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A COMPARATIVE MACRO-AND MICROMORPHOLOGICAL STUDY OF THE STEMS AND LEAVES OF CERTAIN JASMINUM SPECIES CULTIVATED IN EGYPT.

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The macro and micromorphologyical characters of the stems and leaves of Jasminum azoricum L., J. sambac Ait. C.V. double flower and J. sambac Ait. C.V. single flower were investigated in order to identify them both in entire and powdered forms as well as to differentiate between them.

Jasminums are climbing or erect shrubs grown out of-doors in tropical and temperate regions and in green houses[1-3]. They constitute a complex of species which show considerable variation in relation to their flora and other characters[4].

The genus includes many plants that are used medicinally[5,6]. The leaves and roots of J. sambac Ait.(Arabian Jasmine, Nyctanthes sambac L.) are used as lactifuge and for eye-sore[7].

From the laboratory investigations it was found that the three plants, J. azoricum L.,J. sambac Ait. C.V. double flower (J. trifoliatum Hort.) and J. sambac Ait. C.V. single flower are rich in lactone glycosides, flavonoids and hexahydricalcohols[8,9]. J.azoricum L. and J. sambac Ait. were

found to be different in their components. While, both the two varieties of J.sambac contain the same constituents but differ in quantity[8].

Plant Materials:

The samples of the plants were collected from the Experimental Station of Horticulture, Faculty of Agriculture, Assiut Univ., and identified by Dr. N.A. El-Keltawy, Assoc. Prof. of Horticulture. Fresh as well as preserved samples (Water: alcohol: glycerin mixture) , were used.

Habitat:

J. azoricum L.: is an evergreen climbing shrub with terete branches and trifoliate leaves. Flowers are grouped in loose cymes, white and sweet-scented. J.Sambac Ait. is a sun-loving plant and thrives best under relatively dry conditions. The plant grows as erect shrubs, 1 to 1-3 metres in height. The double flower variety shows thick fleshy pure white buds and flowers and is exceedingly rich in perfume. The doubleness is apparently achieved by fusion of a number of flowers beceause of the large number of stamens.

The flowers of the three plants are grouped in terminal cymes composed of a salveform corolla and cylindrical tube. The fruits are bilobate berry.

The common method for their propagation is by cuttings or layering.

The plants are shown in Fig 1.

MACROMORPHOLOGY

A_ The stems: (Fig. 2A, B & C)

The main trunk of the three plants is cylindrical, hard, monopodially branched, growing ascendingly and reaching up to 5 cm in diameter. The plants bear cylindrical branches which are hairy and longitudinally striated, . The internodes vary in length from 3.5 to 7 cm in J. azoricum, 3 to 4 cm in J. Sambac double flower and 5 to 6 cm in J. Sambac single flower. The surface of the stems is pale-brown rough and wrinkled. While, the older ones are rough and bear the scars of fallen leaves. The stems are odourless and with a bitter taste.

B- The leaves: (Fig. 2A, B & C)

The leaves vary in their characters between the three plants as follows: J. azoricum: (Fig. 2 A)

The leaves are compound, ternate, exstipulate and opposite decussate. The leaflets are Ovate-lanceolate with entire margin, acute elongated or tapering apex, symmetric base, hairy surface, coriaceous texture and long petiole. The leaf rachis is slender, yellowish-green and hairy. The terminal leaflets are larger than the lateral ones, measuring from 6 to 7 cm in length and about 3 cm in width, while the lateral from 3.5 to 4 cm in length and 1.5 to 2 cm in width.

J.Sambac: (Fig. 2 B & C)

Double flower: The leaves are simple arranged in alternate threes on the stems and branches. The lamina is ovate to spathulate with rounded apex and very

short stout petiole. They measure from 2.5 to 4.5 cm in length and 1.5 to 2.5 cm in width at its middle part.

Single flower: The leaves are simple, opposite-decussate, the lower older ones are smaller in size, ovate or spathulate. Ascendingly, the leaves become more larger, ovate or ovate-lanceolate with acute, tapering apex and showing axillary buds. They measure from 3 to 7.5 cm in length, 2.5 to 4.5 cm in width.

