

MICROCHEMICAL IDENTIFICATION OF SOPHORA ALKALOIDS

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Identification of micro-quantities of matrine, matrine N-oxide, sofranol; baptifoline; anagerine and methylcytisine alkaloids from Sophora flavescens Ait. by microcrystallisation and colour tests.

Alkaloids of Sophora species are divided into three groups of quinolizidine ring system (Sadykov, 1975) cytosine group; sparteine group and matrine group. Each group comprises many closely related alkaloids, which have minor variations in the degree of oxygenation, hydrogenation or aromatic substitution in the given ring system.

The classical methods of identification are time-consuming and in most cases requires relatively large quantities of material which may not be available. On the other hand, the identification of alkaloids by microchemical techniques was described to be convenient, simple, direct and rapid (Fulton, 1969). The authors therefore were presued to apply some microchemical mehtods for the identification of some Sophora alkaloids which may be highly advantageous especially in toxicological cases where the amount of material is very limited.

Experimental

Plant material: Powdered roots of *S. flavescens*, procured from USSR (Saiberia region).

Extraction procedure: Alcoholic ext. of the powdered root was treated with dil. HCl, filtered; the filtrate was washed with chloroform. The acidic solu. was rendered alkaline and fractionated subsequently with petroleum ether and chloroform. till exhaustion.

Each fraction was chromatographed on an alumina column; elution was done by chloroform; chloroform-meOH(5, 10, 15 and 20% v/v). Matrine, baptifoline and anagerine were isolated and identified from the petroleum ether fraction, while matrine -N- oxide, matrine, methyl-cytisine and sofranol were isolated and identified from the chloroformic fraction. (Abdel-Baky 1980). The results are given in table 1:

Colour test: The isolated alkaloids were subjected to colour tests. Few drops of some chosen reagents, were added separately to few crystals of each six alkaloids in a porcelain slabe. The results are recorded in table II.

Microcrystal tests, were done using the aqueous test solution of the alkaloids (Each aqueous test solution contained 0.1% of the alkaloid, by mixing a drop of the reagent and a full drop of alkaloidal soln. on a plain clean slide without application of cover glass.

Many reagents; especially those recommended by (Clarke 1957) as alkaloidal precipitant, were used and those proved useful are given in table III and Fig. I.

Results:

The microcrystal tests were highly efficient in identification of each six alkaloids including the closely related matrine, matrine-N-oxide and sofranol; between baptifoline and anagerine. At least three different microcrystal tests were made on each alkaloid as a further proof of identity. However the colour reactions; were less specific than microcrystal tests and thus may be suitable for preliminary testing or adding on additional character in identification. A high advantage that both microcrystal classical method of identification and may be easily applied to alkaloids eluted from PC or TLC.

Table 1: The Isolated Alkaloids of *Sophora flavescens* Ait.

No	Alkaloid	Mol. Formula	m.p.	$\{\alpha\}^{20}_D$
1	Matrine	$C_{15}H_{24}ON_2$	76-78°C	+39° (C 0.5% H_2O)
2	Baptifoline	$C_{15}H_{20}O_2N_2$	210°	-135° (C 0.5% H_2O)
3	Anagerine	$C_{15}H_{20}ON_2$	B.p. 210°C	-166° (C 0.5% H_2O)
4	Matrine N-oxide	$C_{15}O_2N_2H_2O$	161-163°C	+45° (C 0.5% H_2O)
5	Sofranol	$C_{15}H_{24}O_2N_2$	171-173°C	+60° (C 0.5% H_2O)
6	Methyl-cytisine	$C_{12}H_{16}ON_2$	136-137°C	-221 (C 0.5% H_2O)

Table 2: Colour reactions.

