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(12) **United States Plant Patent**
Nakata et al.

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(54) **MANDARIN PLANT NAMED ‘Mikanken16’**

(50) Latin Name: *Citrus reticulata* Blanco x *Citrus sinensis* (L.) Osbeck
Varietal Denomination: **Mikanken16**

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See application file for complete search history.

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(57) **ABSTRACT**
A new variety of *Citrus* ‘Mikanken16’ that has dark orange fruit color, no seeds, high juiciness, orange-like flavor, ease of peeling the fruit by hand, good appearance and good tasting qualities.

3 Drawing Sheets

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Common name: Mandarin.
Botanical classification: *Citrus reticulata* Blanco x *Citrus sinensis* (L.) Osbeck.
Variety denomination: ‘Mikanken16’.

BACKGROUND OF THE NEW VARIETY

The present invention relates to a new and distinct variety of Mandarin, *Citrus* L., which has been given the variety denomination ‘Mikanken16’.

ORIGIN OF THE VARIETY

The parent varieties are ‘95-56-25’ (male parent) (not patented in the U.S.) and ‘Mikanken4’ (female parent) (not patented in the U.S.), respectively.

The variety was developed and propagated in Uwajima, Ehime, Japan.

The variety was reproduced asexually by vegetative reproduction by top grafting one-year-old scions on rootstocks, in Uwajima, Ehime, Japan. The name of the rootstock is ‘MIYAGAWAWASE’ (not patented).

In 2004, crossing the parent varieties and collecting seeds were grown in the next year.

In 2005, 2006 seedlings are grown.

In 2007, they were grafted on top of root stock.

In 2010, the first fruit was harvested and lines were primary selected.

In 2013, plants were secondary selected.

From 2012 to 2022 growing tests for their performance.

In 2023, breeding was completed with DUS status confirmed (distinct, uniform, and stable), whereby it was confirmed that the instant tree reproduces true to type in

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successive generations of asexual reproduction, and the variety was named ‘Mikanken16’.

Cultivation of the variety does not require special conditions or treatments.

The variety is currently mainly intended for fruit production.

SUMMARY OF THE VARIETY

This new mandarin plant ‘Mikanken16’ has leave blades with no emargination at the tip, fruit with dark orange surface color (JHS color chart No. 1306), medium surface roughness, medium filling of the core, and medium to late maturity for consumption (typically April), that distinguish it notably from its female parent ‘Mikanken4’.

Also the fruit of ‘Mikanken16’ having no collar, no navel opening, and no polyembryony of seeds, as well as having medium surface roughness, medium filling of the core, and medium to late maturity for consumption (typically April), distinguishes it notably from comparative variety ‘Shiranuhi’ (not patented) and having no navel opening, and no polyembryony of seeds, as well as having dark orange surface color (JHS color chart No. 1306), medium surface roughness, and medium to late maturity for consumption (typically April), distinguishes it notably from comparative variety ‘Kiyomi’ (not patented).

Specifically, Table 1 below shows a comparison between the instant variety ‘Mikanken16’ and the female parent ‘Mikanken4’ as follows (evaluation based on averages):

TABLE 1

Comparison between 'Mikanken16' and 'Mikanken4'			
No.	Characteristics	Female parent 'Mikanken4' States	Present variety 'Mikanken16' States
36	Leaf blade: emargination at tip	Present	Absent
99	Fruit surface: roughness	Smooth	Medium
109	Fruit: filling of core	Absent or Very Sparse	Medium
127	Time of maturity of fruit for consumption	Late (May)	Medium to Late (April)

A comparison with the male parent '95-56-25' is not available because '95-56-25' was an old breeding line, whose states of characteristics are unknown and for which there are no long living plant materials.

Table 2 below shows a comparison between the instant variety 'Mikanken16' and comparative varieties 'Shiranuhi' and 'Kiyomi' as follows (average evaluation):

TABLE 2

Comparison between 'Mikanken16' and 'Shiranuhi' and 'Kiyomi'				
No.	Characteristics	Reference variety 'Shiranuhi' States	Reference variety 'Kiyomi' States	Present variety 'Mikanken16' States
87	Fruit: presence of collar	Present		Absent
94	Fruit: presence of navel opening	Occasion- ally Present	Occasion- ally Present	Absent
97	Fruit surface: predominant color(s)		Medium Orange (JHS No. 1605)	Dark Orange (JHS No. 1306)
99	Fruit surface: roughness	Medium to Rough	Smooth to Medium	Medium
109	Fruit: filling of core	Absent or Very Sparse		Medium
126	Seed: poly- embryony	Present		Absent
127	Time of maturity of fruit for consumption	Medium (March)	Medium (March)	Medium to Late (April)

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, which are as nearly true as is reasonable possible to make in a color illustration of this type:

FIG. 1 is a color photograph showing a general view of an illustrative mandarin tree of the variety named 'Mikanken16' bearing fruits.

FIG. 2 is a color photograph showing flowers of 'Mikanken16'.

FIG. 3 is a color photograph showing leaves of 'Mikanken16', together with leaves of comparative varieties 'Kiyomi', and 'Shiranuhi'.

FIG. 4 is a color photograph showing fruits of 'Mikanken16'.

FIG. 5 is a color photograph showing leaves of 'Mikanken16', together with leaves of female parent 'Mikanken4', illustrating the difference between the leaf blades, in that the leaf blades of 'Mikanken16' have absent emargination at the tip instead of present emargination at the tip for 'Mikanken4'.

FIG. 6 is a color photograph showing fruits of 'Mikanken16', together with fruits of comparative variety 'Kiyomi', illustrating the difference between the fruit surface predominant colors, in that the fruit surface predominant color of 'Mikanken16' is dark orange (JHS color chart No. 1306) instead of medium orange (JHS color chart No. 1605) for 'Kiyomi', and the difference between the fruit surface roughnesses, in that the fruit surface roughness of 'Mikanken16' is medium instead of smooth to medium for the fruit of 'Kiyomi'.

