’ are denoted in this column of the tables and correspond to the numbers 01-09, i.e. ‘Characteristic Codes of Filed Variety’.

“Parent Variety” The parent varieties of the instant mushrooms ‘Grifon 120’ are denoted in this column of the tables. Incidentally, the parents of ‘Grifon 120’ are ‘HOKUTO MY-95’, ‘HOKUTO NT-100’, ‘MH182099’ and ‘MH182188’ as described in the specification.

(3) Morphological characteristics of ‘Grifon 120’:

CONFIGURATION		RHS COLOR CODE
PILEUS	Shape: Fan-like form (sector) Lateral Diameter: 40.13 mm (Standard Deviation: 16.04; n = 142) Thickness: 2.57 mm (Standard Deviation: 0.58; n = 142)	199a Gray-brown
Gill	None	
Stipe	Slender	

CULTIVATION METHOD

(Culture Vessel) Twenty polypropylene culture bags with a ventilating filter, which is formed in a square and has the dimensions of 8500 to 9000 cc in volume, 200×120 mm in bore diameter, and 460 mm in height, were prepared for cultivation of the fungal strains. The cultivation of the fungal strains was performed twice, using the ten culture bags each time.

(Culture Medium) Culture media composed of sawdust of broadleaf tree, especially beechwood, and corn bran was used. Each culture bag was filled with 2.5 kg of the culture medium at a mixture ratio of 1 kg of sawdust, 0.5 kg of corn bran and 2.1 kg of water (ratio by weight) and sterilized by autoclaving.

(Seed Fungus) Seed fungus composed of sawdust was used. About 25 cc of seed fungus was inoculated upon each culture medium.

(Cultivation) Cultivation was performed for 40 to 70 days at a temperature of 20 to 25 degrees C., at a humidity of 60% to 70%, and at an illumination intensity of 200 to 500 lux. The time when primordium of the objective fungal strain is formed and colored was determined to be an ending time period of cultivation.

(Strain Growth) After the cultivation, the growing condition of the strains was shifted to the condition of a temperature of 15 to 20 degrees C., a humidity of 80% to 95% and an illumination intensity of 500 to 1500 lux to make mazaedia of the strains grow. The time when pores appear in the cap gill was determined to be harvesttime.

RESULT OF CULTIVATION

The cultural experiment clarifies the differences between 'Grifon 120' of the invention and the control fungal strains including the most similar strains, as shown in Tables 2 to 4 above. The mazaedia of the strains are shown in FIG. 4 through FIG. 8.

(4) Morphological characteristics of the cap gill of Grifon120

Comparison was observed about a pore and gill color of 'Grifon 120' and similar varieties. The results are shown in the picture of the accompanying drawing.

The cap gill is more white than that of the similar species 'HOKUTO NT-100' similar to 'Grifon 120', and slightly colored. The pores in the gill were also made slow grow beyond recognition (FIG. 9).

(5) Features of the broth decocted from 'Grifon 120' (Table 5)

A comparison of broth between 'Grifon 120' of the invention and the similar varieties was drawn to evaluate 'Grifon 120'. The broth of the strains in the experiment was obtained by boiling hot water containing 100 grams of the strain mazaedium over high heat for 30 seconds, further boiling the hot water for 30 seconds over gentle heat, and then bringing out the mazaedium from the hot water. The broths obtained resultantly from the comparative investigation performed for the strains were measured in concentration by comparison. (FIG. 10)

The result was that 'Grifon 120' was weaker in broth concentration than the commercial varieties of strains, but substantially equal to the similar variety 'NT-100'.

TABLE 5

Comparison of absorbance of broths Absorption wavelength 437 nm				
Fungal strain				
	'Grifon 120'	'HOKUTO NT-100'	'HOKUTO MY-95'	'MH182011'
Absorbance	0.214	0.218	0.253	0.263

(6) Eating-quality test of 'Grifon 120' (Table 6)

The eating-quality of 'Grifon 120' of the invention was compared with 'Hokuto NT-100'. 'Grifon 120' is a strain improved from the parent variety NT-100 to enhance the cultural and eating quality thereof as described above. However, new varieties obtained by breeding do not always have the same flavor and texture. The strain does not always become tasteless even though the strain is made better in morphology. Thus, a taste test of the strains was also carried out.

The resultantly obtained fungi (mushrooms) were preserved in a common environment as would be for ordinary distribution. That is, the mushrooms were preserved at 3 degrees C. for 5 days after harvesting, at 30 degrees C. for two days, and further 15 degrees C. for three days. Then, on the tenth day after harvesting, a taste test was carried out.

The taste test was conducted by 64 monitors eating mushrooms, a questionnaire on the taste of the mushrooms was then carried out. The results of a questionnaire are shown in Table 6.

TABLE 6

Results of Taste Test										
		Daintiness				Firmness			Ranking	
		A	B	C	E	G	N	E	D	E
'NT-100'	(ppl)	13	39	11	1	46	18	0	16	14
	(%)	20	61	17	2	72	28	0	25	
'Grifon 120'	(ppl)	28	31	5	0	57	7	0	34	22
	(%)	44	48	8	0	89	11	0	53	

[Daintiness] A: Good taste B: Fair C: Bad taste E: No opinion

[Firmness] G: Crunchy N: Soft E: No opinion

[Ranking] D: Rated as "tasty" by comparison with others E: No opinion

As will be appreciated from the results shown in Table 6, 'Grifon 120' of the invention is better in daintiness and firmness than the control varieties. 'Grifon 120' was chosen as "higher-ranking" by 53 percent of monitors while the control variety 'HOKUTO NT-100' was chosen by 25 percent of monitors. Thus, 'Grifon 120' of the invention should prove dainty to the consuming public.

CONCLUSION

The new variety 'Grifon 120' produced by breeding according to the invention is different in morphologic attribute from the similar variety 'HOKUTO NT-100' and superior to the control variety 'MH182011' in terms of morphology, broth denseness and eating quality.

What is claimed is:

