

[54] APPLE ROOTSTOCK - CEPILAND VARIETY
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[52] U.S. Cl. Plt./34
[58] Field of Search Plt./34, 35

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& Scheiner

[57] ABSTRACT

The invention relates to a new and distinct virus-free
variety of apple tree useful as a rootstock for supporting
grafted apple varieties, particularly for planting of
hedgerows of apple trees. The new variety originated as
a clone of heat treated Paradis-Jaune-de-Metz selection,
M9B, also called M9 INFEL. It has been found that
there is better root lignification as well as generally
several points of root issue on the clones as well as an
increased vigor to the cultivars.

5 Drawing Sheets

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The present invention relates to a new and distinct
mutant of "M9" apple rootstock material, which has
been treated and indexed to be virus-free rootstock
apple tree CEPILAND which was selected from a test
stool bed planting at the Lanxade Centre of the Centre
Technique Interprofessionnel des Fruits et Legumes,
Paris, France based on its outstanding rooting and
dwarfing capacity differences.
In 1964, the English Paradis-Jaune-de-Metz selection,
M9, was introduced in the Lanxade Centre. In 1968,
during the development of heat treatment at the Centre,
the M9 was one of the first clones to be regenerated by
this technique. It was then called the M9 B and after-
wards the M9 INFEL.
In order to supply French nurserymen as soon as
possible and enable fruit growers to dispose of virus-
free M9, this clone was propagated by grafting, on
apple tree seedlings, and prepropagated, by the grafted
- earthed-up layering technique, in the Centre. During
this prepropagation phase, 1970-1973, year after year,
this selection was found to have a poor aptitude to root
and issue shoots in stool beds. This phenomenon was
certainly emphasized by the fact that the stock came
from grafts on seedlings.
Several techniques were then tried in order to im-
prove the production of layers: installation of bands in
order to "compress" the twig at the onset of growth,
planting by layering of stock, early and repeated earth-
ing. Some of these techniques such as layered planting,
gave better results. However, the production did not
exceed 3 to 4 marketable plants per stock and difficulties
were encountered during the mechanization of the har-
vest of layers.
It was therefore obvious that the M9 2 selection, as
well as the original M9 a clone, presented difficulties in
propagation. This defect is genetic. In 1974, in collabo-
ration with the INRA and the profession, the multipli-
cation of the M9 B was halted and a decision was made
to set up a selection program among the Paradis-Jaune-
de-Metz population found in France.
During 1974, several contacts were made with
French propagators specializing in the production of
rootstocks. In addition, visits were made to the main

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plots of Paradis-Jaune-de-Metz stool beds. During the
following winter, 425 types were found and underwent
experiments at Lanxade.
As of 1975, three series of studies were simulta-
neously carried out on these mutant plant material:
Health control by indexing of the materials introduced;
The 5 lots were found to be infected with virus diseases,
Spy Decline and CLS;
Establishing a trial on behavior during layering — Win-
ter 1974-1975:
Trial A — Lanxade Centre, 30 stocks per clone, 2 repe-
titions; and
Preparation of grafting in a nursery and trial on behav-
ior in an orchard — Winter 1976-1977;
Trial B — Lanxade Centre — Balandran Centre, Va-
lence Centre, 9 trees per clone, 2 repetitions.
In 1976, following the first observations of the test in
a stool bed, Trial A, treatment by heat treatment was
carried out on the original lots and 10 healthy clones, on
the basis of 2 clones from each of the 5 lots, were ob-
tained.
After rapid asexual propagation in a greenhouse and
then outdoors, by grafting on seedlings, and new con-
trols of the state of health by indexing, these 10 clones
were compared in different trials beginning 1978, which
trials comprised:
Trial on behavior during layering — Winter 1977-1978,
Trial C — Lanxade, 30 stocks per clone, 2 repetitions;
Trial on behavior in a nursery of bench grafting in 1978
— Trial D — Lanxade, 60 plants per clone; and
Trial on behavior in an orchard — Winter 1978-1979,
Trial E — Lanxade-Balandran-Valence, 8 trees per
clone, 2 repetitions.
After two years of observations in a stool bed, Trial
C, 6 clones were selected in 1979 for their better apti-
tude to be propagated by layering: they are clones F, G,
H, J. L and M. In 1981, after two additional years of
study of the behavior during layering, Trial C, and after

the initial results on the behavior in an orchard, Trial E, a selected mutant, namely Clone F, called CEPILAND, was retained.

Moreover, at the same time as these studies were carried out in France on the Paradis-Jaune-de-Metz, several creations were introduced at Lanxade for comparative purposes:

from ENGLAND (East Malling Station) M9 A, in 1964, and M9 EMLA, and 1975;
from BELGIUM, Gorseme Centre: 6 clones comprising the 2 selections KL 10 and KL 29, in 1974;
from the NETHERLANDS, Wilhelminadorp Stations, T 337, T 338, T 339 and T 340, in 1976;
from GERMANY, BURGMEER Nurseries in Straelen, SP 1, SP 2, SP 10 and SP 18, in 1977; and
from FRANCE, INRA Station in Versailles, regeneration by heat treatment of selections M9-3, M9-10, M9-31 bis and M9-35, work by Fleckinger, and selection of 8 clones numbered Lx 174 to Lx 181, in 1977.

As a rootstock, this mutation is virus-free and supports vigorous growth of the scion cultivar, making a "hedgerow" tree, and the scion cultivar shows a sharp increase, up to 30% in Valence Centre with trial of GOLDEN×972 Variety, in the total production after 7 years of most healthy clones as compared to the virus infected clone M9.