Alkaloid	Formaldehyde + Sulphuric acid	Ammonium Vanadate + Sulphuric acid	Ammonium molybdat + Sulphuric acid.
Matrine	- ve	Orange colour fades quiekly to yellowish green	- ve
Baptifoline	- ve	light brown	orange colour
Anagerine	- ve	yellowish brown	faint brown
Matrine-N-oxide	- ve	yellow colour	faint brown
Sofranol	- ve	brown	faint brown
Methyl-cytisine	faint brown	bluish green	brown

Table 3: Forma of crystals

		Forms of crystals with			
Alkaloid					
	Picric acid	K_2Cdl_4 (Marme reagent)	H_2PtCl_6	$AuCl_4$	$HgCl_2$
Matrine	Long needles and rods.	A white ppt was firstly formed from which colourless plates are formed within 10 minutes	Rosettes like crystals are formed within 10 minutes	Branching needles with fan like shape within 5 minutes	Plates
Matrine-N oxide	Needles	- ve	Long branching needles partly in sheaves	Colourless blades irregular and splintary	Characteristic rosettes of needles and rods.
Sofranol	Needles	Faint white ppt without characteristic shape	- ve	Dimorphic or trimorphic blades irregular and splintary	

Anagerine	Aggregates of rods	- ve	Plates	Aggregates of plates	Orange ppt without characteristic forms
Baptifoline	Needles and rods	- ve	Aggregates of needles in rosettes like forms	Elongated plates clustered	- ve
Methyl-cytisine	Rods	- ve	Aggregates of needles in rosettes like forms	Elongated plates clustered	- ve