1. A new and distinct variety of mushroom, substantially as described and illustrated herein.

* * * * *

FIG. 1A

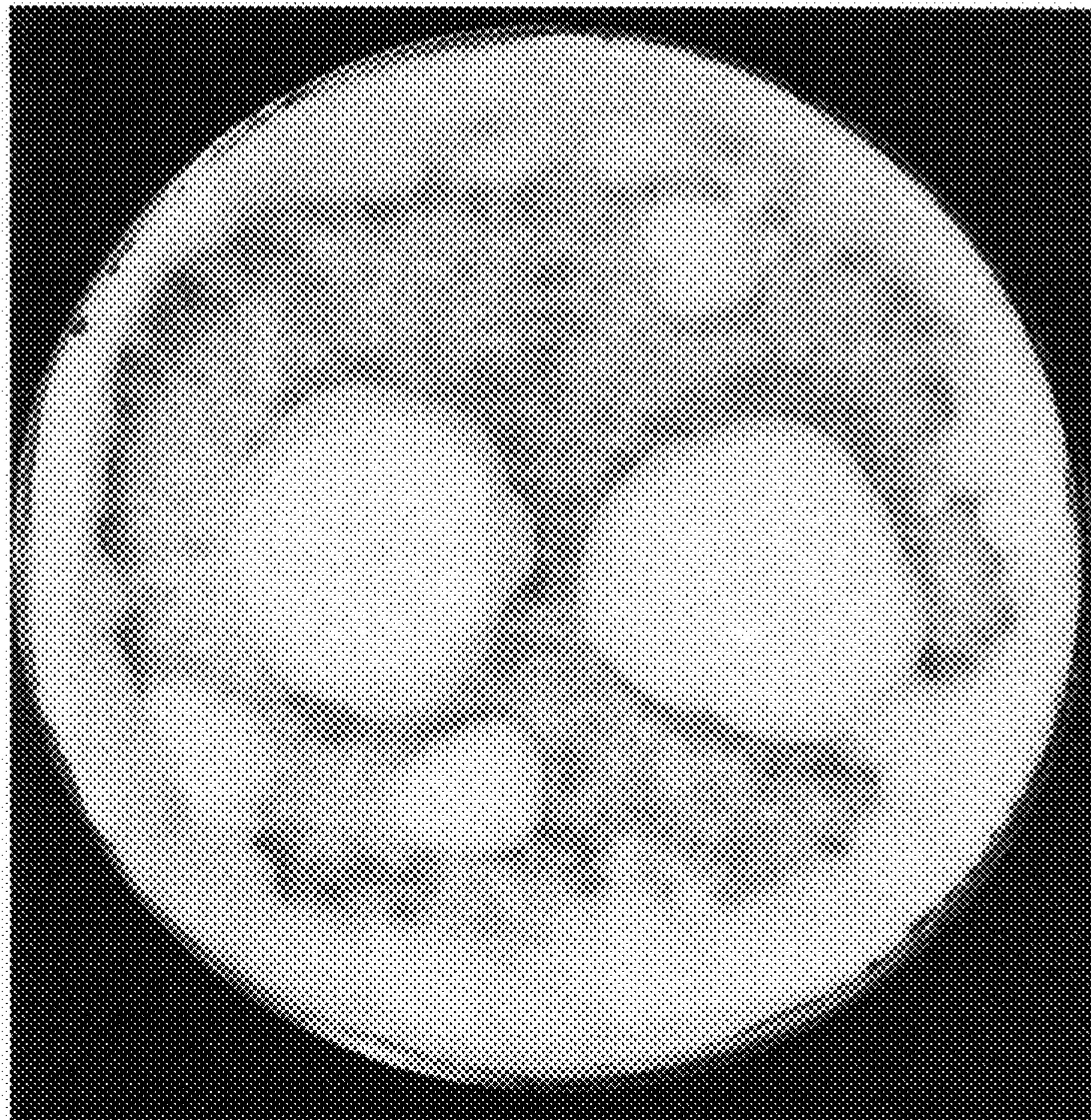


FIG. 1B

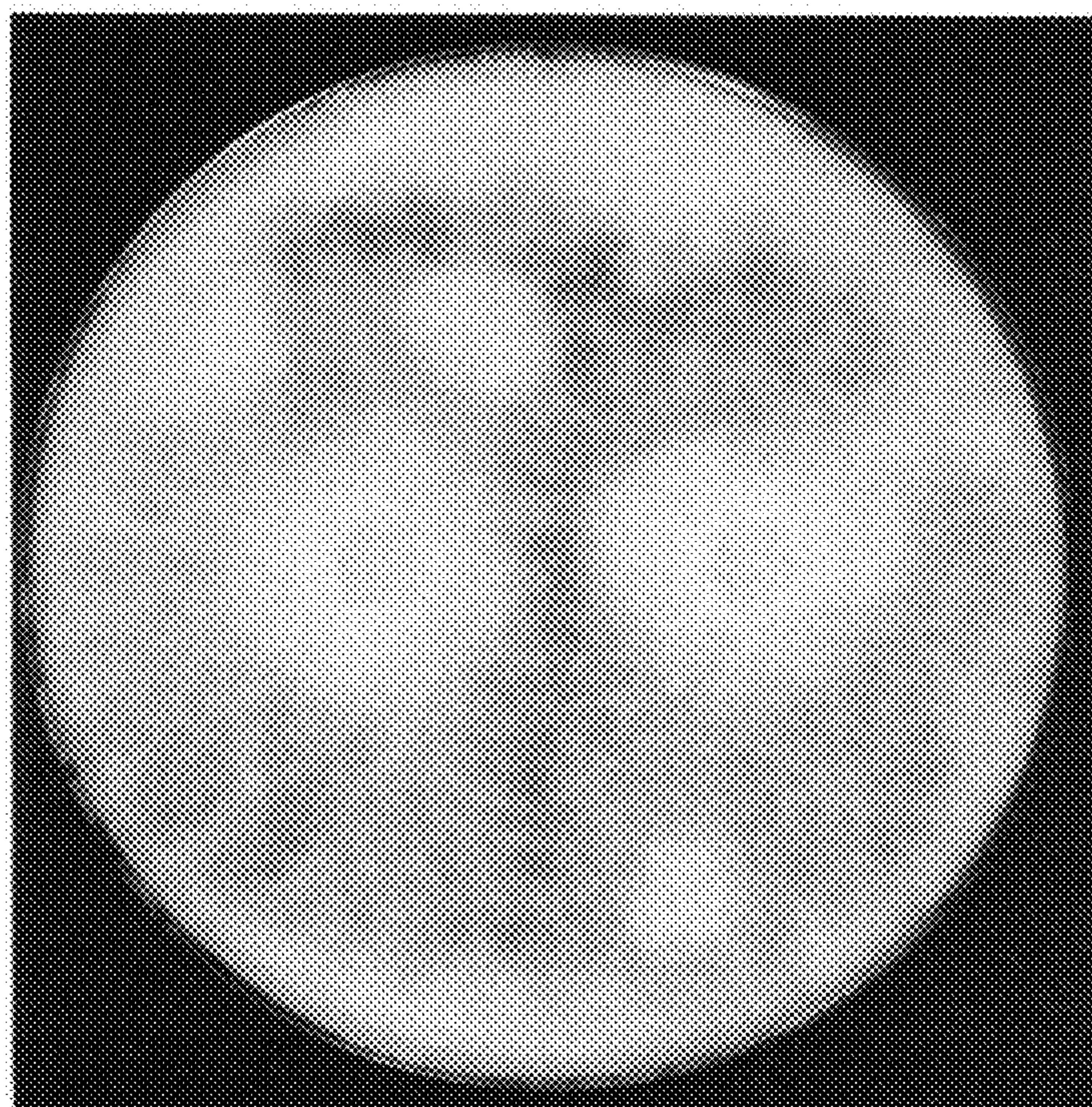


FIG. 2A

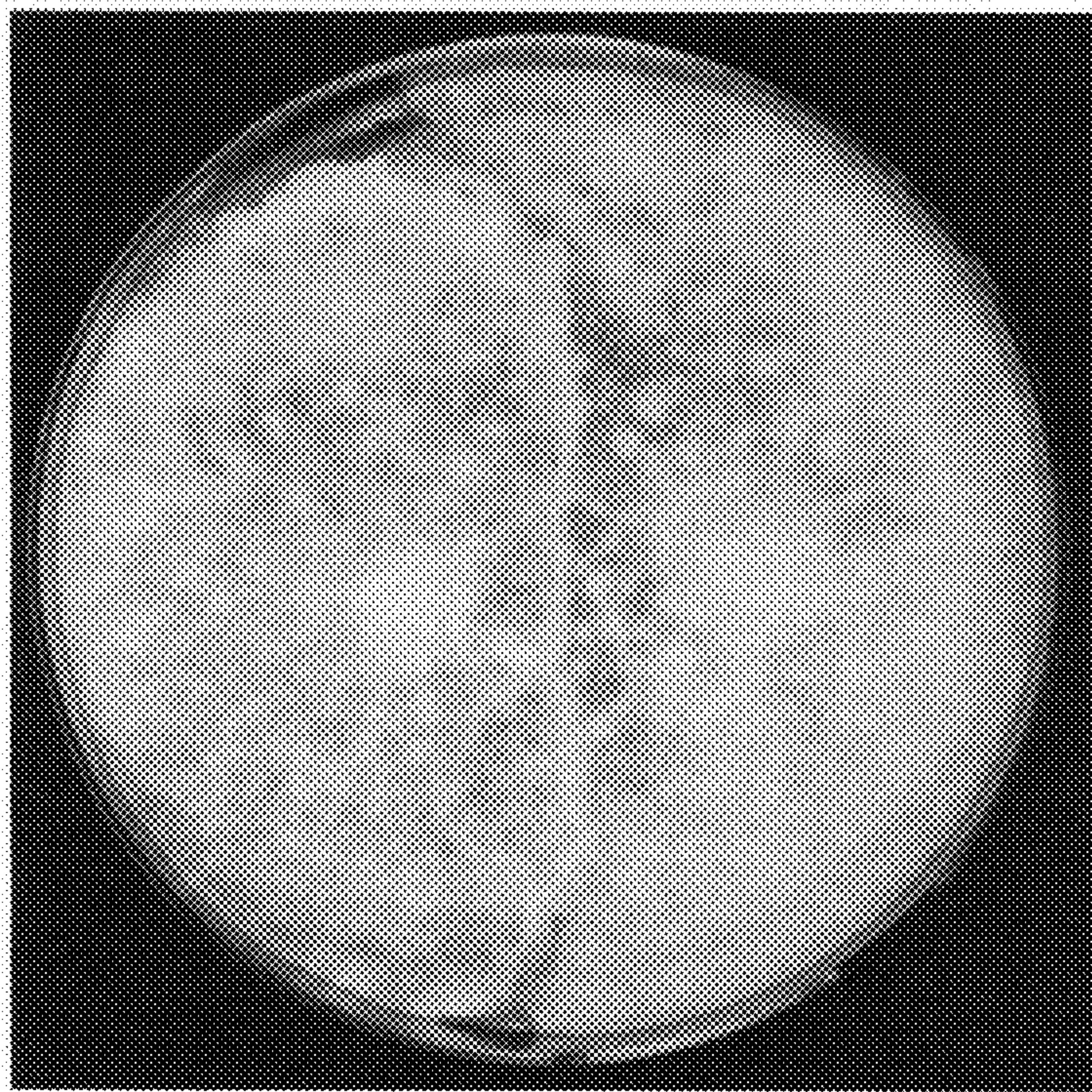