FIG. 7 is a color photograph showing the transverse section of a fruit of 'Mikanken16' together with a fruit of female parent 'Mikanken4', illustrating the difference between the filling of the core, in that the fruit of 'Mikanken16' has medium filling of the core, instead of absent or very sparse filling of the core for the fruit of 'Mikanken4'.

Due to chemical and/or digital development, processing and printing, the plants or portions of plants depicted in the photographs may or may not be precisely accurate, when compared to the actual botanical specimens.

DETAILED DESCRIPTION OF THE INVENTION

Table 3 shows the botanical description of the 'Mikanken16' plants evaluated in 2022 (including the comparison with the reference plants 'KIYOMI' and 'SHIRANUI'). Values as provided are averages. The ages of the trees evaluated was 6 years, and the location of the trees evaluated was in Uwajima, Ehime, Japan.

The 'Mikanken16' plants shown on the photographs were grown at Uwajima, Ehime, Japan. The plants were 3-year grown trees after top grafting. The tree was photographed on Dec. 7, 2016, the flowers were photographed on May 7, 2016, the mature leaves photographed on Jul. 26, 2016 and the fruits were photographed on Mar. 23, 2017.

Colors are given according to the J.H.S. (Japan Horticultural Society) Color Chart.

BOTANICAL DESCRIPTION

TABLE 3

Botanical description of 'Mikanken16'			
No.	Characteristics	States	Values
1	Ploidy	Diploid	
2	Tree: growth habit	Spreading	
3	Tree's vigor	Strong	
4	Tree's density of canopy	Medium	
5	Tree's mature height		2.75 m
6	Tree's mature spread		2.95 m
7	Tree's trunk diameter at a specified height above ground		52.3 mm at 10 cm above grafting area
8	Tree's bark texture	Rough	
9	Tree's bark color	Green brown	JHS color chart No. 2509
10	Branch length		12.6 cm
11	Branch diameter		2.8 mm
12	Branch crotch angle		50°
13	Branch bark texture	Smooth	
14	Branch bark color	Dark yellow green	JHS color chart No.3508
15	Tree: density of spines	Intermediate	
16	Number of spines		2.1

TABLE 3-continued

Botanical description of 'Mikanken16'			
No.	Characteristics	States	Values
17	Total leaf bearing nodes		6.5
18	Location of spines	On branches	
19	Length of spines		1.7 mm
20	Spine diameter		0.5 mm
21	Spine shape		conical
22	Spine color	Dark yellow green	JHS color chart No. 3508
23	Leaf type	Individual leaf	
24	Leaf blade: length (apical leaflet in case of compound leaf)	Medium	7.3 cm
25	Leaf blade: width (apical leaflet in case of compound leaf)	Medium	4.3 cm
26	Leaf blade: ratio length/width (apical leaflet in case of compound leaf)	Very small	1.7
27	Leaf blade: shape in cross section (apical leaflet in case of compound leaf)	Intermediate: curved inwards	
28	Leaf blade: twisting	Intermediate	
29	Leaf blade: blistering	Absent or Weak	
30	Leaf blade: color	Medium green	JHS color chart No.3509
31	Leaf or leaflet: color of upper leaf surface	Dark yellow green	JHS color chart No.3509
32	Leaf or leaflet: color lower leaf surface	Dark yellow green	JHS color chart No.3507
33	Leaf blade: undulation of margin	Absent or Weak	
34	Leaf blade: incisions of margin	Crenate	
35	Leaf blade: shape of apex	Acute	
36	Leaf blade: emargination at tip	Absent	
37	Single or compound leaves?	Single leaf	
38	Base descriptor of leaf and/or leaflet	Acute	
39	Texture of top surface of leaf and/or leaflet	Smooth	
40	Texture of bottom surface of leaf and/or leaflet	Smooth	
41	Petiole: length	Medium	1.9 cm
42	Petiole diameter		1.9 mm
43	Petiole texture (both surfaces)		smooth
44	Petiole color (both surfaces)	Dark yellow green	JHS color chart No.3509
45	Petiole: presence of wings	Present	
46	Petiole wing shape	Vestigial	
47	Petiole wing length		8.0 mm
48	Petiole wing texture (both surfaces)	Smooth	
49	Petiole wing color (both surfaces)	Upper and lower: dark yellow green	JHS color chart No. 3508 (upper), 3509 (lower)
50	Varieties with petiole wings present only: Petiole: width of wings	Narrow	2.0 mm
51	Flower: length of petal	Medium	18.4 mm
52	Flower: width of petal	Very Broad	8.3 mm
53	Flower: ratio length/ width of petal	Small	2.2
54	Flower: length of stamens	—	10.3 mm
55	Flower depth		2.2 cm
56	Flower diameter		3.5 cm
57	Petal number per flower		5
58	Petal shape	Spindle-shaped	
59	Petal apex	Acute to obtuse	
60	Petal margin	Slightly curved	
61	Petal base descriptors	Truncate	
62	Petal color (both surfaces)	White (both side)	JHS color chart No. 3301