J. sambac leaves (the two varieties) are exstipulate, with entire margin, coriaceous texture, hairy surface and symmetric base. The leaves of the three plants are yellowish-green to dark green in colour, odourless and with a bitter taste.

MICROMORPHOLOGY

A- The Stems: (Fig. 3 A, B & C)

Transverse sections through the young stems are nearly circular and hairy. The outer epidermis is formed of one layer followed by a narrow parenchymatous cortex. The latter is lined internally by non-differentiated endodermis. The pericycle varies in the two species, in J. azoricum it is represented by interrupted bands of parenchyma and schlerenchyma while in J.Sambac, a contineous band of schlerenchyma is present. The phloem is soft and the xylem is radiating enclosing a parenchymatous pith.

The epidermal cells of the stems (Fig. 3 D, E & F) are usually isodiametric and covered with smooth cuticle. Stomata , if present, are ranunculaceous and rounded. Hairs are rare and non-glandular, unicellular, sometimes bicellular, elongated with rounded

ends and warty cuticle.

Table 1 shows the different variable histological characters of the epidermis of the stems.

The cortical parenchyma (Fig. 3 & 4) is lined externally by one row of hypodermal collenchyma in case of J. azoricum, The parenchyma is tangentially-elongated and contain starch granules as well as cluster crystals of calcium oxalate in J. sambac. The pericyclic schlerenchyma is represented by fibres in J. azoricum which are exceeded by stone cells in J. sambac , double and single flower. The fibres (Fig. 5) are elongated, showing comparatively wide lumina and narrow, pitted lignified walls. Stone cells (Fig. 4&5) are oval to rounded and with wide lumena and lignified pitted walls. Xylem vessels (Fig. 5) are usually solitary and show lignified pitted walls. Tracheids (Fig.5) are elongated rectangular or with tapering ends and have pitted, lignified walls. Medullary rays are uni-or biseriate with elongated lignified, pitted cells. The pith is parenchymatous. The parenchyma show pitted lignified walls. Those of J. sambac contain cluster crystals of calcium oxalate.

Table 1 shows the differences between the histological characters of the stems.

In the old stems cork is formed. The cork cells are polygonal with lignified thick walls.

B- The leaves:

Transverse sections through the lamina (Fig. 6,7& 8D, E,F) are somewhat planoconvex with homogeneous mesophyll in J.azoricum and a non-homogeneous one in J. sambac with upper palisade of almost two rows. The palisade is interrupted in the midrib region by a zone of collenchyma

of one row which is lacking in J. azoricum. Another zone is abutting on the lower epidermis of one or two rows in J. azoricum and J. sambac single flower and about 3 to 5 rows in J. sambac double flower. The main vascular bundles are crescent-shaped showing a parenchymatous pericycle in case of J.azoricum or an interrupted arc of parenchyma and schlerenchyma in J. sambac. The pericyclic schlerenchyma is formed of stone cells and pericyclic fibres resembling those of stems. Xylem arcs are radiating showing mainly biseriate medullary rays and lignified spiral, pitted and scalariform vessels. Phloem is soft. The cortical parenchyma and spongy mesophyll contain starch granules exceeded by culster crystals of calcium oxalate in J. sambac.

The epidermal cells (Fig. 8A, B & C): The upper and lower epidermal cells are polygonal, isodiametric with straight anticlinal walls and covered with smooth cuticle. Stomata are ranunculaceous and hairs are non-glandular resembling those of the stems.

Significant differences in the histological characters of the leaves are recorded in Table 2.

Table 1: The significant differences in the main histological characters of the stems of J.azoricum and J.Sambac (Double & single-flower)