FIG. 2B

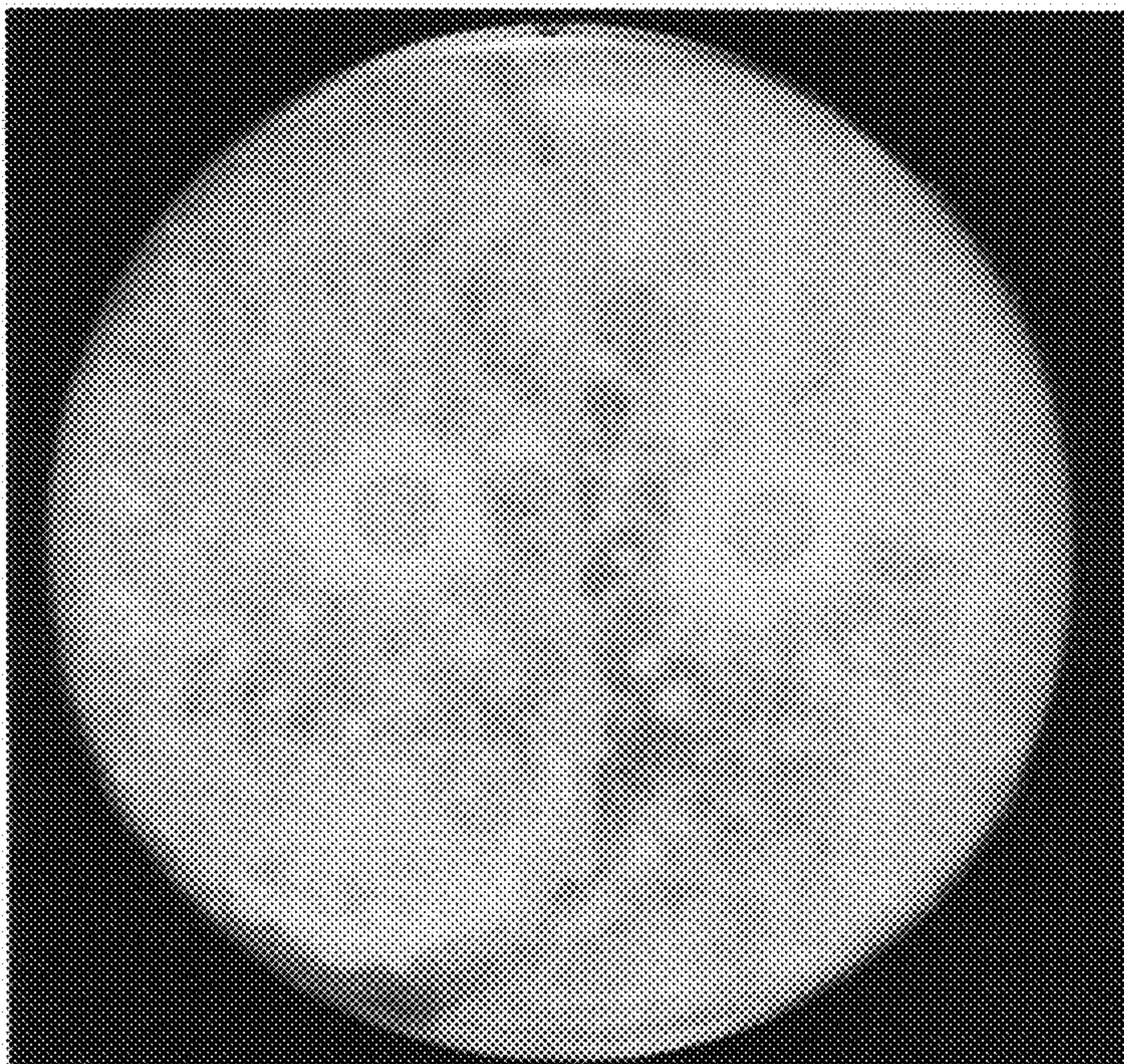


FIG. 3A

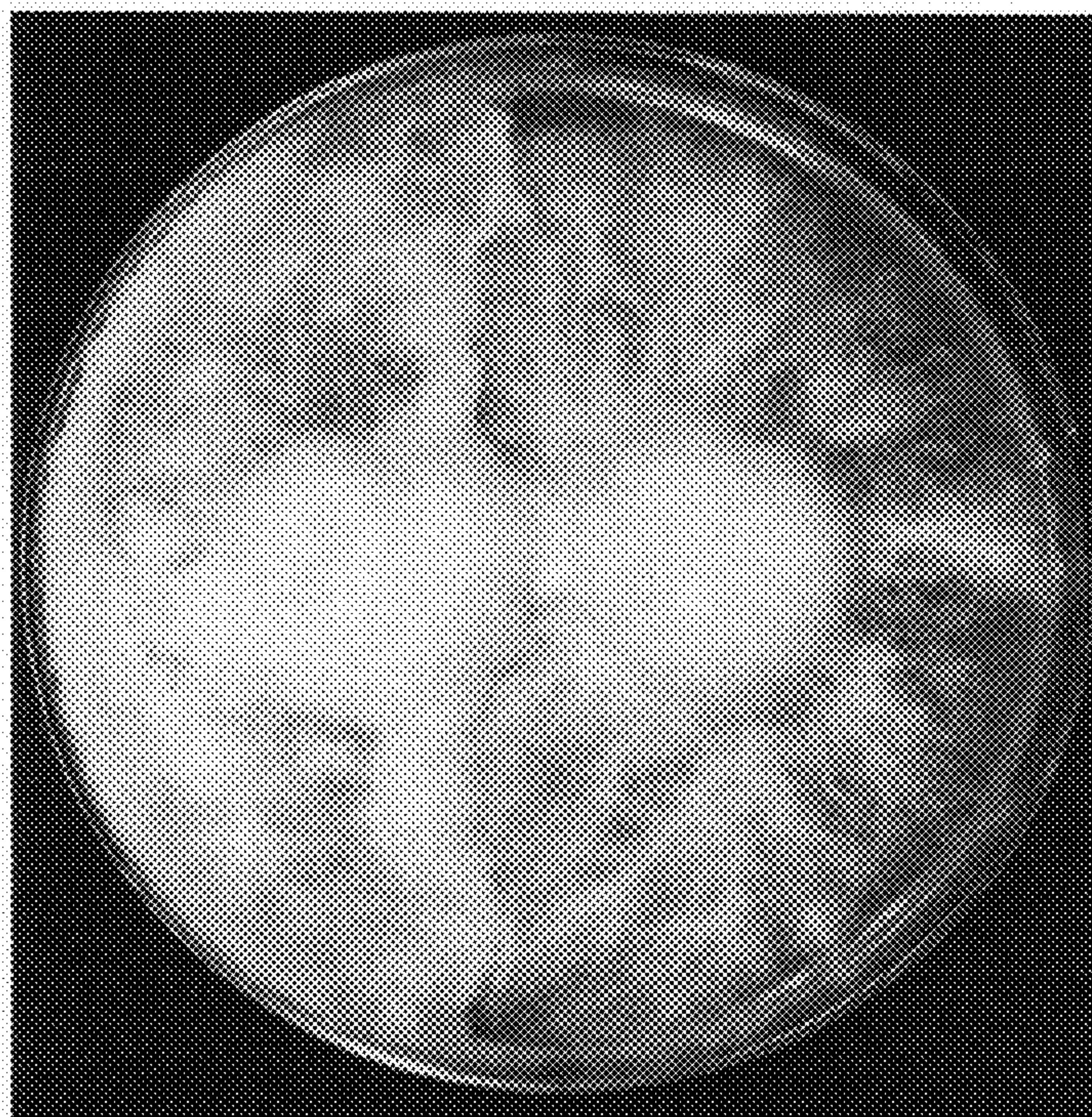


FIG. 3B