TABLE 3-continued

Botanical description of 'Mikanken16'			
No.	Characteristics	States	Values
63	Sepal number per flower		5
64	Sepal shape	Lanceolate	
65	Sepal apex	Acute	
66	Sepal color (both surfaces)	Light yellow green (both side)	JHS color chart No. 3304
67	Pistil number per flower		1
68	Stigma color	Light yellow	
69	Stigma style	Round	
70	Stigma length		0.2 mm
71	Stigma color	Bright orange yellow	JHS color chart No. 2205
72	Anther: color	Medium yellow	JHS color chart No. 2203 (>14 ≤ 21%)
73	Anther: viable pollen	Low	
74	Amount of pollen produced	Very few	
75	Infructescence: clustering of fruits	Present	
76	Number of fruits per cluster		1
77	Fruit: length	Long	7.7 cm
78	Fruit: diameter	Large	8.7 cm
79	Fruit: ratio length/diameter	Medium	1.13
80	Fruit: position of broadest part	At Middle	
81	Fruit: shape in transverse section	Circular	
82	Fruit: general shape of proximal part (excluding neck, collar and depression at stalk end)	Flattened	
83	Fruit: presence of neck	Absent	
84	Fruit: presence of depression at stalk end	Present	
85	Fruit: depth of depression at stalk end	Shallow	2.5 mm
86	Fruit: presence of constriction at stalk end	Absent	
87	Fruit: presence of collar	Absent	
88	Fruit: general shape of distal part (excluding nipple, bulging of navel and depression at distal end)	Flattened	
89	Fruit: presence of depression at distal end	Present	
90	Fruit: depth of depression at distal end	Shallow	1.7 mm
91	Fruit: presence of areola	Absent	
92	Fruit: diameter of stylar scar	Very small	1.4 mm
93	Fruit: persistence of style	None	
94	Fruit: presence of navel opening	Absent	
95	Fruit: presence of radial grooves at distal end	Absent	
96	Fruit: expression of radial grooves at distal end	Absent or Very Weak	
97	Fruit surface: predominant color(s)	Dark orange	JHS color chart No. 1306
98	Fruit surface: glossiness	Medium	
99	Fruit surface: roughness	Medium	
100	Fruit surface: diameter of oil glands	All about the same diameter	1.5 mm
101	Fruit rind: adherence to flesh	Weak	
102	Fruit rind: strength	Weak	
103	Fruit rind: conspicuousness of oil glands on inner surface	Absent or Weakly Conspicuous	
104	Fruit rind thickness		3.5 mm
105	Fruit rind ease of peeling	Somewhat easy	
106	Fruit: color of albedo	Light yellow	JHS color chart No. 1905
107	Fruit: density of albedo	Medium	
108	Fruit: main color of flesh	Dark orange	JHS color chart No. 1306
109	Fruit: filling of core	Medium	
110	Fruit: presence of rudimentary segments	Absent or Very Weak	
111	Number of segments per fruit		12

TABLE 3-continued

Botanical description of 'Mikanken16'			
No.	Characteristics	States	Values
112	Fruit: strength of segment walls	Medium	
113	Fruit; conspicuousness of juice vesicle walls	Medium	
114	Fruit: presence of navel (viewed internally)	Absent or Very Rare	
115	Fruit: juiciness	High	
116	Fruit juice: total soluble solids	High	13.1 Brix
117	Fruit juice: acidity	Medium	1.02
118	Juice sac length		8.4 mm
119	Juice sac width		2.8 mm
120	Juice color	Dark orange	JHS color chart No. 1306
121	Fruit: strength of fiber	Medium	
122	Fruit: number of seeds (controlled manual self-pollination)	Absent or Very Few	0
123	Fruit: number of seeds (open pollination)	Absent or Very Few	0
124	Fruit weight		233.21 g

TABLE 3-continued

Botanical description of 'Mikanken16'			
No.	Characteristics	States	Values
125	Fruit productivity: amount of fruit produced per tree per season		35 kg/tree
126	Seed: polyembryony	Absent	
127	Time of maturity of fruit for consumption	Medium to Late	April
128	Fruit: parthenocarpy	Present	
129	Plant: self-incompatibility	Present	

Other features of the plant are as follows:
Disease and pest resistance: Normal resistance was observed for pests and diseases in Uwajima, Ehime, Japan.
Tree hardiness: USDA Hardiness Zone 9a-9b (until −3° C.).
Fruit shipability: Medium.
Fruit storageability: Medium.
The invention claimed is:
1. A new and distinct variety of *Citrus* plant named 'Mikanken16', substantially as described and illustrated herein.