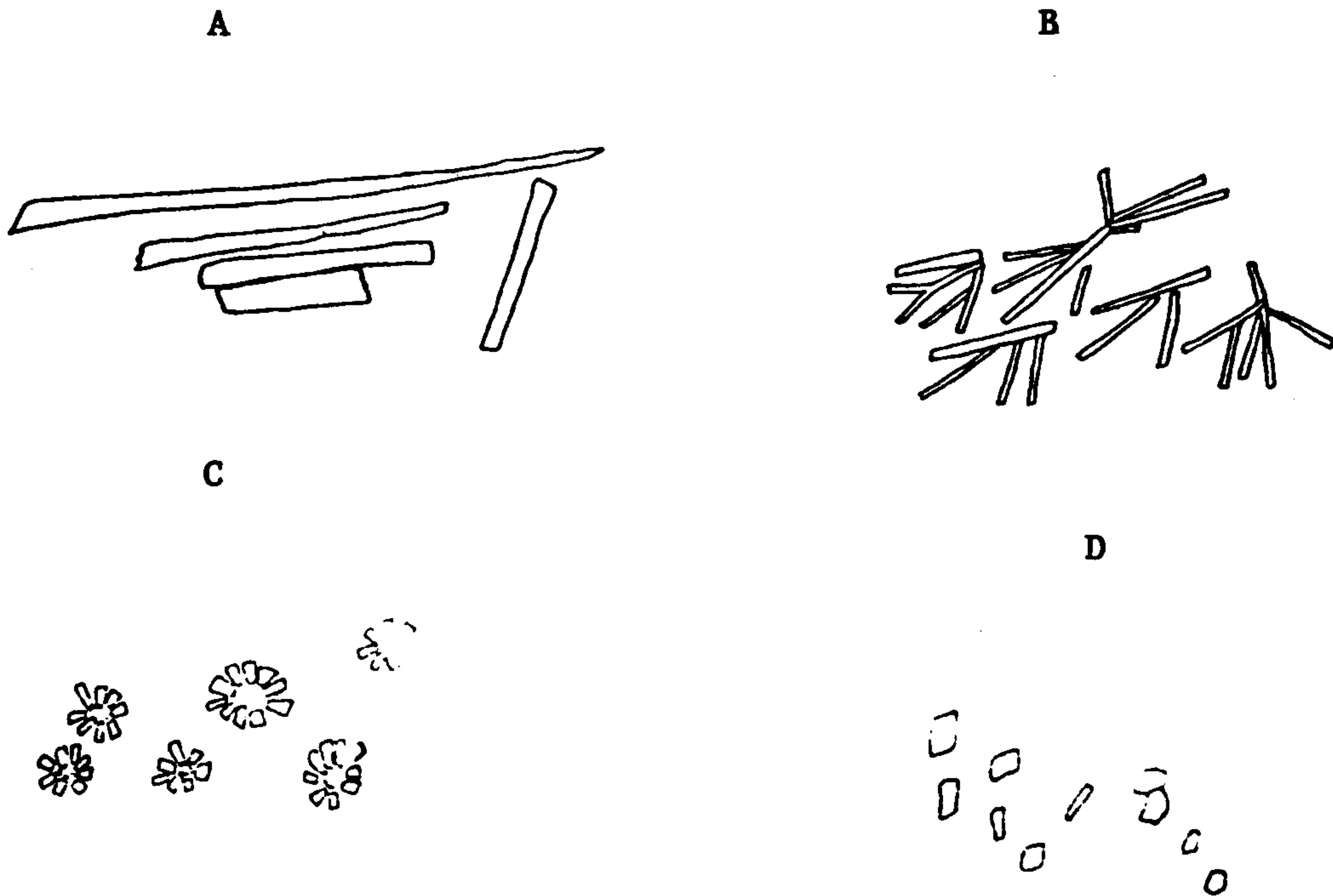


Fig. 1 : A- Matrine picrate
 B- Matrine + AuCl₄
 C- Matrine + H₂ptCl₆
 D- Matrine + HgCl₂

X 40
 X 40
 X 40
 X 40

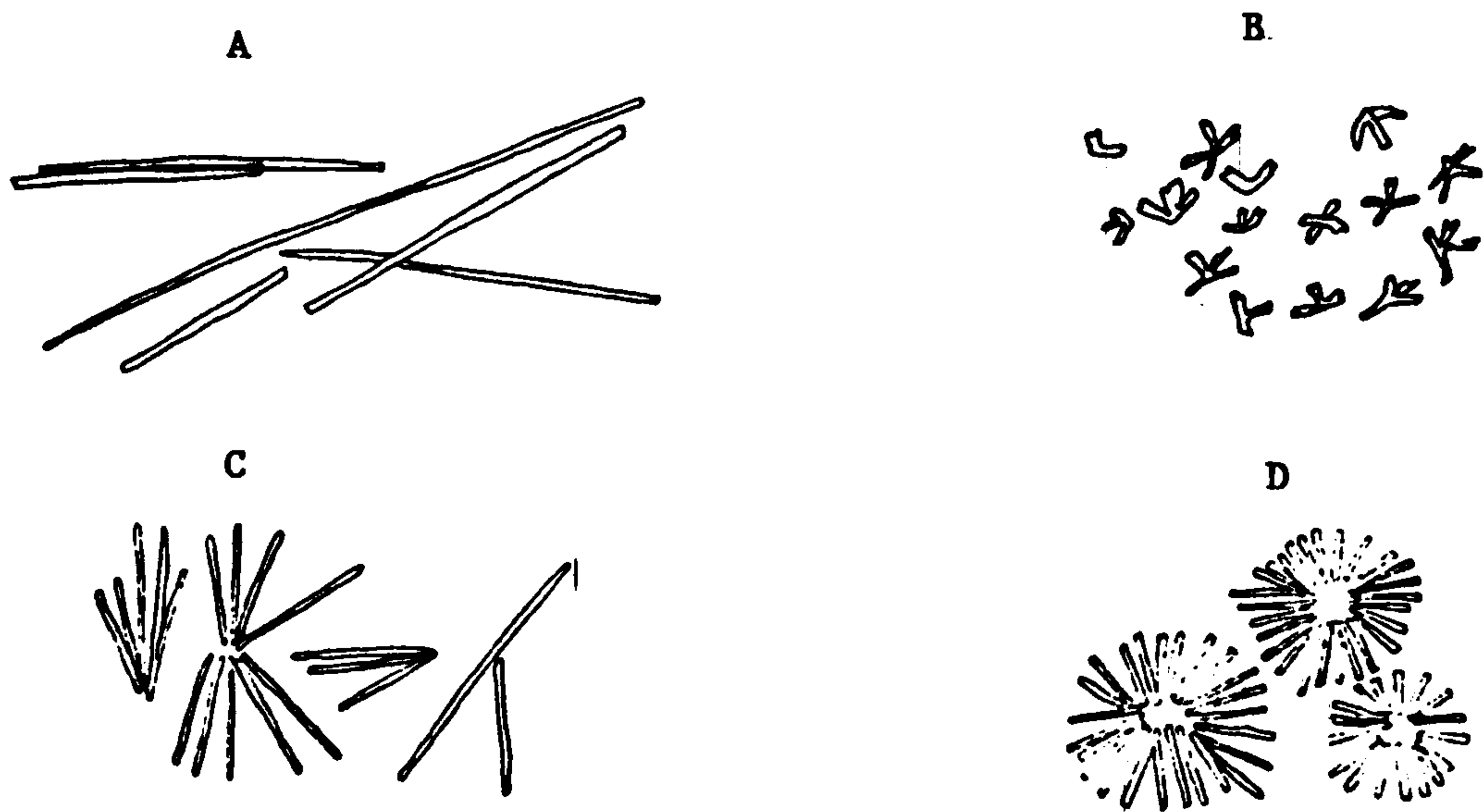


Fig. 2- A- Matrine N-oxide picrate
 B- Matrine-N-oxide + AuCl₄
 C- Matrine-N-oxide + H₂ptCl₆
 D- Matrine-N-oxide + HgCl₂