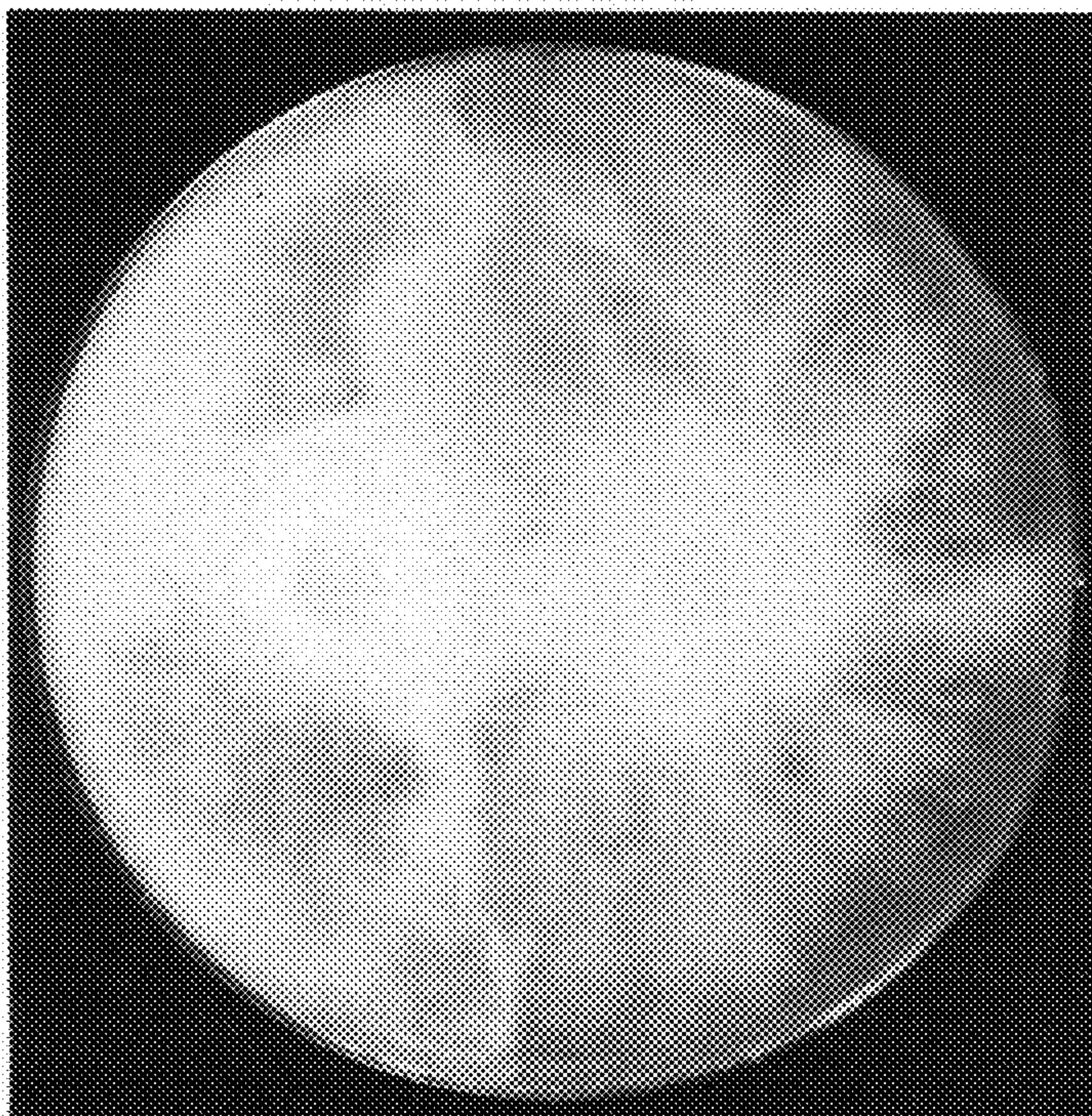


FIG. 4A



FIG. 4B

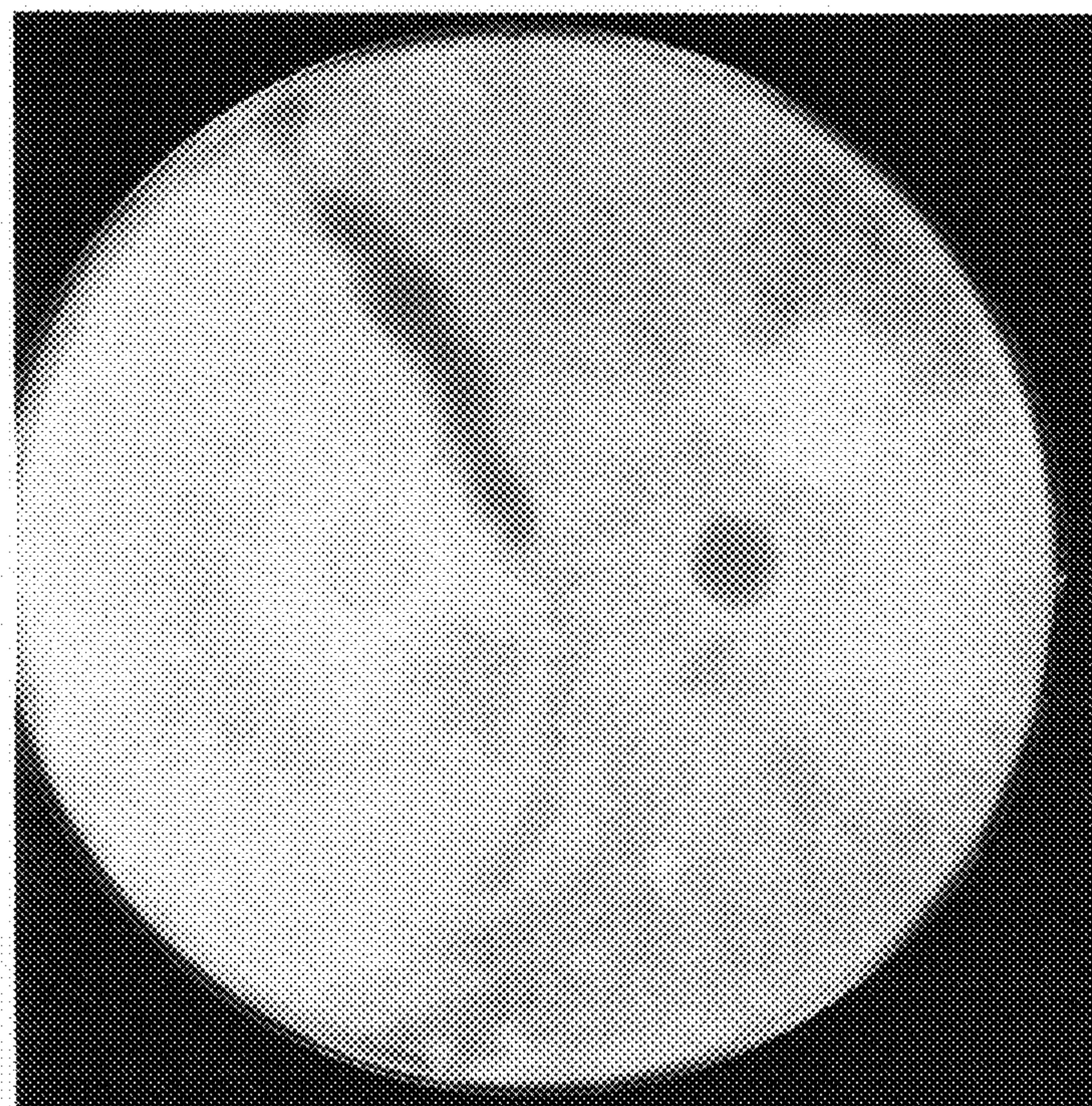


FIG. 5