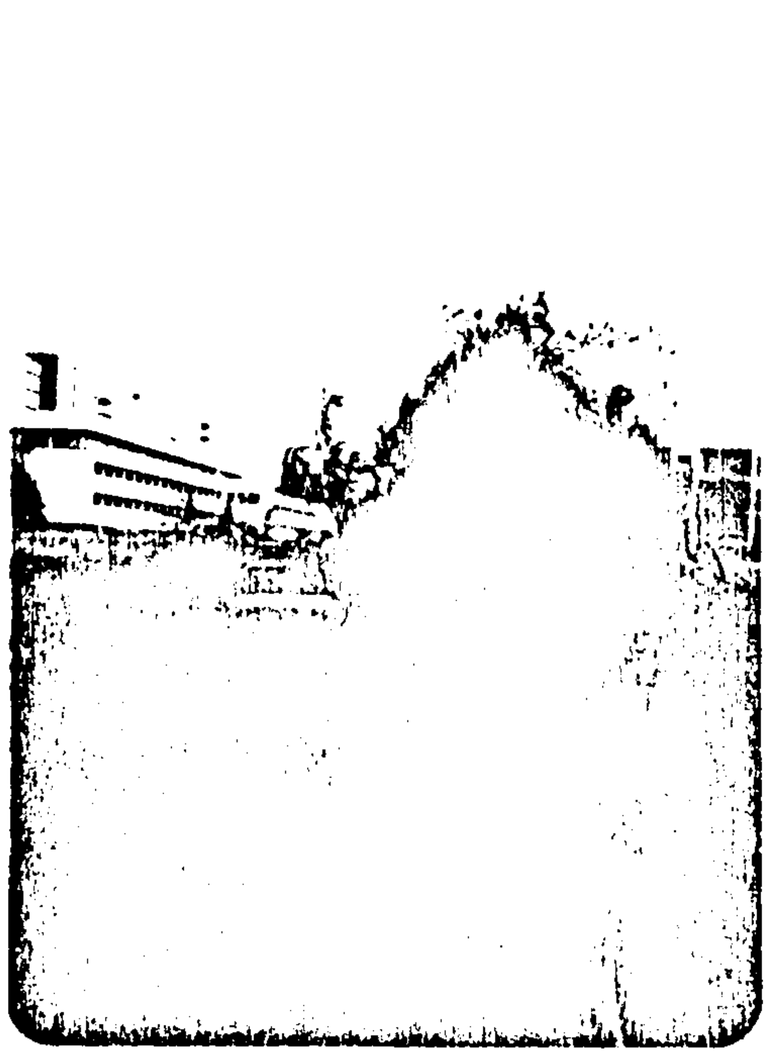
Character	J.azoricum	J.sambac	
		double-flower	single-flower
1- Epidermal cells			
. Walls	beaded	straight & thick	slight curved
. Stomata	present	absent	present in a higher level
. Contents	-------	-------	CaOx. clusters
. Dimensions*			
- Length	32 - 64	64 - 104	28 - 78
- Width	30 - 60	36 - 64	25 - 65
- Height	24 - 28	24 - 28	24 - 28
- Stomata (length)	48 - 50	-------	48 - 52
- Hairs (length)	160 - 290	160 - 360	160 - 360
2- Subep. Coll.	On row	-------	-------
3- Cort. Par.			
. Dimensions*			
- Length	24 - 70	48 - 80	68 - 92
- Width	32 - 40	24 - 36	32 - 60
. Contents	------	Calcium Oxalate clusters	
4- Pericycle	groups of fibres	contineous band of fibres and stone cells.	
. Dimensions*			
- Fibres length	400 - 500	480 - 520	440 - 480
- Stone cells			
length	-------	48 - 68	56 - 68
Width	-------	20 - 32	40 - 42
5- Wood			
. Vessels (diam.)	60 - 80	40 - 68	40 - 52
. Fibres (length)	320 -440	400 - 480	400 - 490
. Tracheids (length)	80 - 100	100 - 110	100 - 120

* All the dimensions are in microns.

Table 2: The significant differences in the histological characters of the leaves of J. azoricum and J. sambac .

Character	*J. azoricum*	*J. sambac*	
		double flower	*single flower*
1—Epidermis			
Epidermal cells			
. Dimensions*			
- Up. ep.			
Length	40 - 64	44 - 88	40 - 100
Width	20 - 34	40 - 72	40 - 80
Height	20 - 24	20 - 28	36 - 48
-L.ep.			
length	36 - 48	40 - 60	40 - 60
Width	16 - 36	32 - 44	32 - 40
Height	20 - 23	16 - 20	32 - 40
. Stomata			
- length	40 - 42	28 - 30	40 - 42
. Hairs			
length	160 - 240	180 - 200	180 - 220
2- Mesophyll	homogeneous parenchyma	non - homogeneous interrupted	- schlerenchyma
3- Pericycle			
4 - Vessels			
diameter	28 - 60	28 - 32	28 - 36
5 - Numerical values			
. Stomatal Index			
Up. ep.	8.6	----	----
l. ep.	14.3	11.5 - 12.5	14.9 - 15.1
. Stomatal Number			
Up. ep.	150 - 200		
l. ep.	350 - 400	300 - 330	250 - 300
. Vein termination Number	5 - 6	4 - 5	4 - 4.5
. Vein islet Number	5 - 5.5	10 - 11	4 - 5

* All dimensions are in microns



Jasminum azoricum L.