The following is a detailed description of the new cultivar CEPILAND. Accompanying photographs depict fruit characteristics, tree habit and leaf characteristics.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the fruit of the new variety;

FIG. 2A shows the adaxial surfaces of the leaves of the new variety;

FIG. 2B shows the abaxial surfaces of the leaves of the new variety;

FIGS. 3A and 3B show the general appearance of the appearance of CEPILAND twigs as opposed to M9 twigs;

FIG. 4 shows CEPILAND rooting in stoolbeds;

FIG. 5 shows the root system for scions of GOLDEN×972 variety grafted on CEPILAND;

FIG. 6 shows unopened flowers of the new variety; and

FIG. 7 shows fully open flowers of the new variety.

The first photograph, FIG. 1, shows the fruit characteristics of the new variety. Short to medium length stems, fruit small, under 100 g., half-raised and irregular shape with a very narrow and shallow ocular cavity, a very closed eye, yellow green color with the presence of red on one cheek, a smooth and fairly waxy skin, and low acidity.

Asexual propagation of this new cultivar by layering, as has been done at the Lanxade Centre, France, has shown that these attributes are transmitted through succeeding asexual propagations.

FIGS. 2A and 2B show respectively the adaxial and abaxial surfaces of the leaves of the new variety, of very small size, having a length of lamina of about 76 mm and a width of lamina of about 54 mm and length of petiole of about 27.3 mm.

The third photograph, FIG. 3, shows the general appearance of CEPILAND twigs as opposed to M9 INFEL twigs.

The fourth photograph, FIG. 4, shows CEPILAND rooting in stool beds.

The fifth photograph, FIG. 5, shows layers of several Paradis Jaune-de-Metz selections at harvest, namely M9 INFEL; KL 19, LANCEP; and CEPILAND.

FIG. 6 shows two rows of flowers, which when viewed from left to right show progressive opening of the flowers of CEPILAND and the deep pink color of the unopened flower.

FIG. 7 shows two rows of flowers of CEPILAND and wherein viewed from left to right the two flowers in the lower row are progressively open more than in FIG. 7 and the remaining flowers in the lower row are viewed from the pedicel, and when so viewed still exhibit the deep pink color of the unopened flower and wherein the top row of open flowers will be seen to be characterized by a pinkish white color when viewed from the stamens and anthers.

The new variety is further characterized as follows:

FRUIT

Observations of the characteristics of the fruit of the new variety, based on a sample comprising 20 apples, gathered from an orchard comprising the new variety, without scion cultivars grafted thereon, were gathered in 1981. The sampled fruit have characteristics of early ripening, latter half of July, small size, e.g. under 100 g., with a half raised and irregular shape with a very narrow and shallow ocular cavity, a very closed eye, short to medium length stem, yellow-green color with the presence of red on one cheek, a smooth and fairly waxy skin and low acidity. These observations are similar to those mentioned in *A New Stock For Grafting Of Apple Trees: Paradis Jaune*, Review Horticole, 1879, pp. 436-437.

TREE

Hedgerow tree which reaches its final volume in 4 to 5 years with a filiform twig and many feathers. The tree has an absence of known diseases, has an aptitude to propagation by layering superior to that of other virus-free clones currently available, 2 to 3 times more marketable prints than M9 clones.

The agronomic behavior of the new variety in orchards is such that there is better homogeneity, since it is a clonal selection and no longer a population. The rootstock of the new variety has better compatibility with grafted varieties, with the grafted variety having 10 to 20% increased vigor and an increase in productivity of 10 to 30%.

LEAF AND TWIG CHARACTERISTICS

Physiological and morphological comparison tests have been carried out with a well known and characteristic type M9, and M9 EMLA. The morphological differences in the leaves and twigs between CEPILAND and M9 EMLA are indicated in Table 1.

TABLE 1

	LEAF (Average)			
	Length of lamina L(mm)	Width of lamina l(mm)	L + l (mm)	Length of petiole (mm)
ROOTSTOCK				
M9 EMLA	101.7	63.8	165.5	32.5
CEPILAND	76.0	54.0	130.0	27.3
	TWIG (Average)			% twigs with feathers or
	Height	Diameter	Internode	

TABLE 1-continued

ROOTSTOCK	(cm)	(mm)	(mm)	fruit spurs
M9 EMLA	50 to 70	8.7	16.4	10 to 20%
CEPILAND	100 to 120	6.5	19.9	40 to 50%

The physiological differences in nursery are shown in Tables 2 and 3.

SUCCESS IN HARDWOOD CUTTING

Data in respect of cuttings of 25 cm in length, the base of which were soaked in an IBA solution at 1000 ppm for one minute, then powdered with talc and captane and immediately put into place in mid-October are shown in Table 2.

TABLE 2

ROOTSTOCK	PERCENTAGE OF ROOTING
M9 EMLA	2%
CEPILAND	54%

APTITUDE FOR STOOLBED LAYERING

Table 3 shows the number of marketable layers per strain of the new variety CEPILAND vis-a-vis M9 of which it is a mutant.

TABLE 3

ROOTSTOCK	From the 2nd to the 4th years (annual average/ 3 years)	From the 5th to the 11th years (annual average/7 years)
M9 EMLA	1,4	6
CEPILAND	6,1	15,7

TWIG

There is a high correlation between the size of the leaf and the twig characteristics, i.e., clone with very small leaves has a very filiform twig with very many feathers and is very tall. The clone of the new variety has a very filiform twig with very many feathers and results in a tall twig. The average twig of the new variety has a height of about 100 to 120 cm, a diameter of about 6.5 mm, an internode distance of about 19.9 mm, and the percentage of twigs with feathers or fruit spurs is about 40 to 50% of plants over 5 years old.

LEAVES

Measurements of the size of the lamina and the petiole, on 50 leaves collected in August, between the 5th and 10th merithal from the end of the new twig growth, for 2 years, was statistically interpreted as the sum L + 1, i.e., length + width, of the lamina. The average length of lamina "L" of the average leaf is about 76 mm and the average width of lamina was about 54 mm. The leaf L + 1 average of the new variety was thus found to be about 130 mm, and the average length of petiole about 27.3 mm. The leaf is of a very small general appearance.