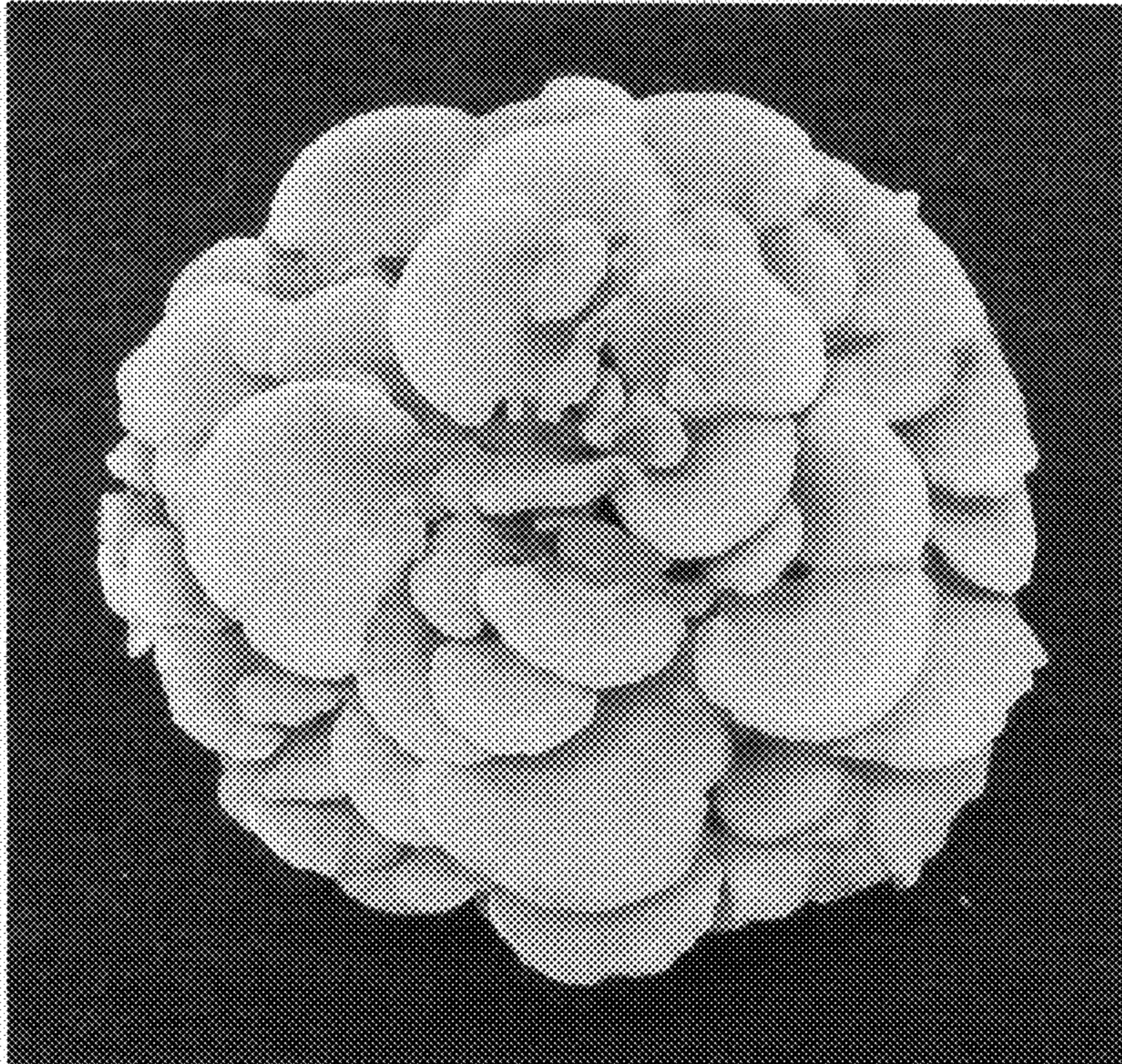


FIG. 6

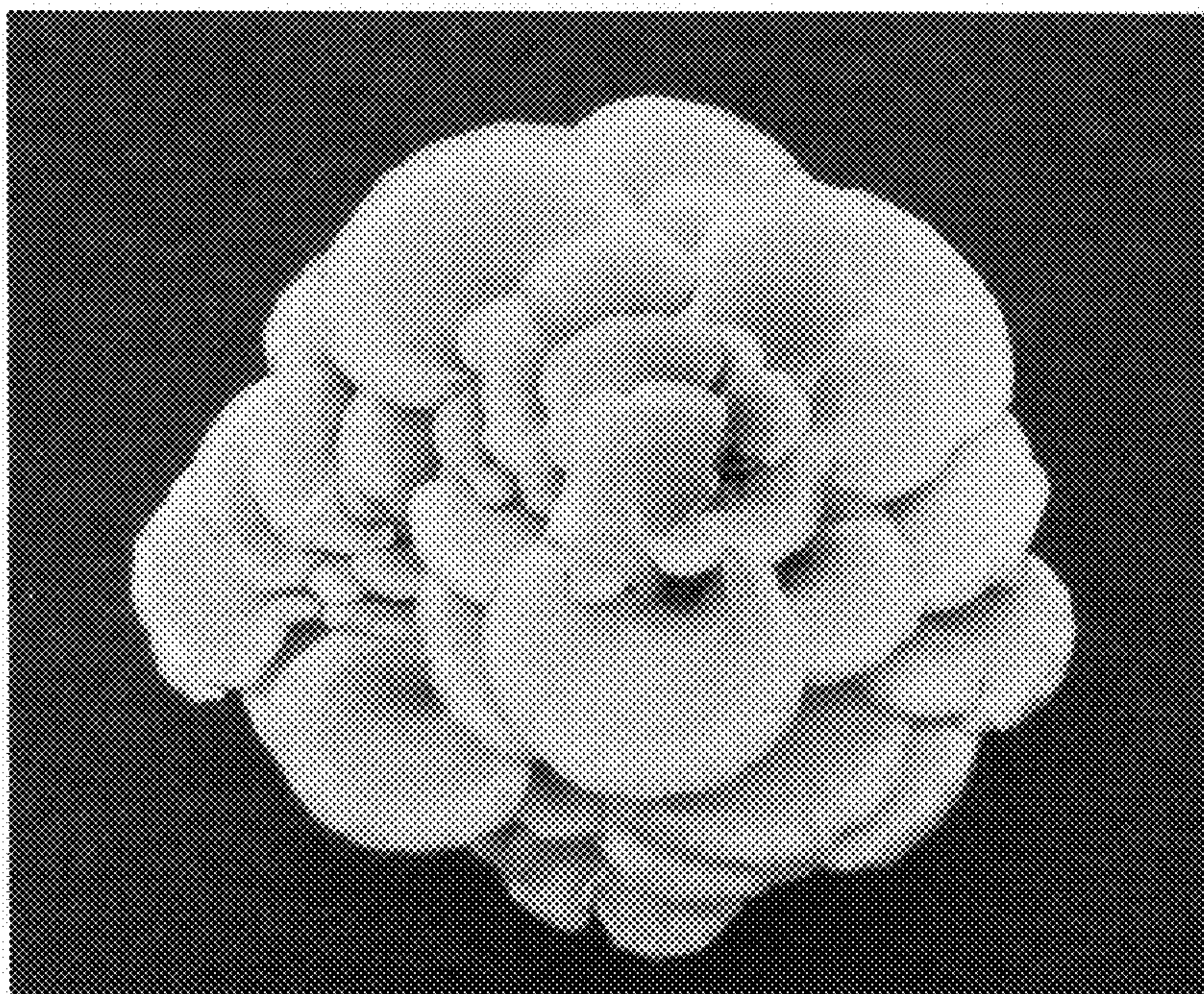


FIG. 7

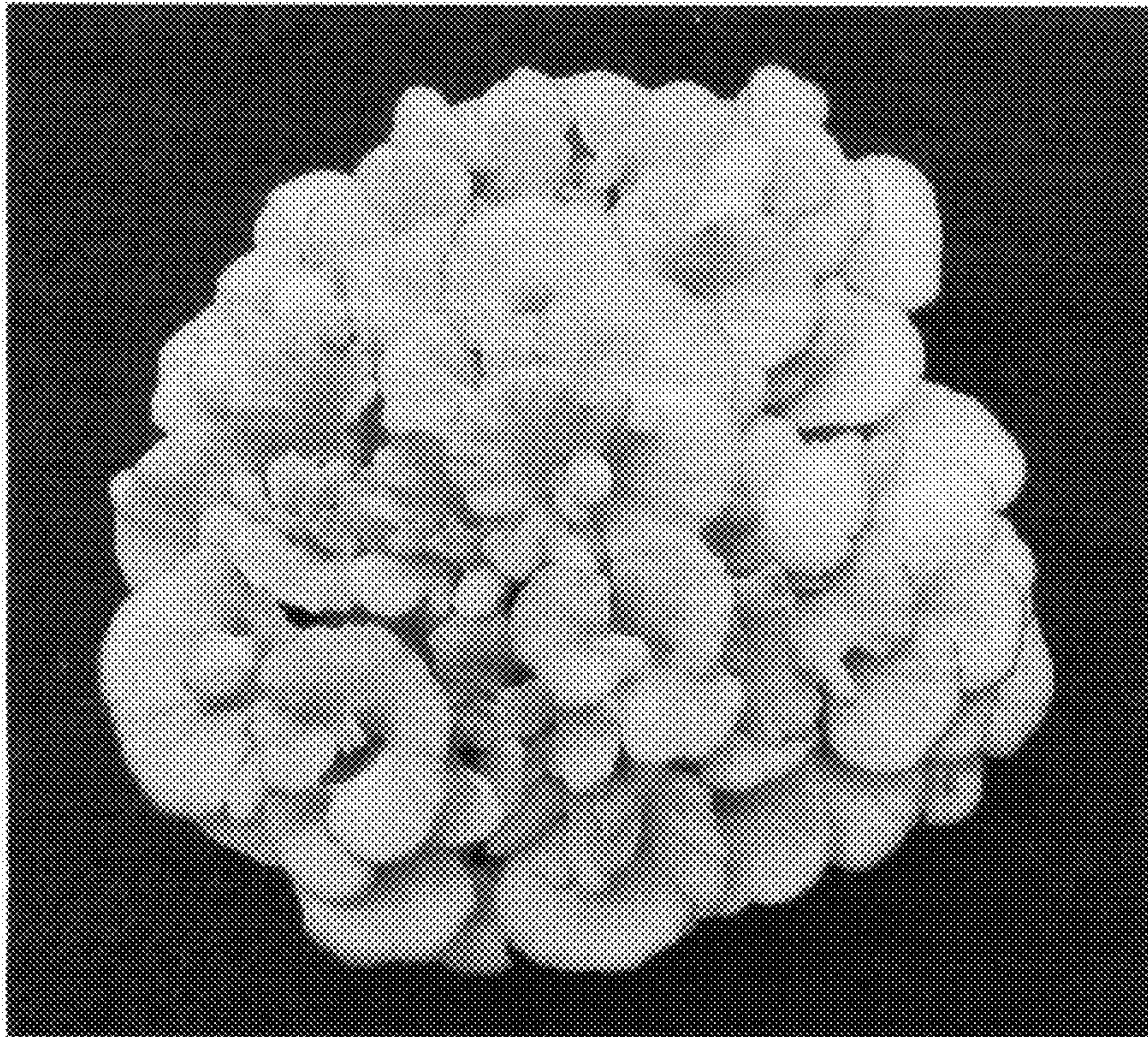