* * * * *

Fig.1



Fig.2

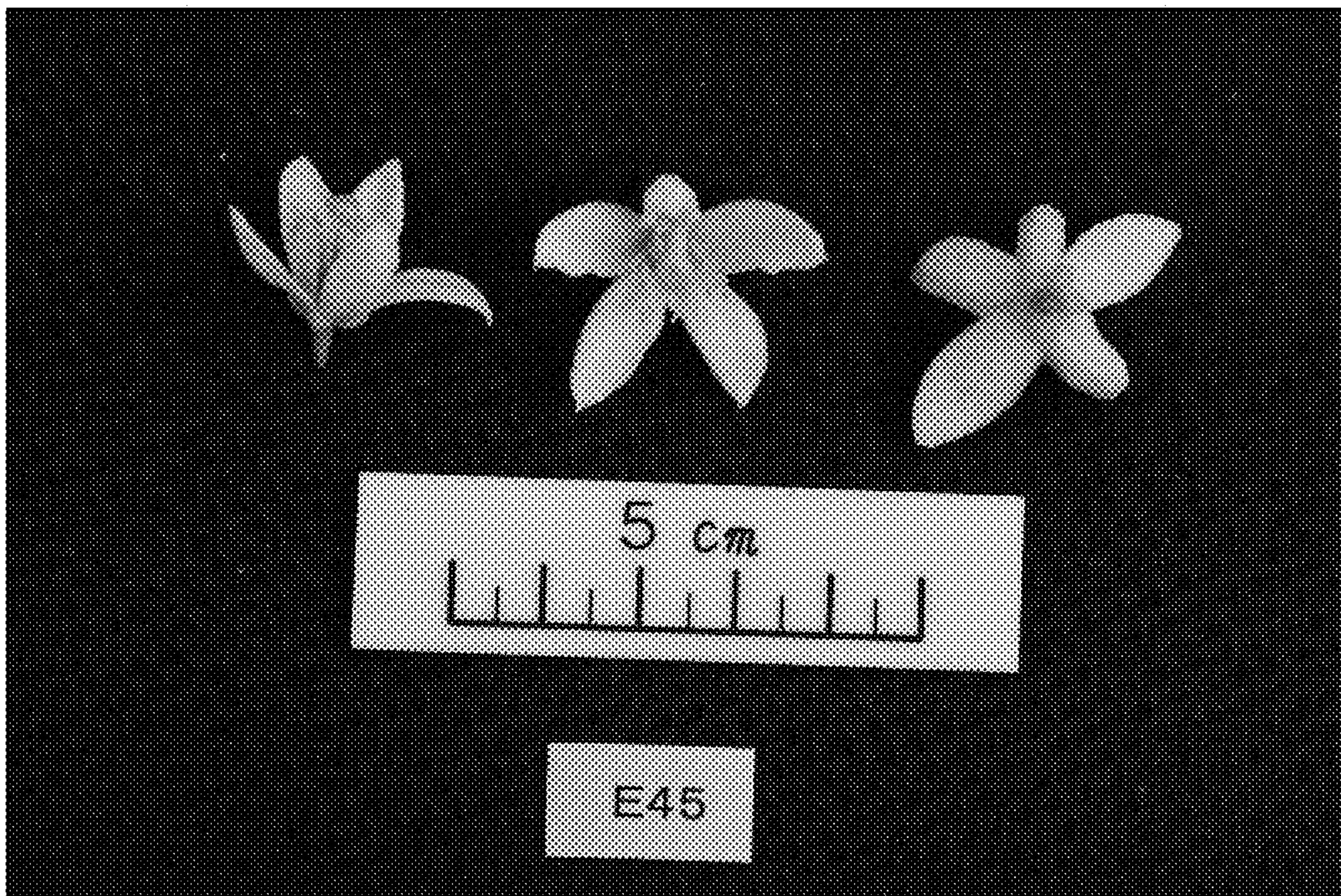


Fig 3