COMPARISON OF NEW VARIETY CEPILAND AND M9 EMLA
CEPILAND

Brief Description:

- Vigor.—Strong.
- Habit.—Fairly Spreading.
- Appearance of branching.—Very filiform.

- Internodes.—Long.
- Expectation: Fairly fruitful the early years.
- Leaf.—Small.
- Roots.—Brittle.
- Change.—Fairly sensitive to draught.

Behavior in orchard:

- Compatibility.—Fairly good (presence of a graft ridge).
- Level of vigor.—Average to weak (+15 to +30% of ordinary M9).
- Setting of fruit.—Very good.
- Productivity.—Good, isometric (+15 to +30% of ordinary M9).
- Characteristics of the fruit.—Good caliber, improved color and early maturity.
- Anchoring.—Weak (staking necessary).
- Adaptation to sun.—Average (in fertile healthy soil).

Multiplication capability:

- Layering.—Good.
- Propagation of cuttings.—Average.
- Micropropagation.—Average.
- Behavior in the grafting nursery.—Fairly good.

Sensitivities:

- Gnarls.—Slightly sensitive.
- Shoots.—Average sensitivity.
- Root suffocation.—Average sensitivity.
- Limestone.—Slight to average sensitivity.
- Winter cold.—Sensitive.
- Phytophthora.—Slightly sensitive.
- Root rot.—Average sensitivity to sensitive.
- Crown gall.—Sensitive.
- Fire blight bacteria.—Average sensitivity to sensitive.
- Virus.—Slightly sensitive.
- Wooly aphid.—Sensitive.
- Fungi.—Sensitive.
- Rabbits.—Sensitive.

M9 EMLA

Brief description:

- Vigor.—weak.
- Habit.—Semi-erect.
- Appearance of branching.—Fairly stocky.
- Internodes.—Average to fairly short.
- Expectation.—Few number of fruit.
- Leaf.—Large.
- Roots.—Brittle.
- Change.—Fairly sensitive to draught.

Behavior in orchard:

- Compatibility.—Fairly good (presence of a graft ridge).
- Level of vigor.—Average (+15 to +30% of ordinary M9).
- Setting of fruit.—Very good.
- Productivity.—Good, isometric (+15 to +30% of ordinary M9).
- Characteristics of the fruit.—Good caliber, improved color and early maturity.
- Anchoring.—Weak (staking necessary).
- Adaptation to sun.—Average (in fertile healthy soil).

Multiplication capability:

- Layering.—Average.
- Propagation of cuttings.—Weak.
- Micropropagation.—Mediocre.
- Behavior in the grafting nursery.—Fairly good.

Sensitivities:

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Gnarls.—Slightly sensitive.
Shoots.—Slight sensitivity.
Root suffocation.—Average sensitivity.
Limestone.—Slight to average sensitivity.
Winter cold.—Sensitive.
Phytophthora.—Slightly sensitive.
Root rot.—Average sensitivity to sensitive.
Crown gall.—Sensitive.
Fire blight bacteria.—Average sensitivity to sensi-
tive.
Virus.—Slightly sensitive.

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Wooly aphis.—Sensitive.
Fungi.—Sensitive.
Rabbits.—Sensitive.

5 We claim:
1. A new and distinct virus-free variety of apple tree
useful as an improved rootstock for apple cultivars,
substantially as illustrated and described, which when
used as such rootstock has better compatibility with all
commercial varieties, facilitates more vigorous growth
and increases productivity of the grafted variety.
* * * * *

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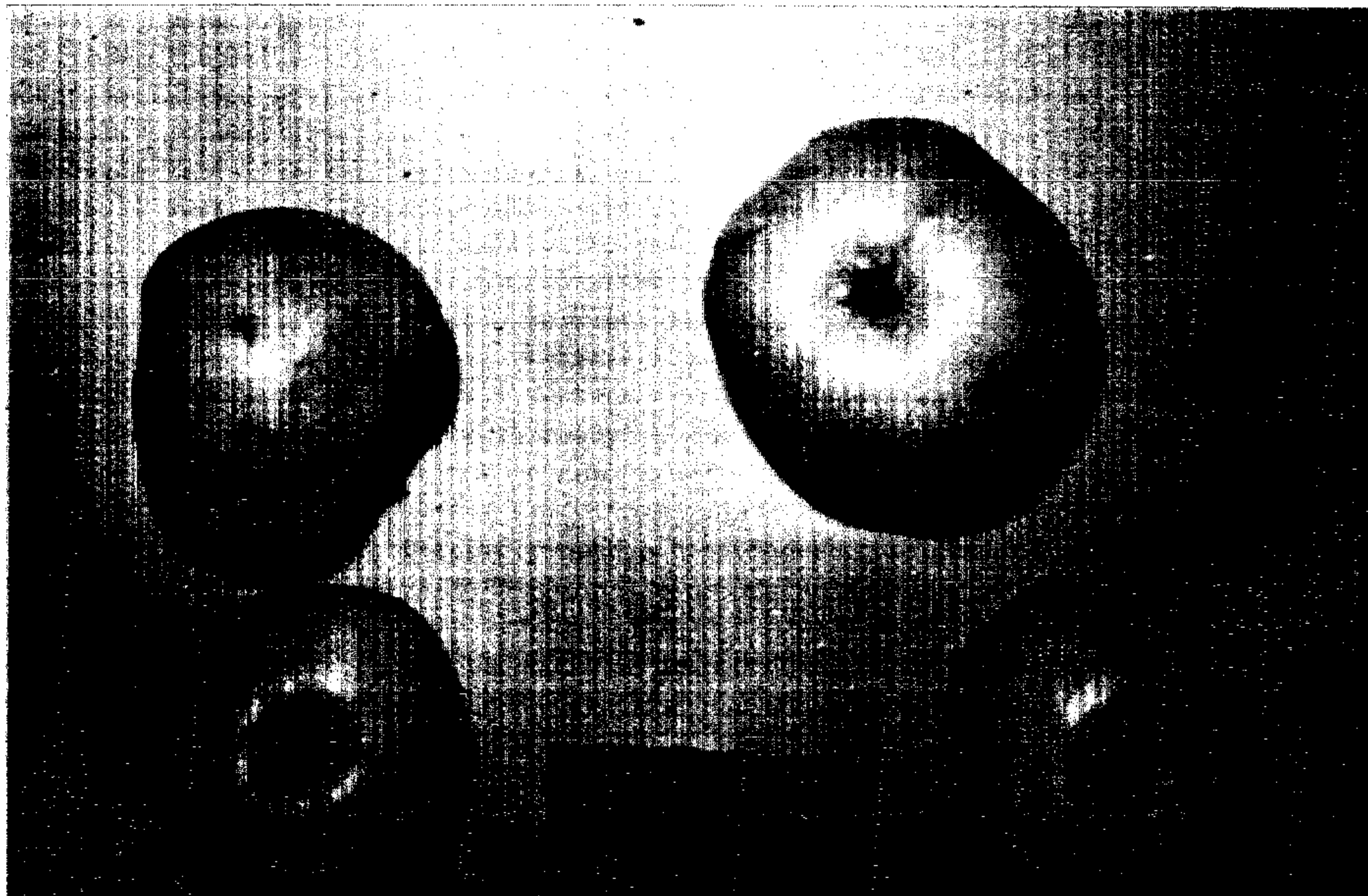