X 40
 X 40
 X 40
 X 40

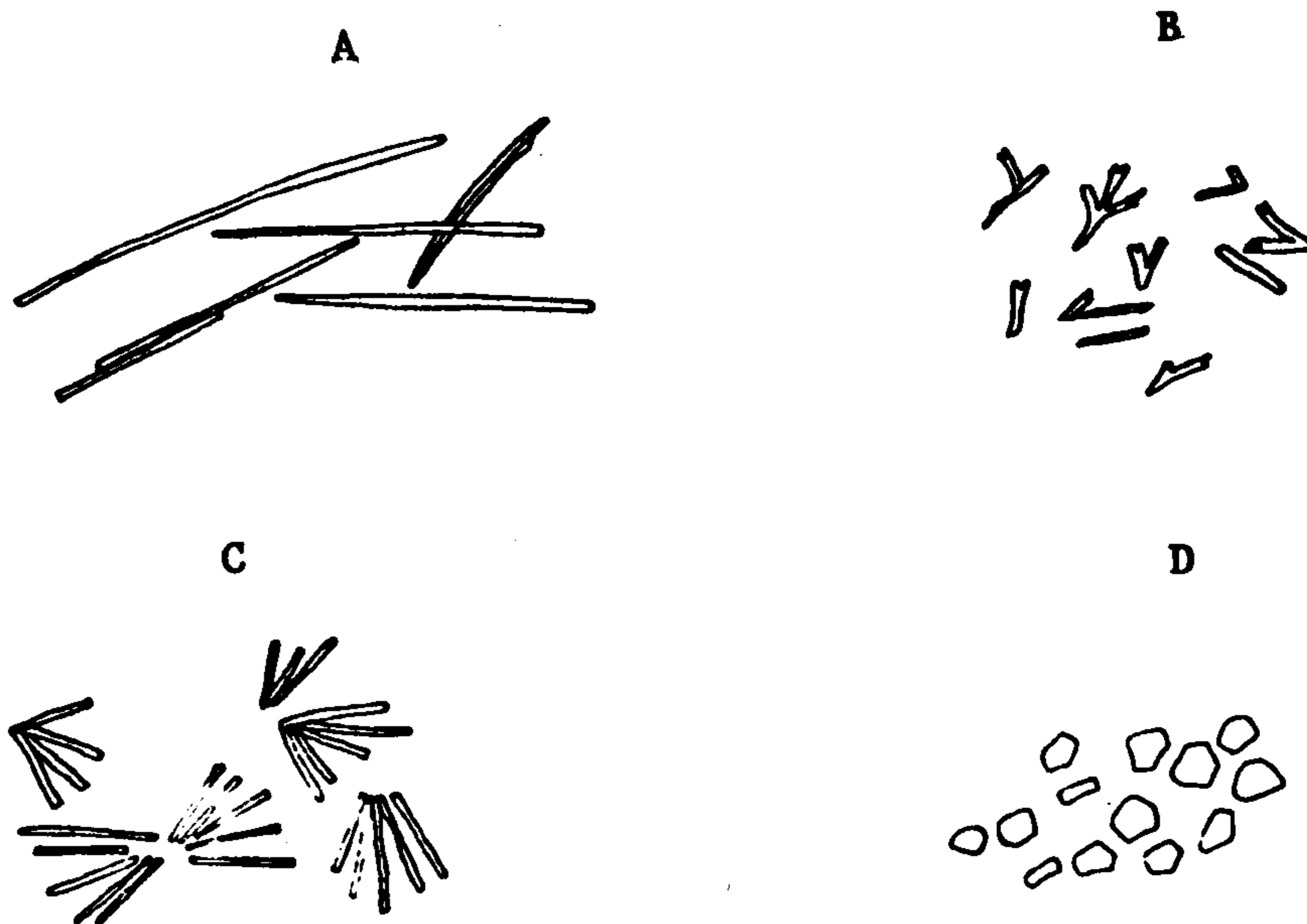


Fig. 3- A- Sofranol picrate X 40
 B- Sofranol + AuCl₄ X 40
 C- Sofranol + H₂ptCl₆ X 40
 D- Sofranol + HgCl₂ X 40