FIG. 8

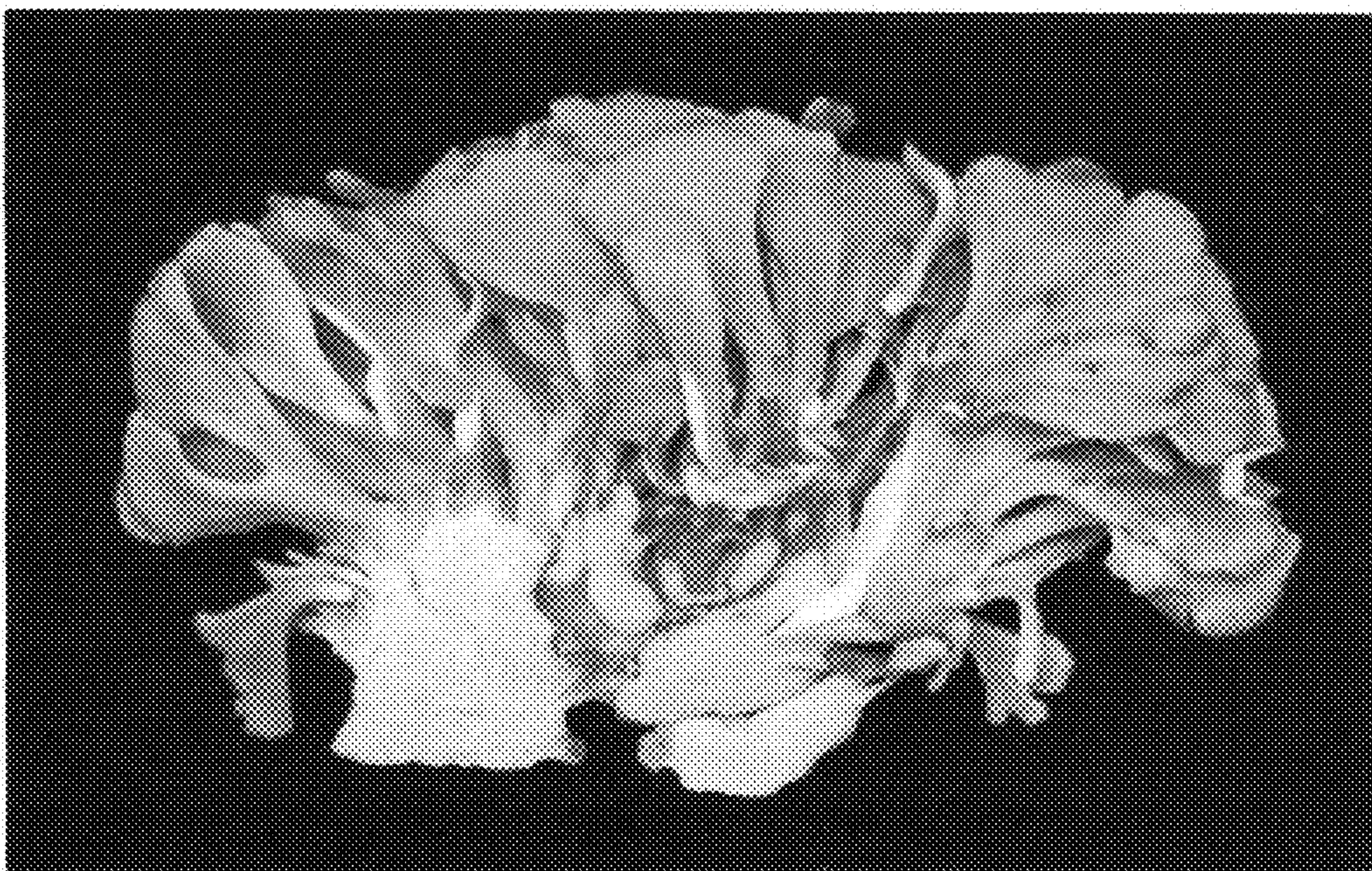


FIG. 9A

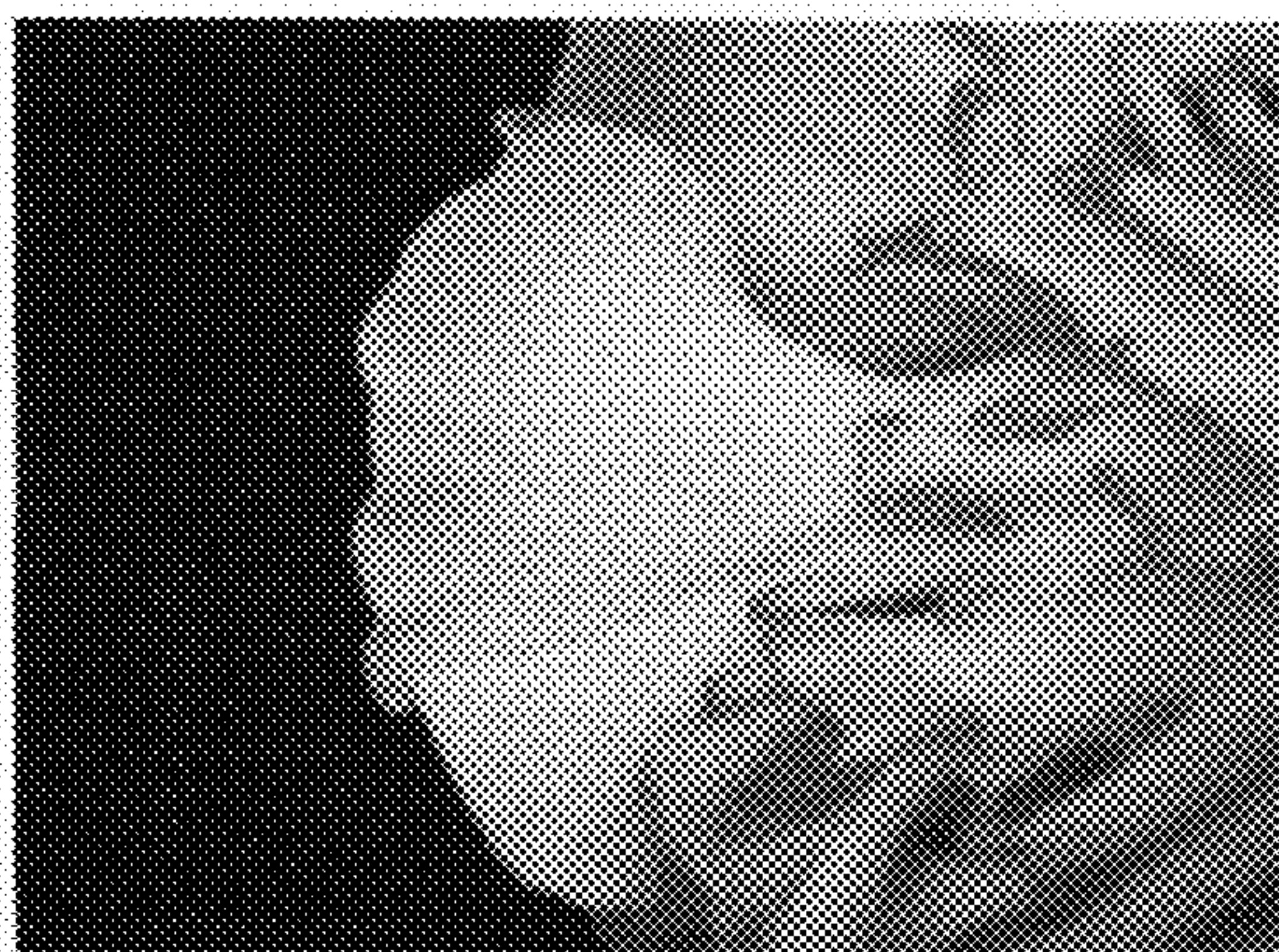


FIG. 9B