FIG.1.

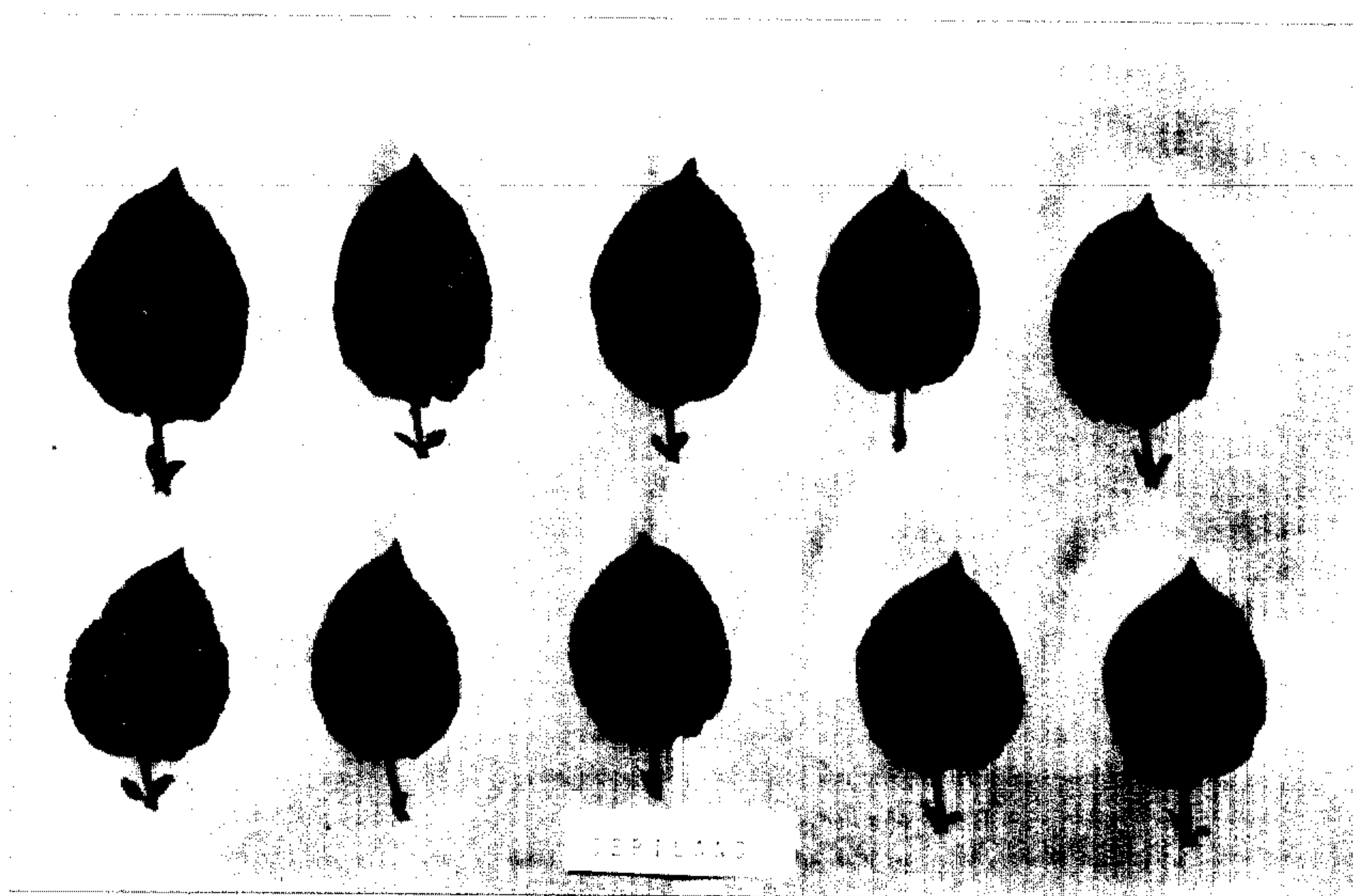


FIG. 2A.