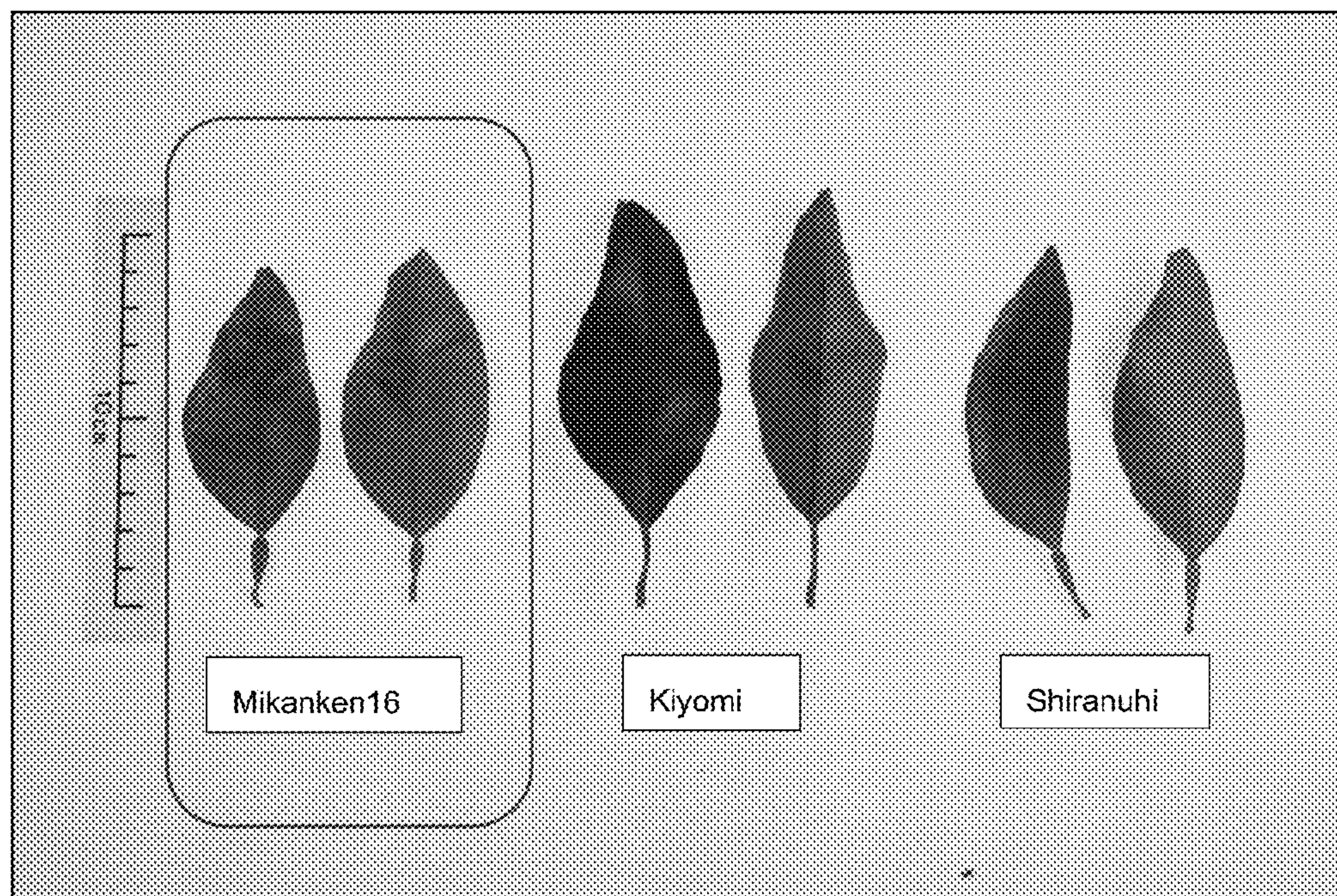


Fig.4

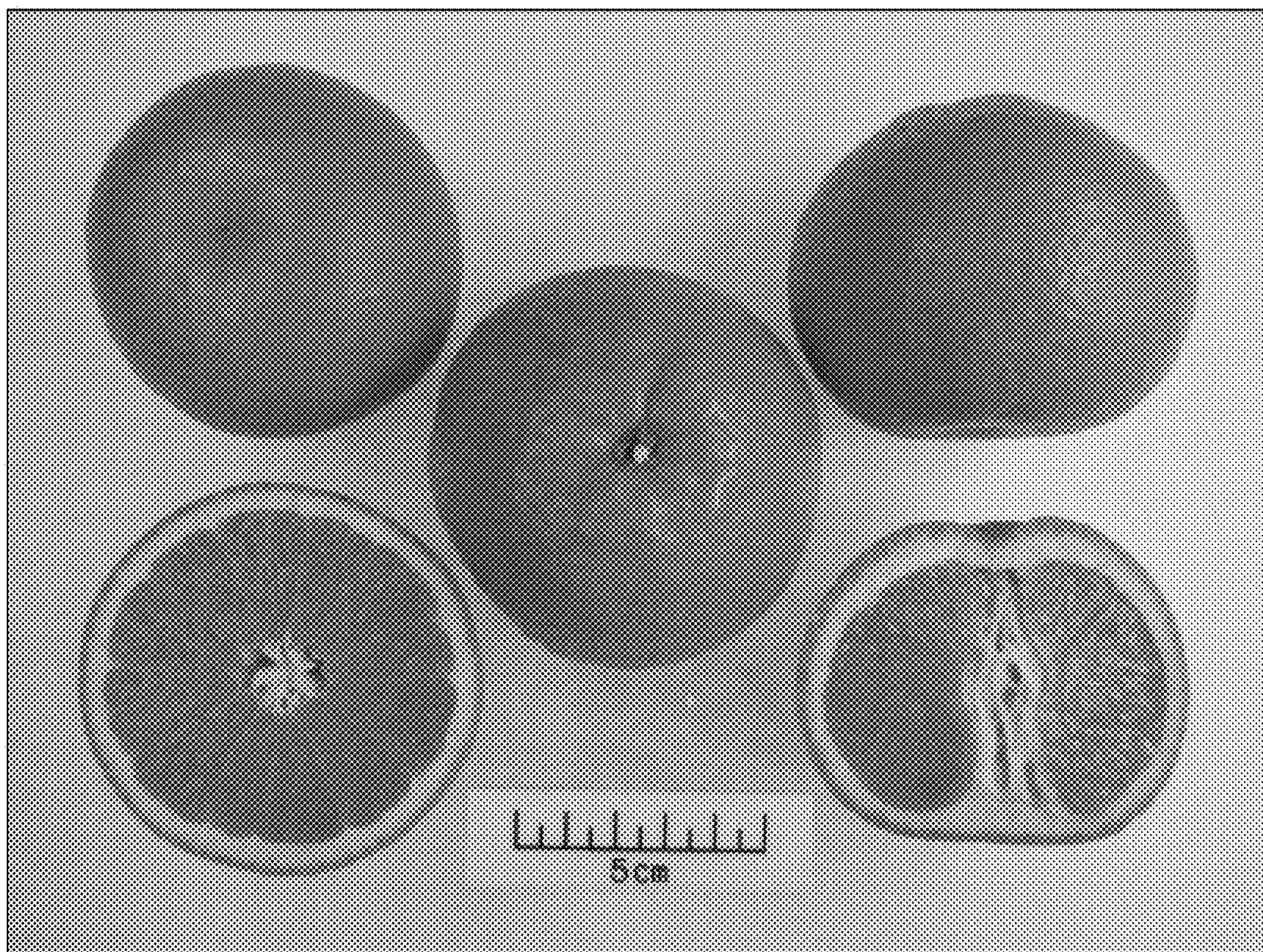