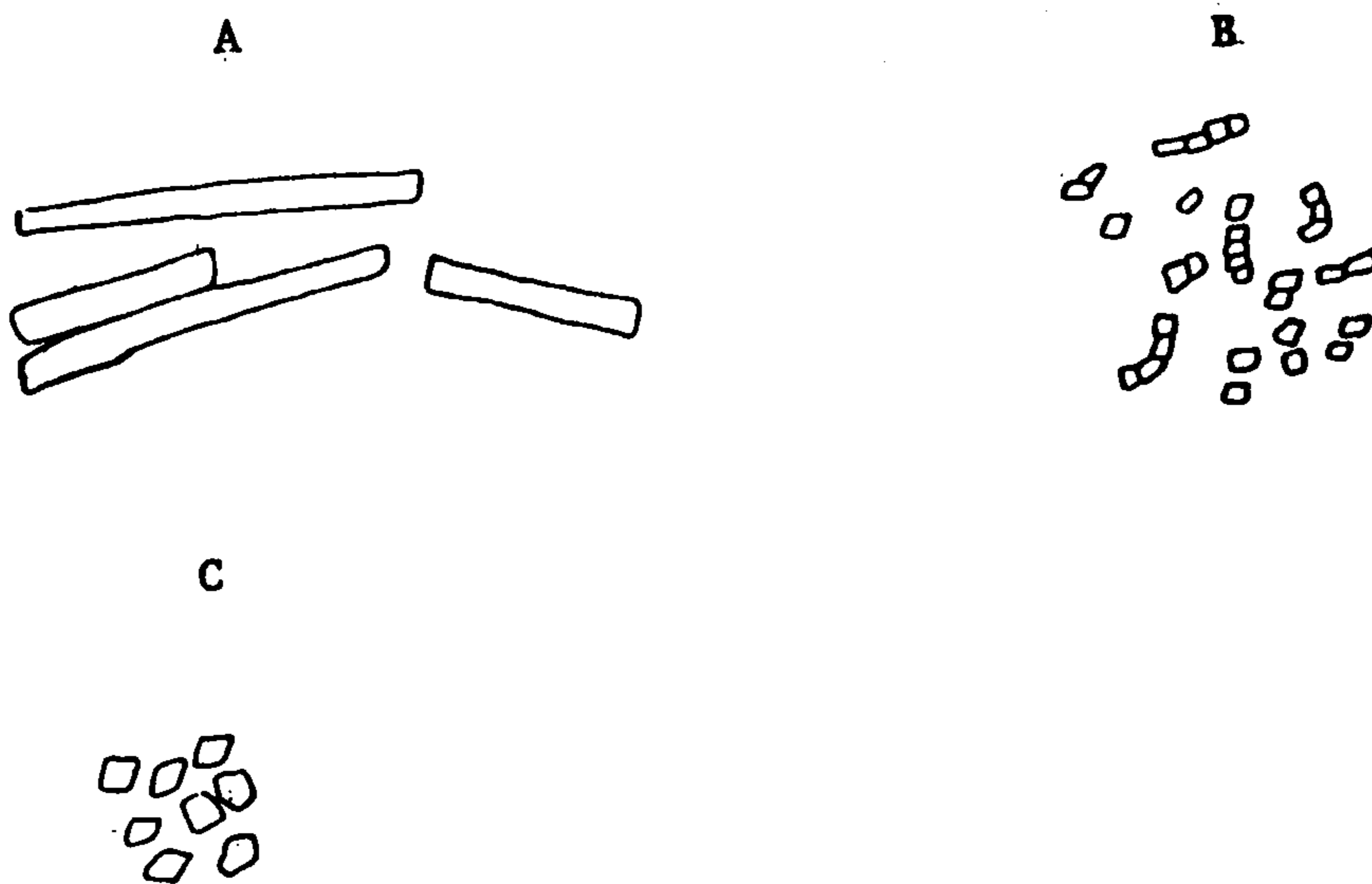


Fig. 4- A- Anagerine picrate X 40
 B- Anagerine + AuCl₄ X 40
 C- Anagerine + H₂ptCl₆ X 40
 D- Anagerine + HgCl₂ X 40