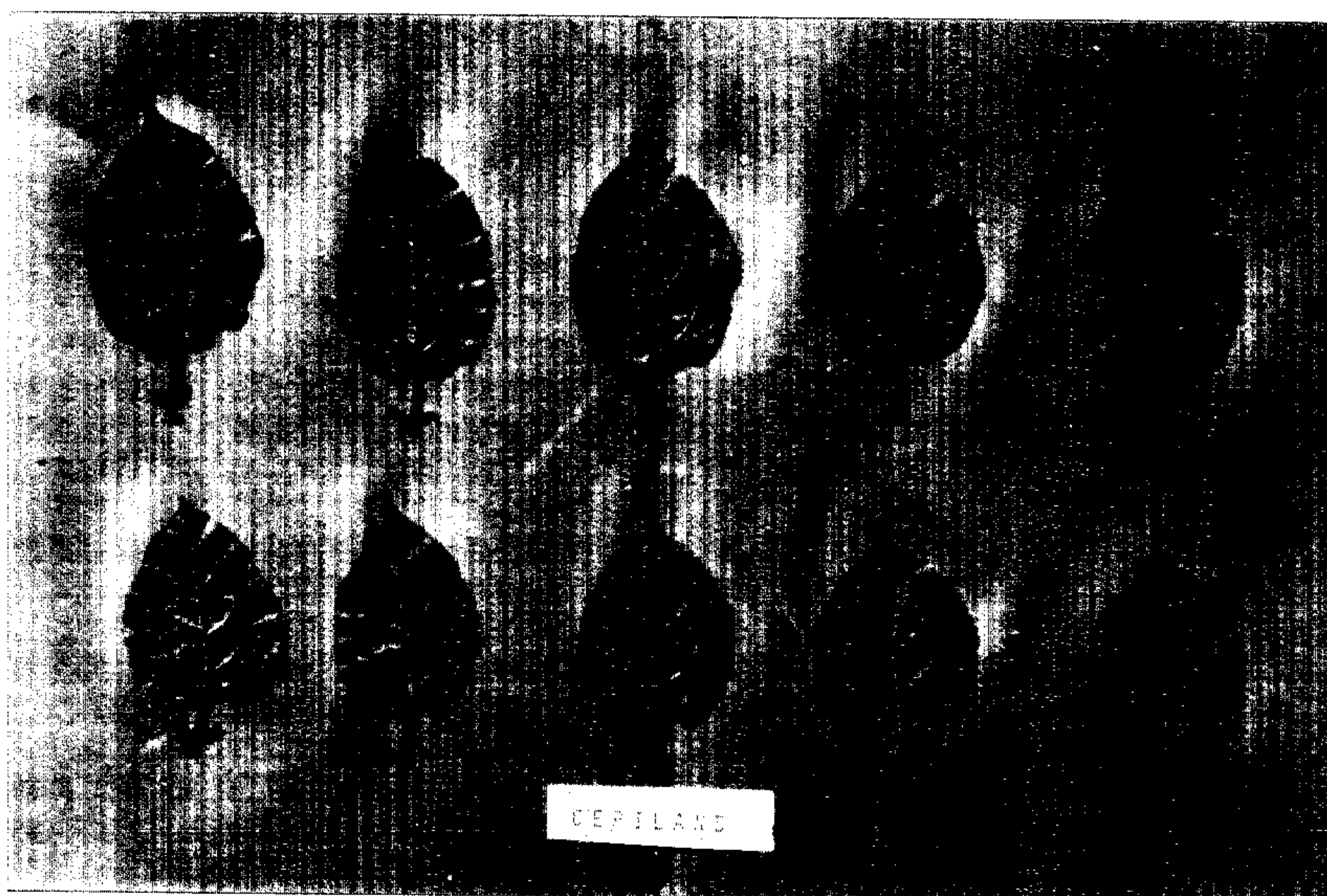


FIG. 2B.