Fig.5

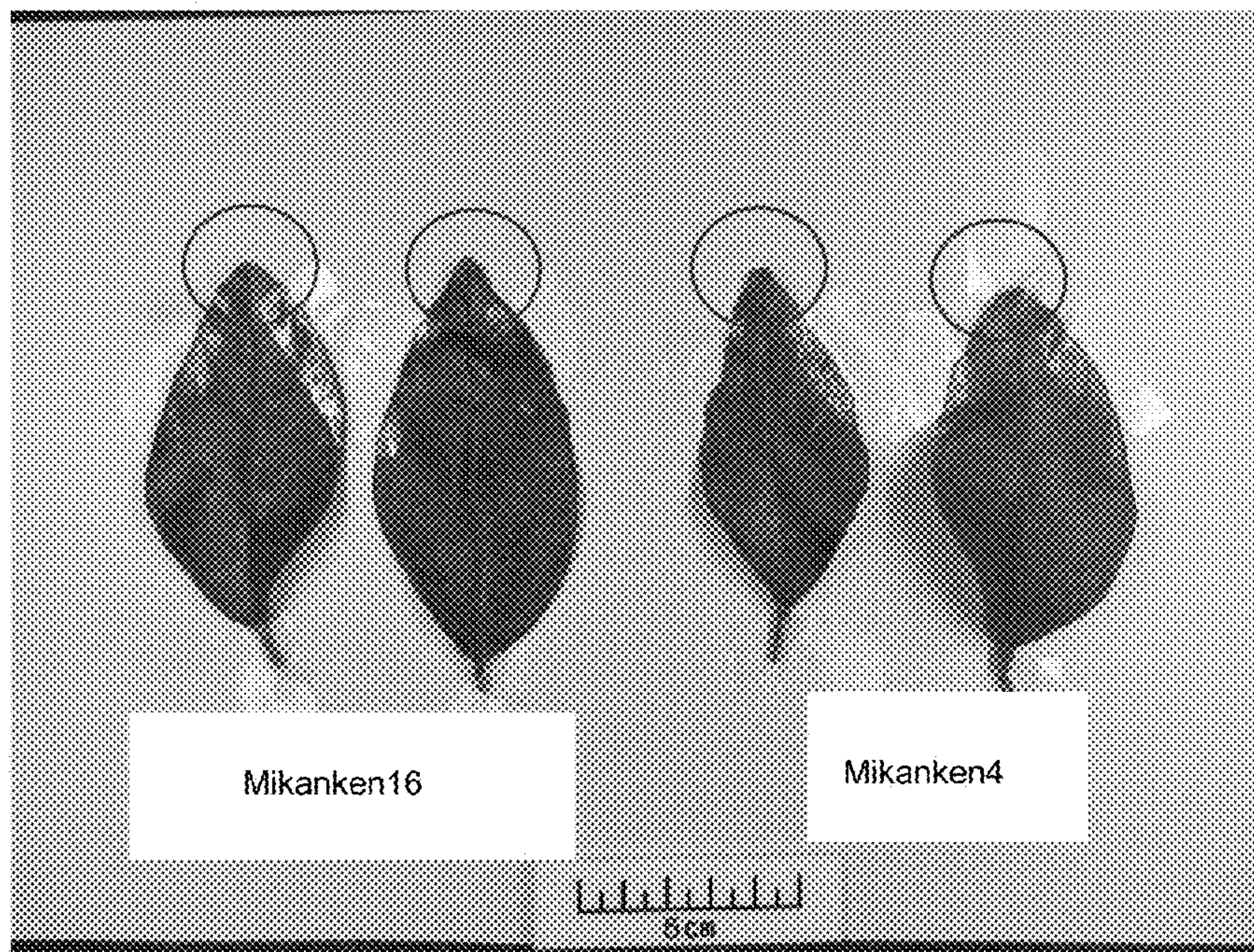