J.sambac Ait. double flower

J.sambac Ait. single flower.

a.A branch of J.azoricum.
b.„ „ of J.sambac double flower.
c.„ „ of J.sambac single flower.

Fig 1.

Fig. 1- Photographs of Jasminums

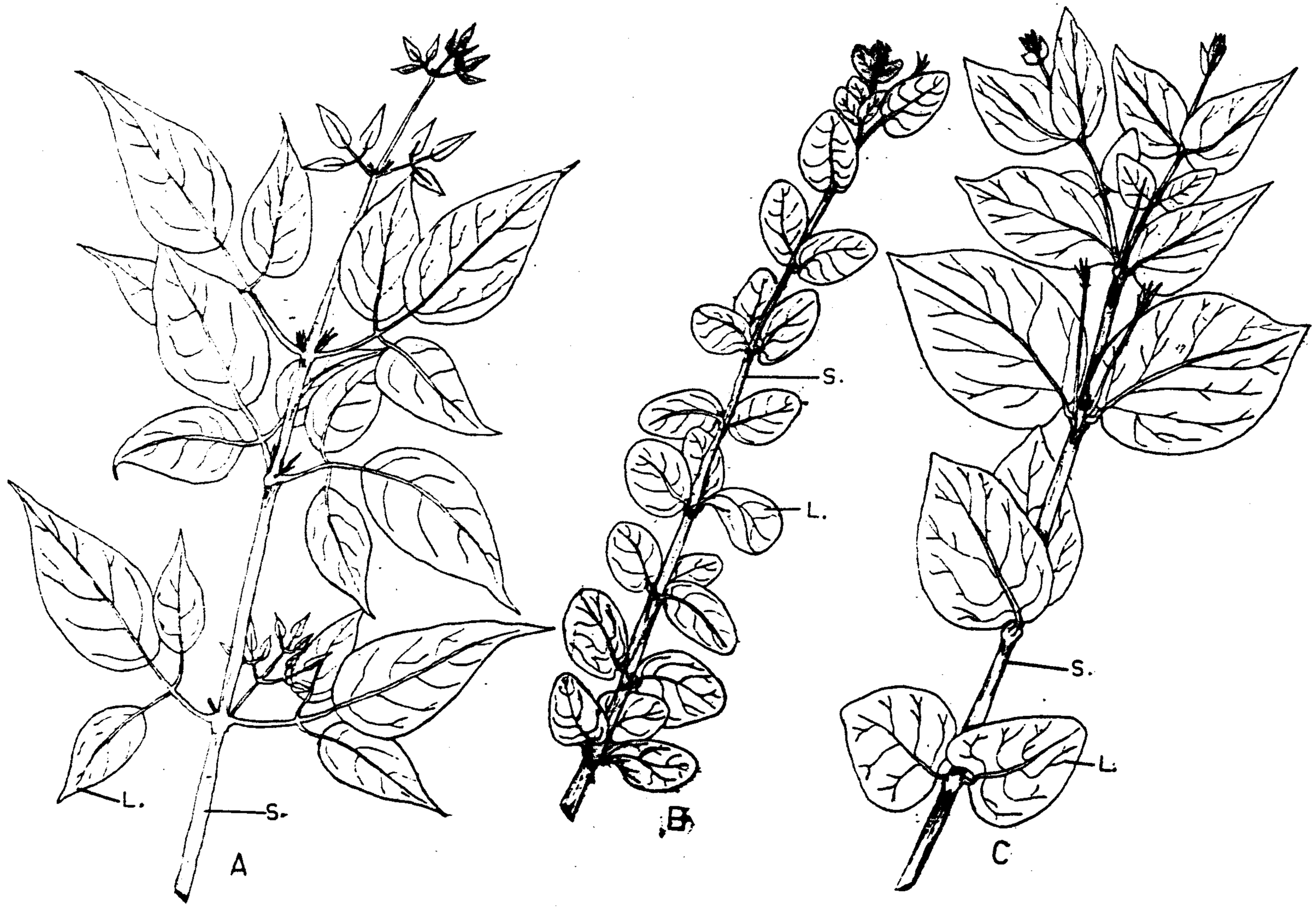


Fig. 2- The stems and leaves X 3/4

A. A branch of J. azoricum.
B. " " J. sambac, double flower.
C. " " J. sambac, single flower.