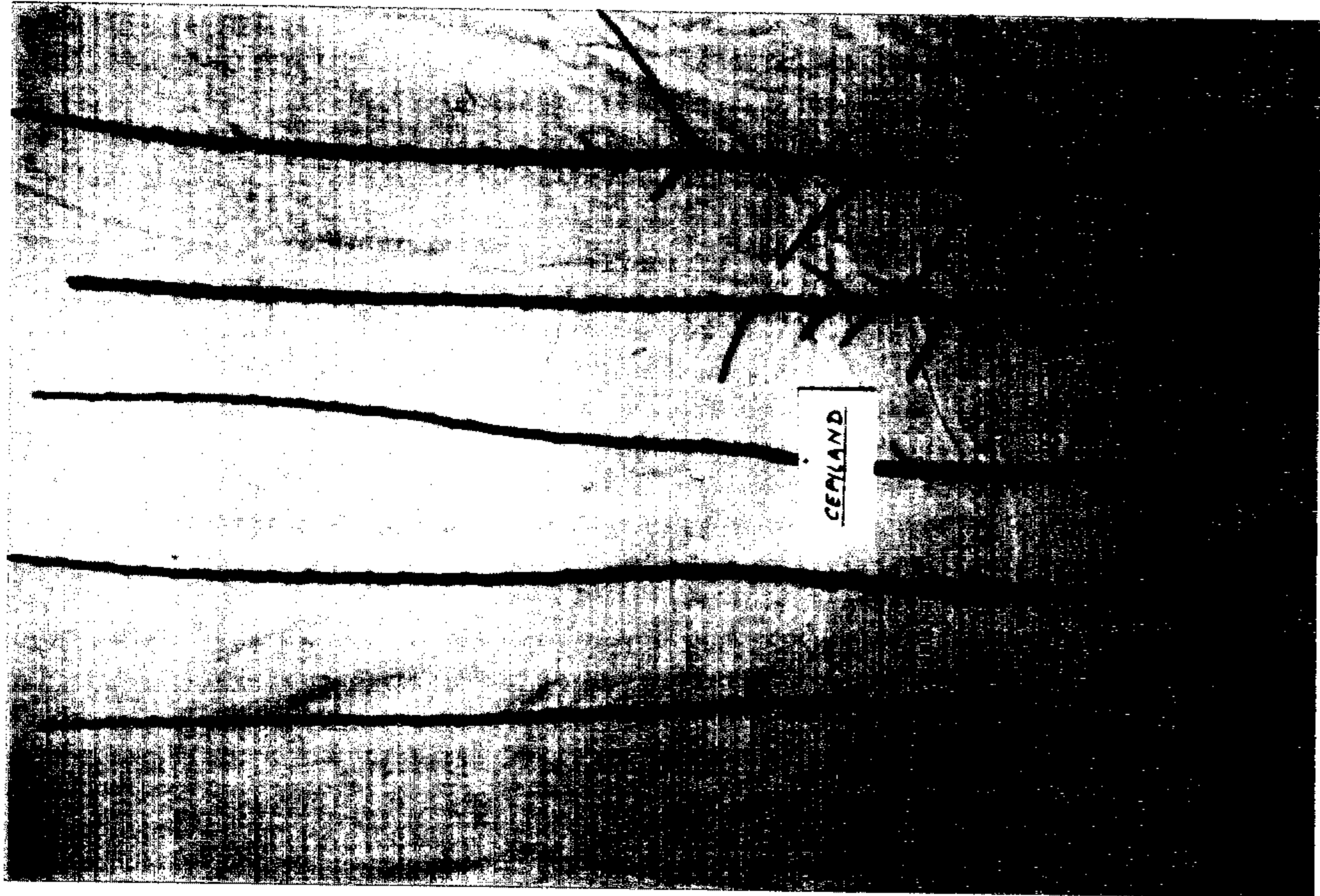


FIG. 3B.

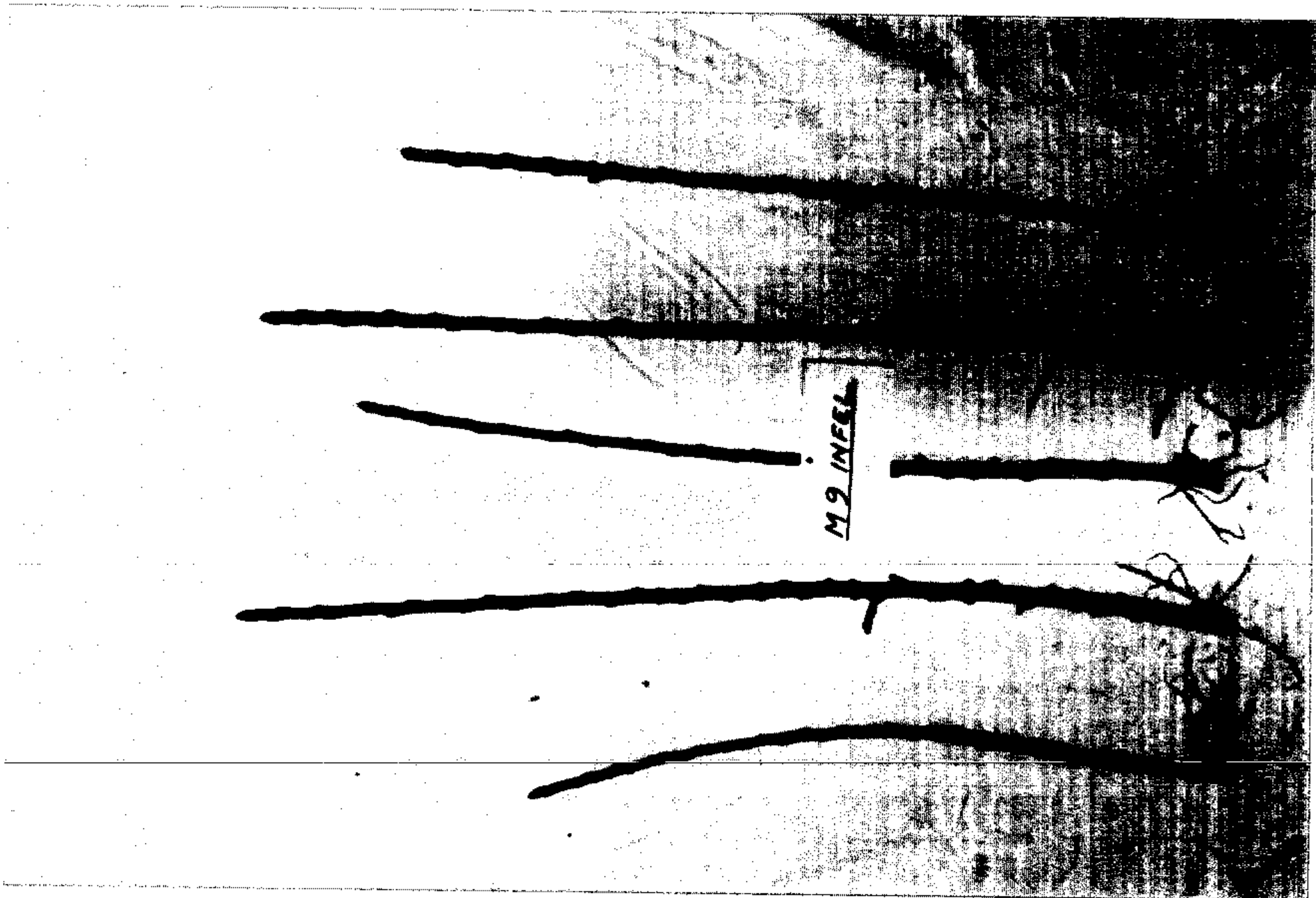


FIG. 3A.