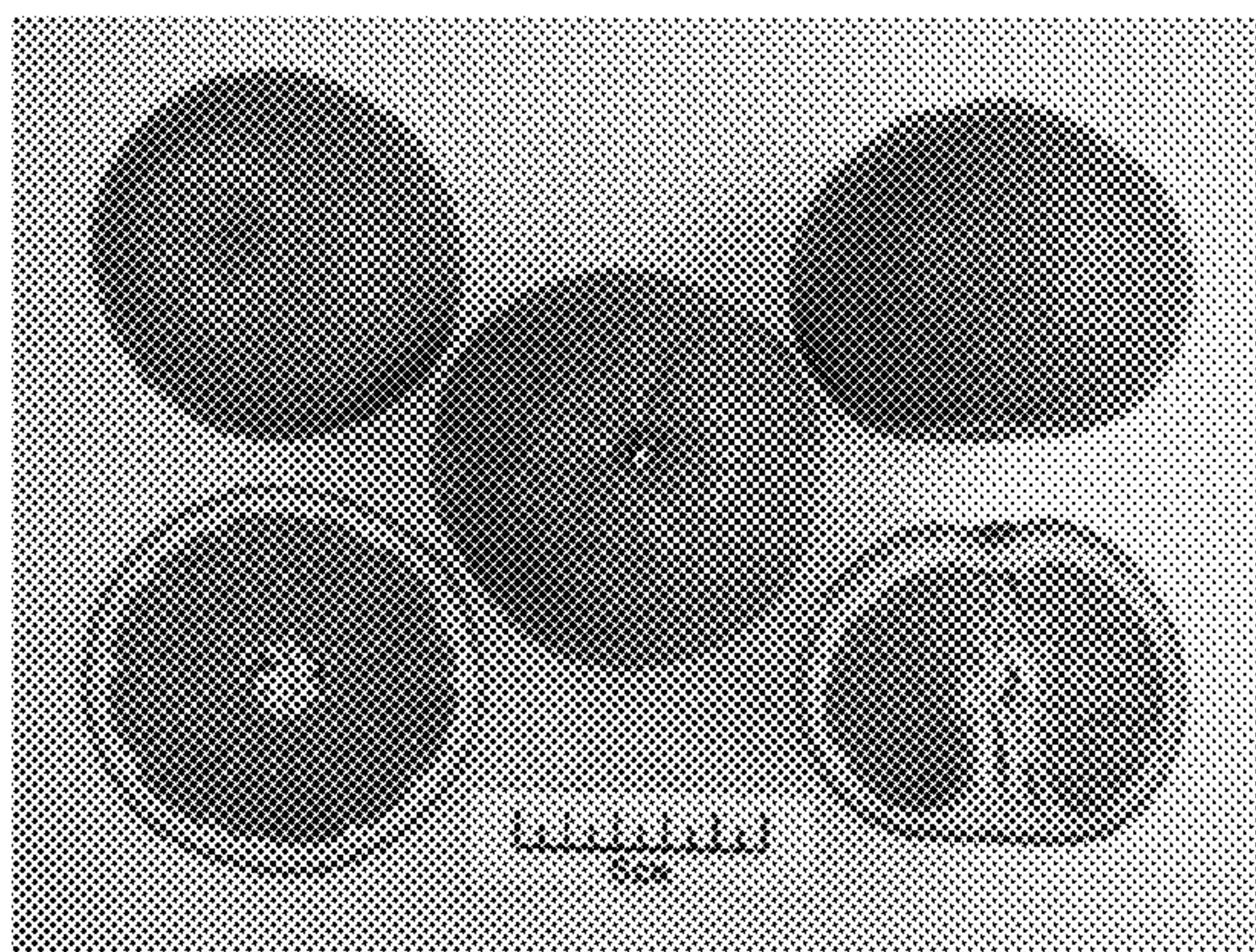
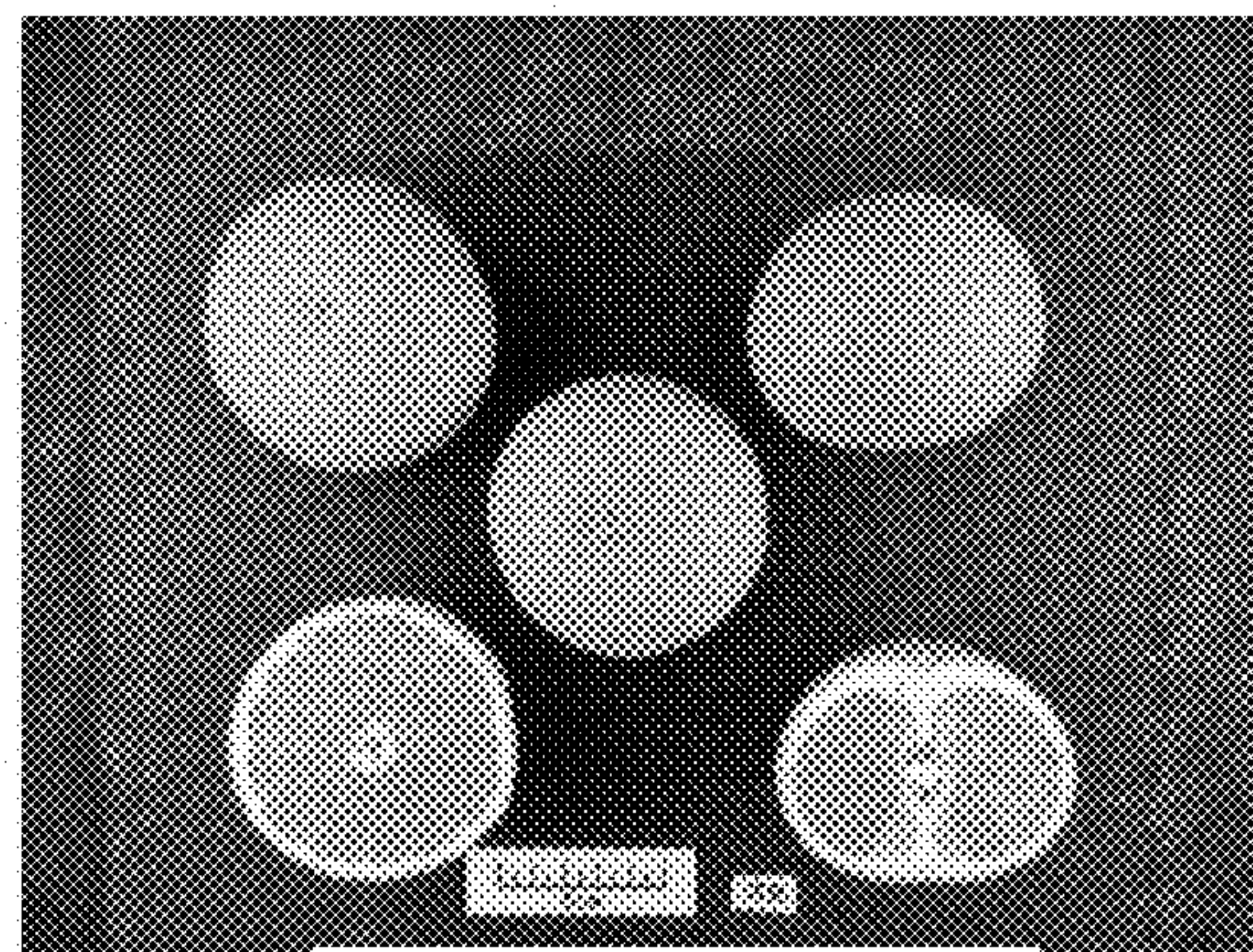