s., stem; l., leaf.

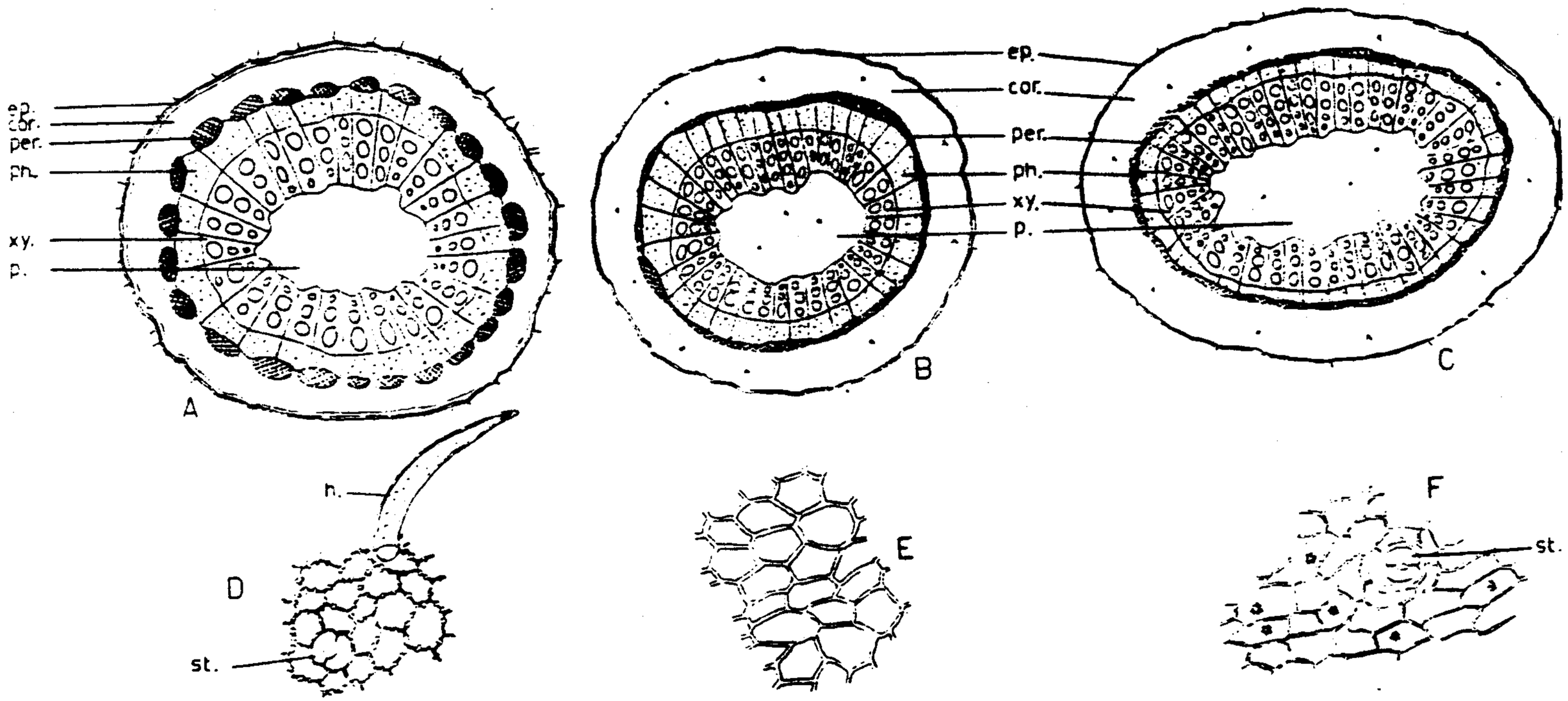


Fig. 3- Micromorphology of the stems

A.	Diagrammatic T.S. in	J.	azoricum.			X 18
B.	"	"	"	J.	sambac,	double flower.	X 18
C.	"	"	"	"	"	single flower.	X 18
D.	Surface preparation in	J.	azoricum .				X 210
E.	"	"	"	J.	sambac,	double flower	X 210
F.	"	"	"	"	"	single flower.	X 210