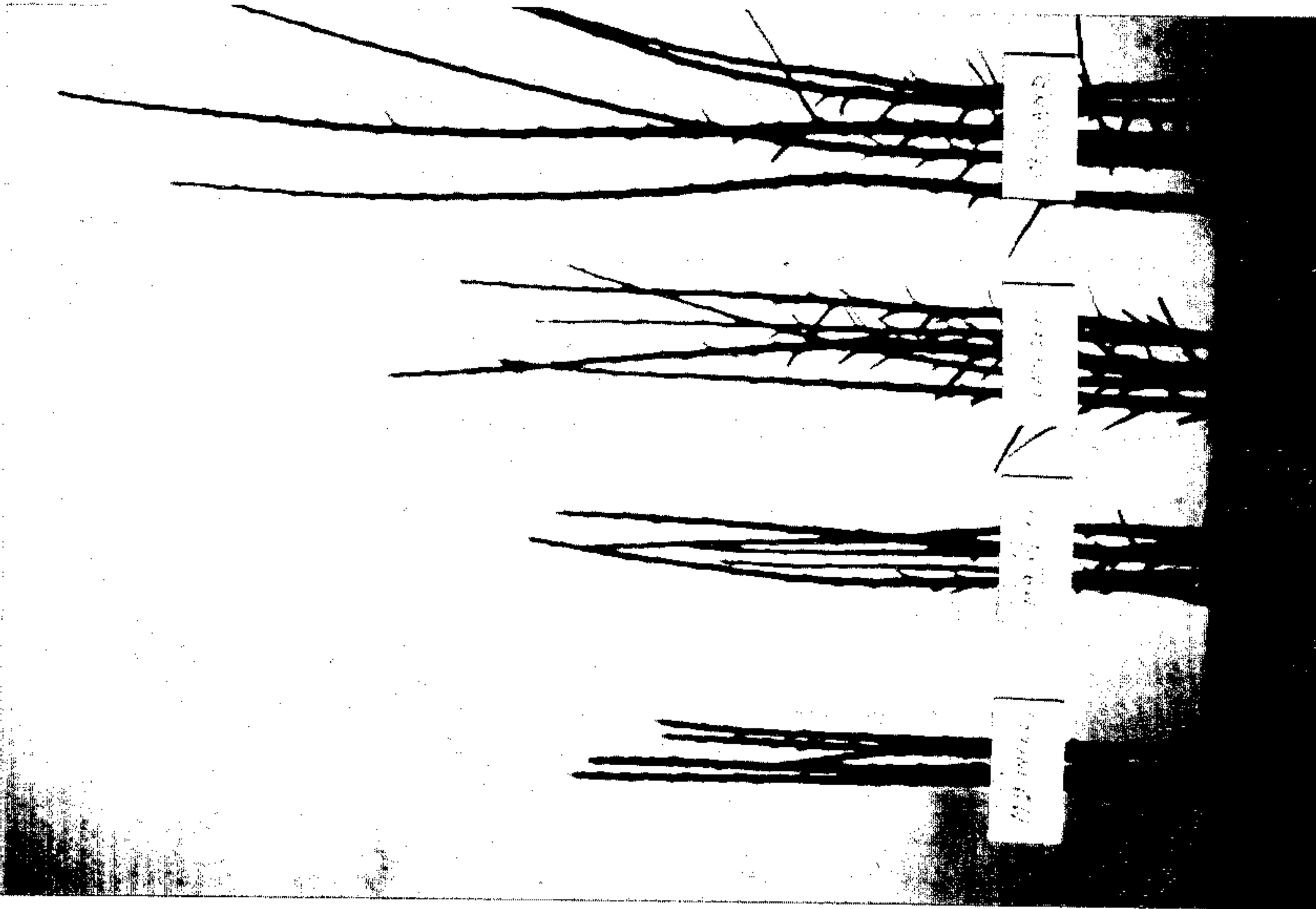


FIG. 5.



FIG. 4.