Fig.6

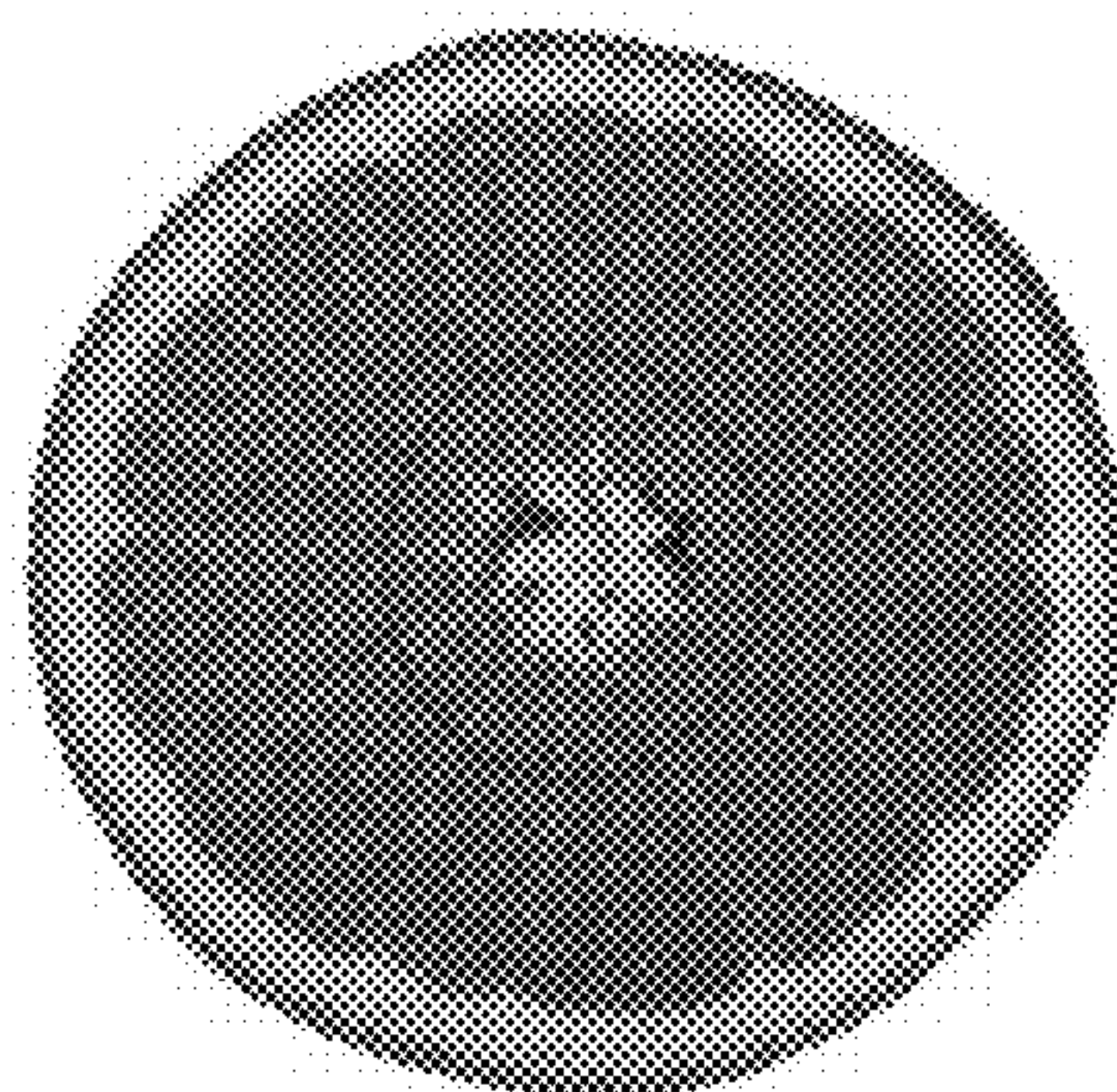


Mikanken16

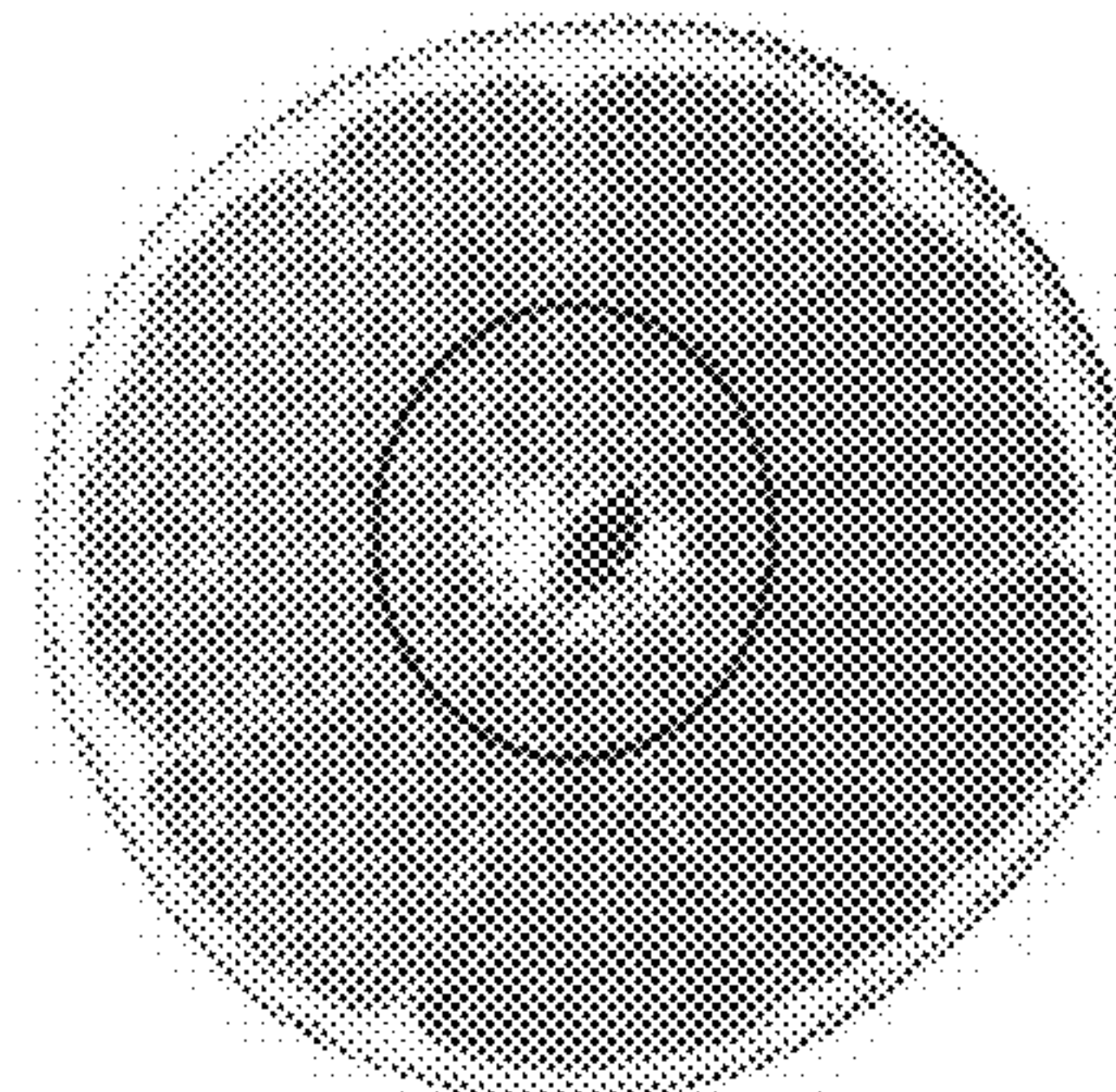


Kiyomi

Fig.7



Mikanken16



Mikanken 4