con., cortex; ep., epidermis; h., lair; Pp., pith; per., pericycle; ph., phloem; st., stomata; xy., xylem.

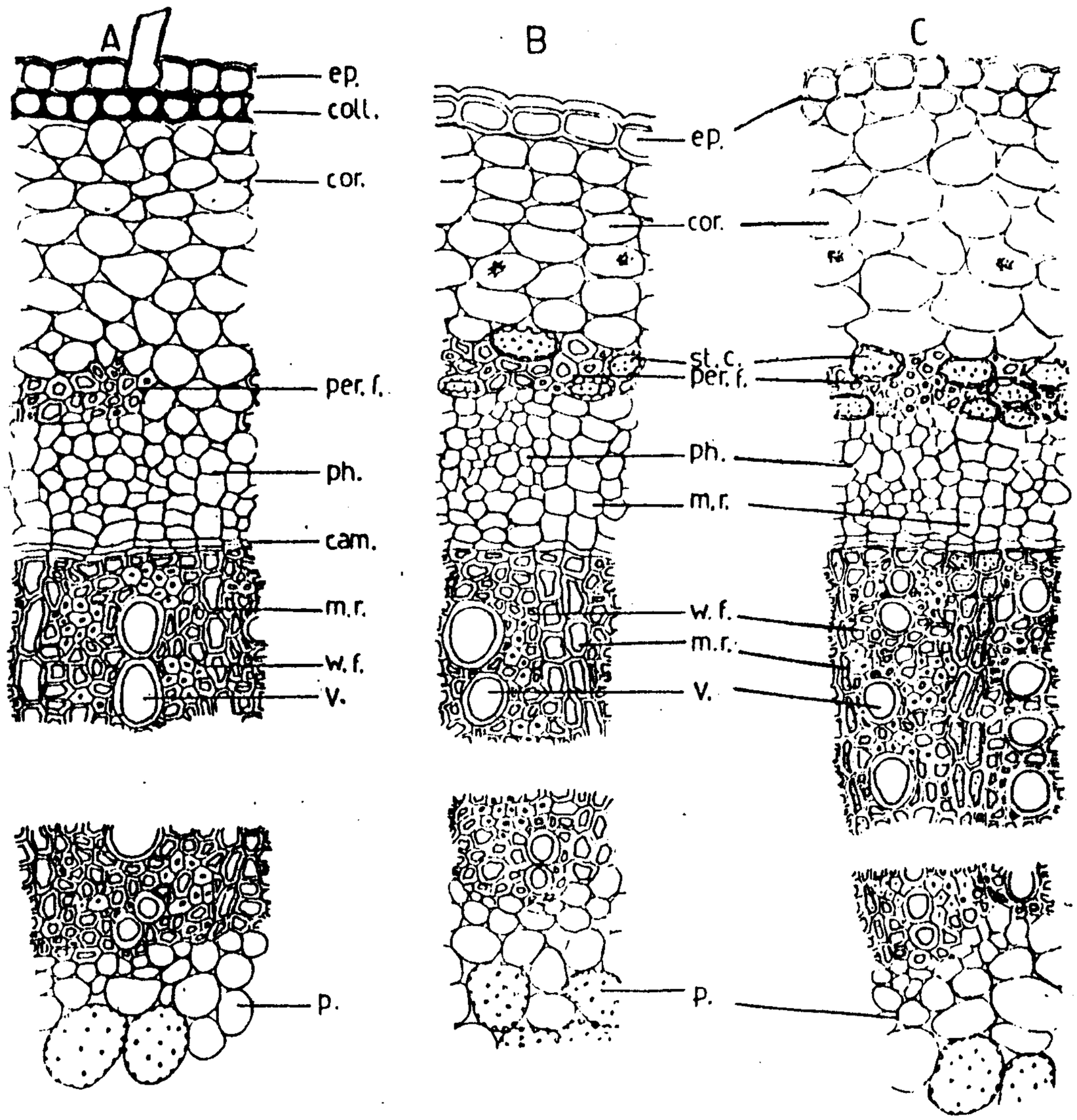


Fig. 4- Detailed T.S. in the stems X 210

A. J. azoricum,
B. J. sambac double flower.
C. J. sambac single flower

cam., cambium; coll., collenchyma; cor., cortex; ep., epidermis; m.n., medullary ray; p., pith; per.f. pericyclic fibres; ph., phloem; st.c., stone cell; v., vessel; w.f., wood fibre.