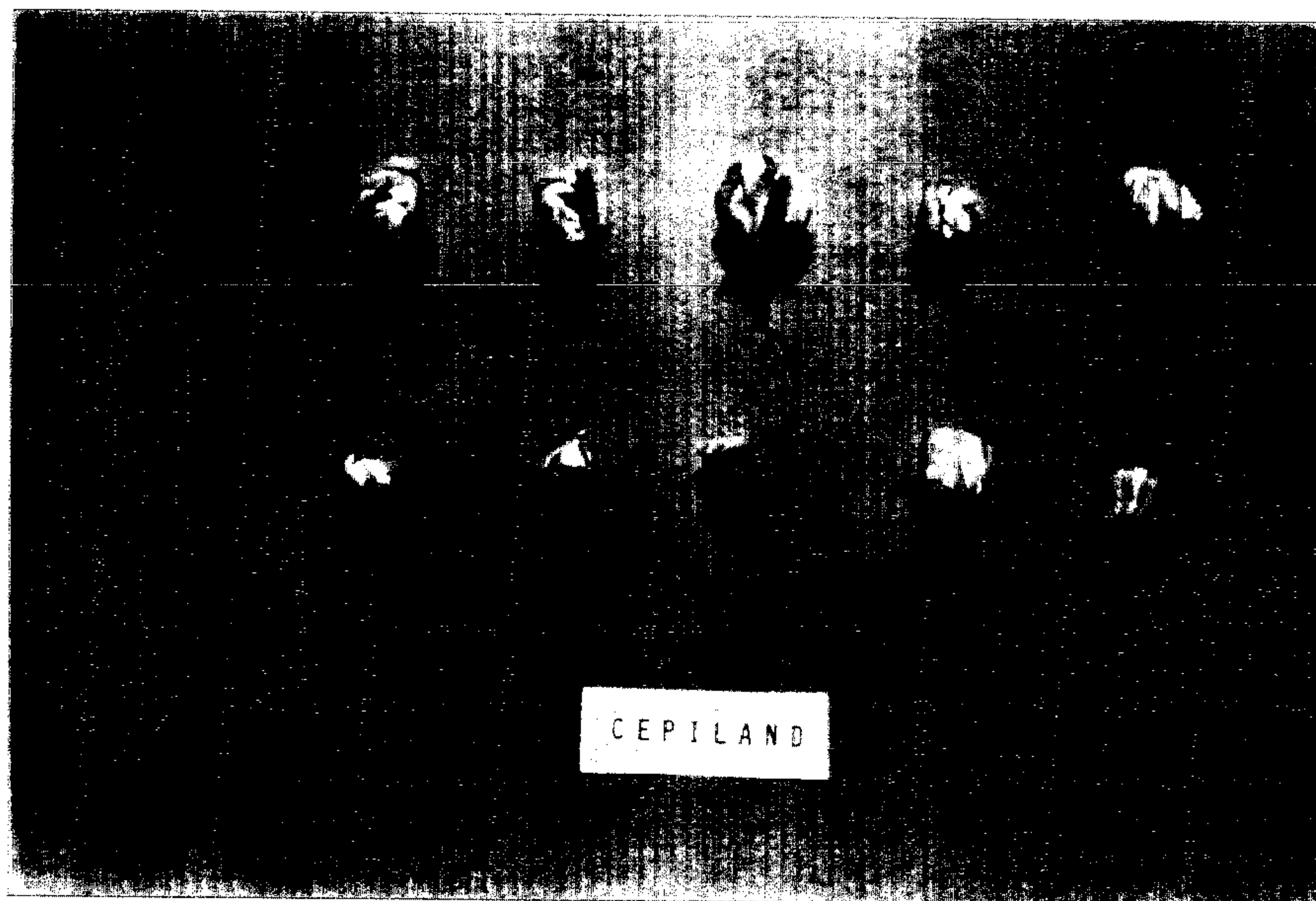


FIG. 6.

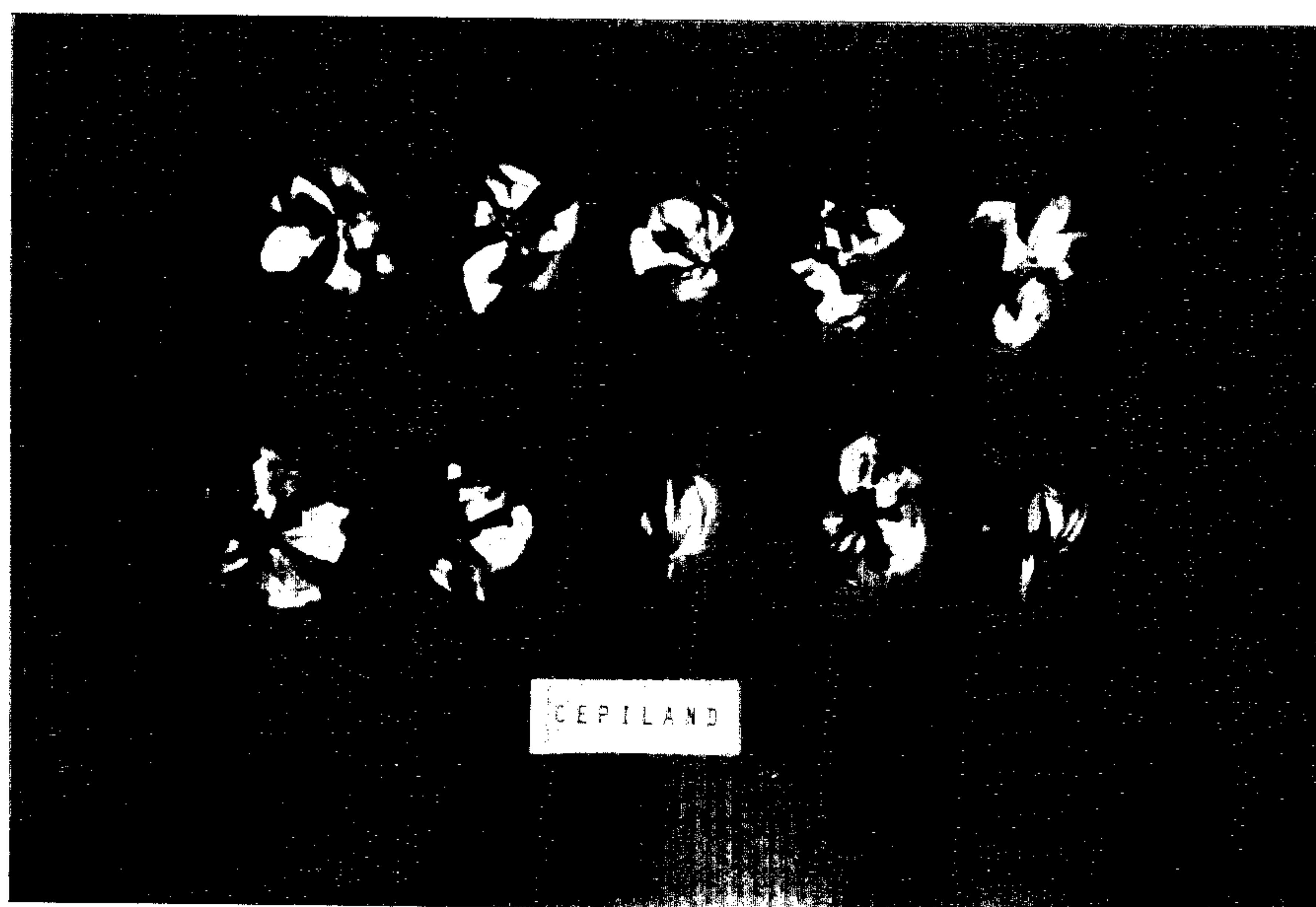


FIG. 7.