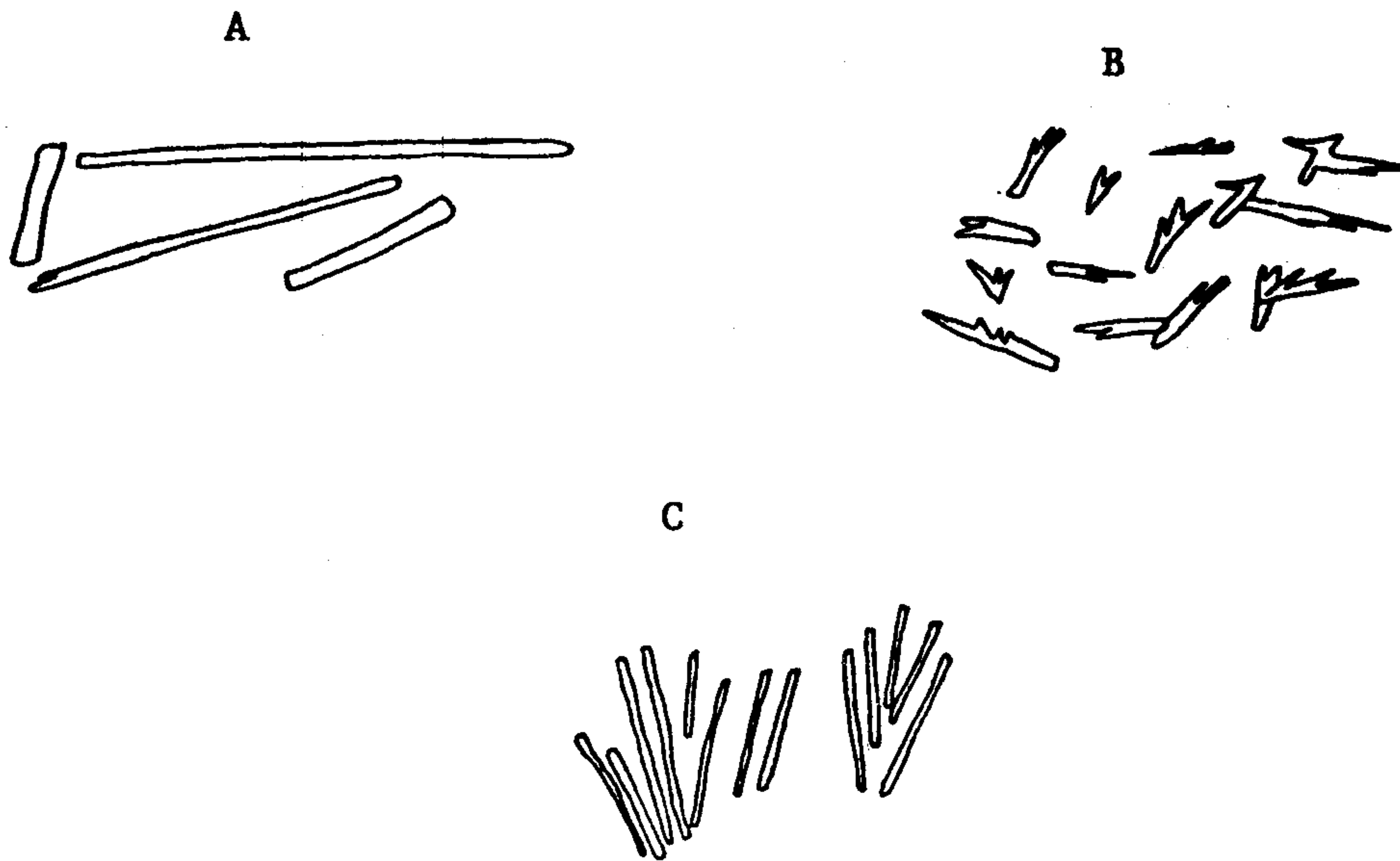


Fig. 5- A- Baptifoline X 40
 B- Baptifoline + AuCl_4 X 40
 C- Baptifoline + H_2ptCl_6 X 40
 D- Baptifoline + HgCl_2 X 40