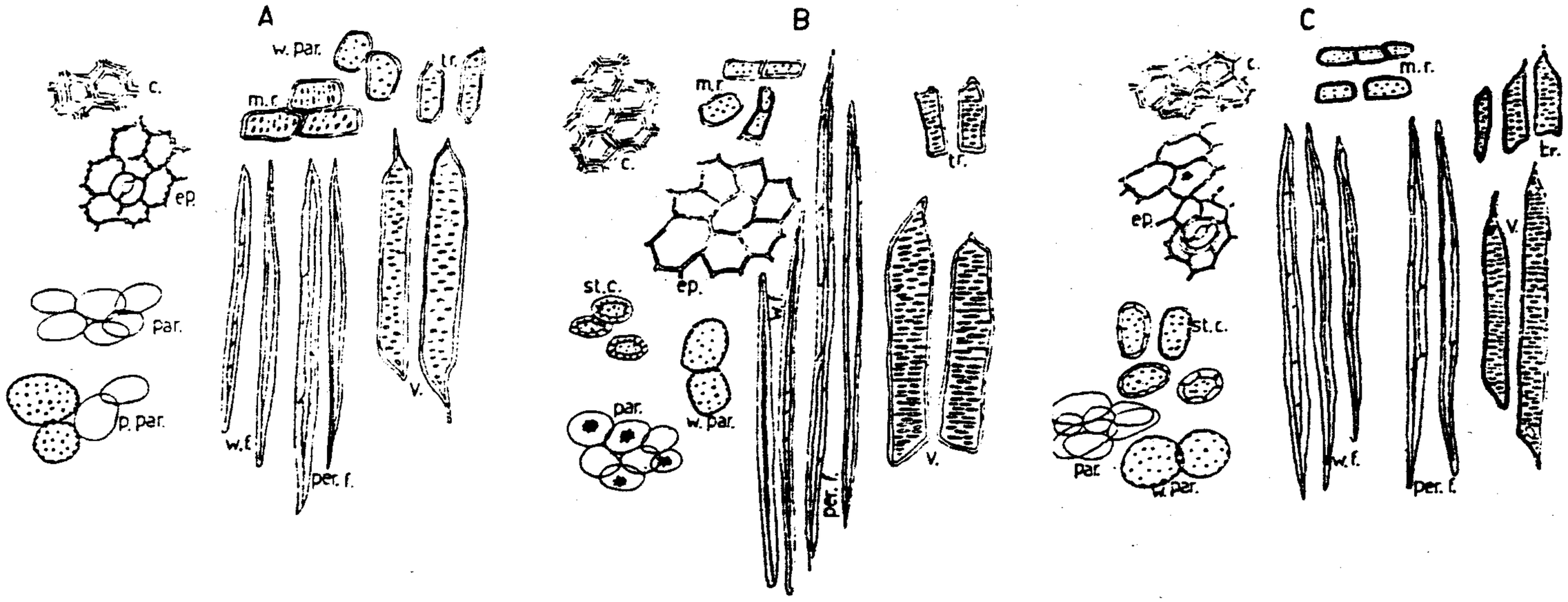


Fig. 5- Isolated elements of the stems X 140
A. J. azoricum.
B. J. sambac, double flower.
C. J. sambac, single flower

c., cork; ep., epidermis; par., parenchyma; m.n. medullary ray; p. par., pitted parenchyma; per.f. pericyclic fibres; st. c., stone cell; tr., tracheid; v., vessel; w.f., wood fibre; w.par., wood parenchyma.