FIG. 9C



FIG. 9D

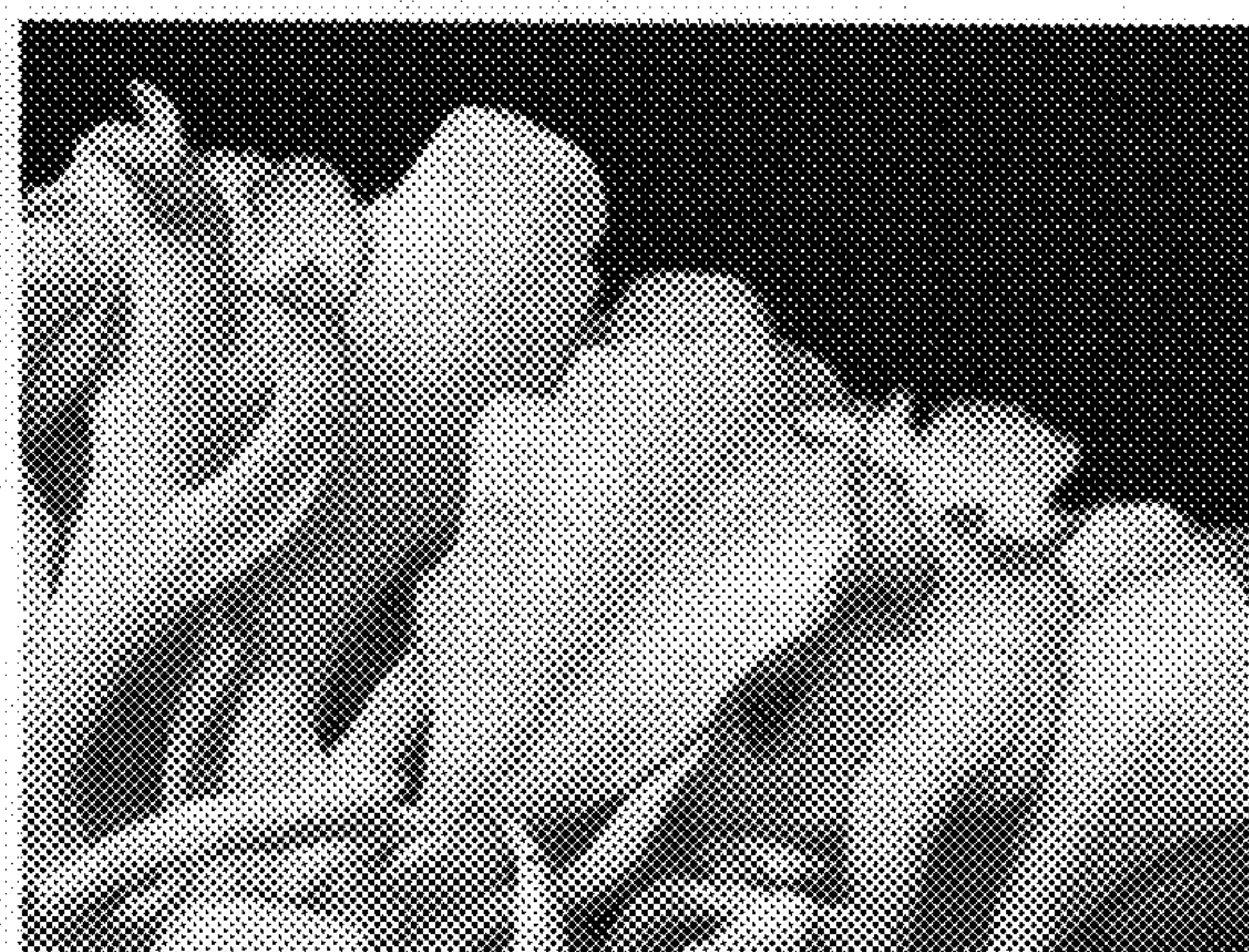


FIG. 10

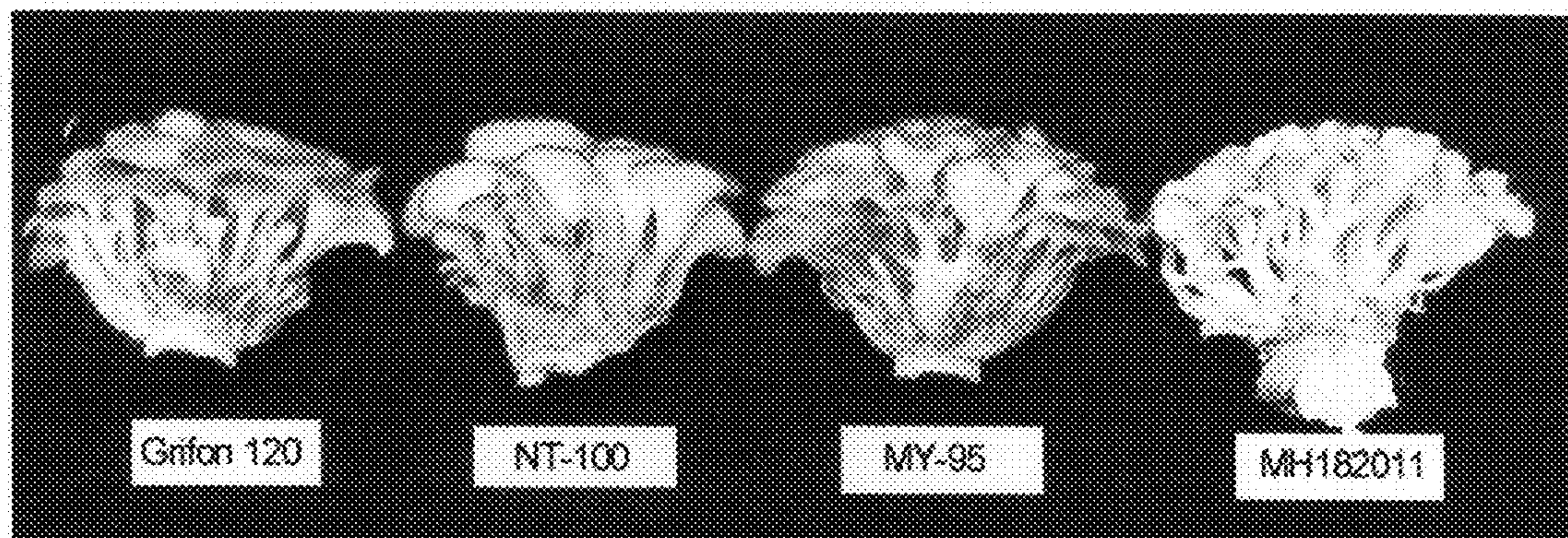


FIG. 11