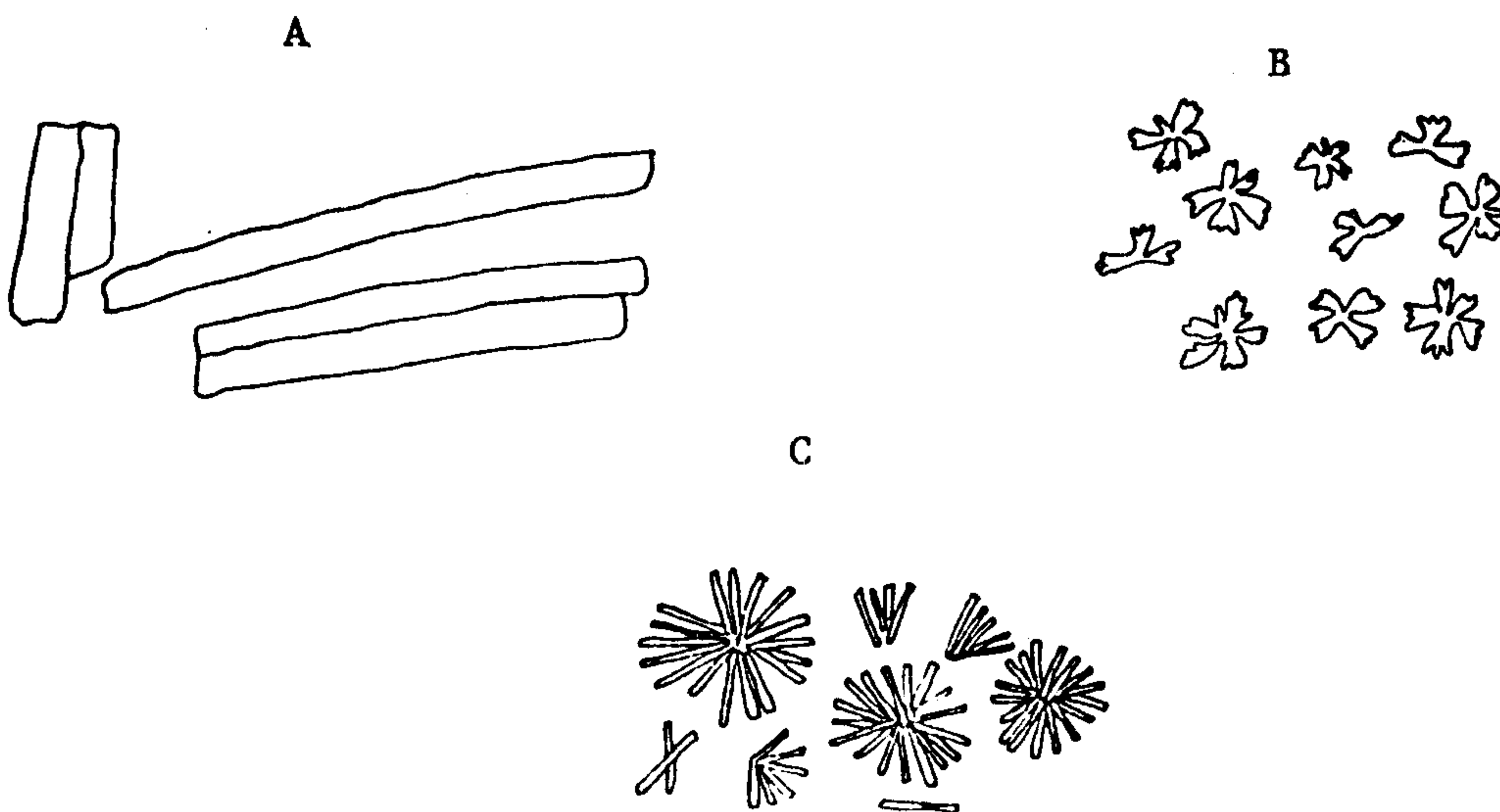


Fig. 6- A- Methyl cytisine X 40
 B- Methyl cytisine AuCl_4 X 40
 C- Methyl cytisine + H_2ptCl_6 X 40
 D- Methyl cytisine + HgCl_2 X 40

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