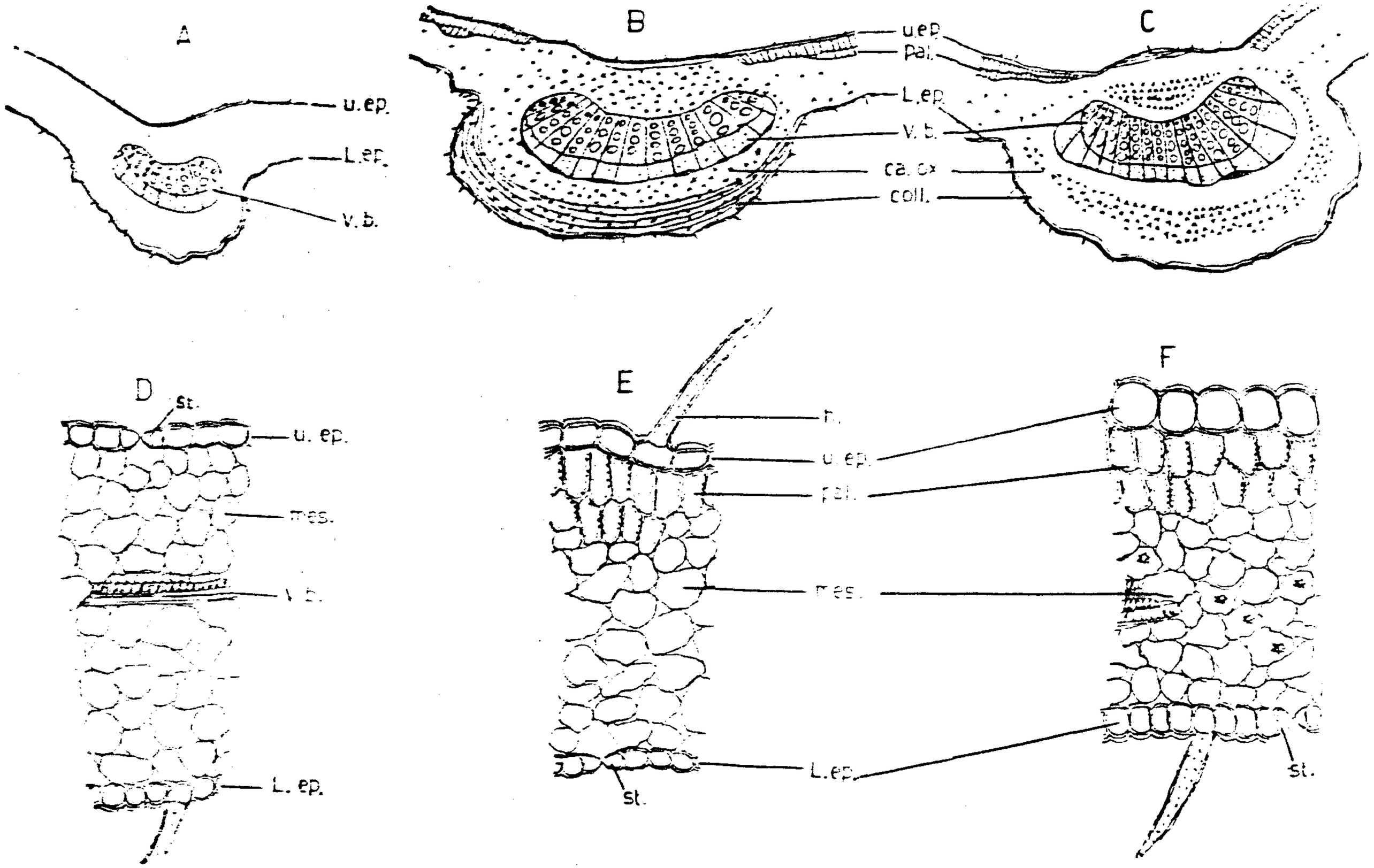


Fig. 6- T.S. in the leaves
Diagrammatic T.S. X 18
A- J. azoricum.
B- J. sambac, double flower
C- J. sambac, single flower

Detailed T.S. in the lamina X 210
D- J. azoricum.
E- J. sambac, double flower
F- J. sambac. single flower

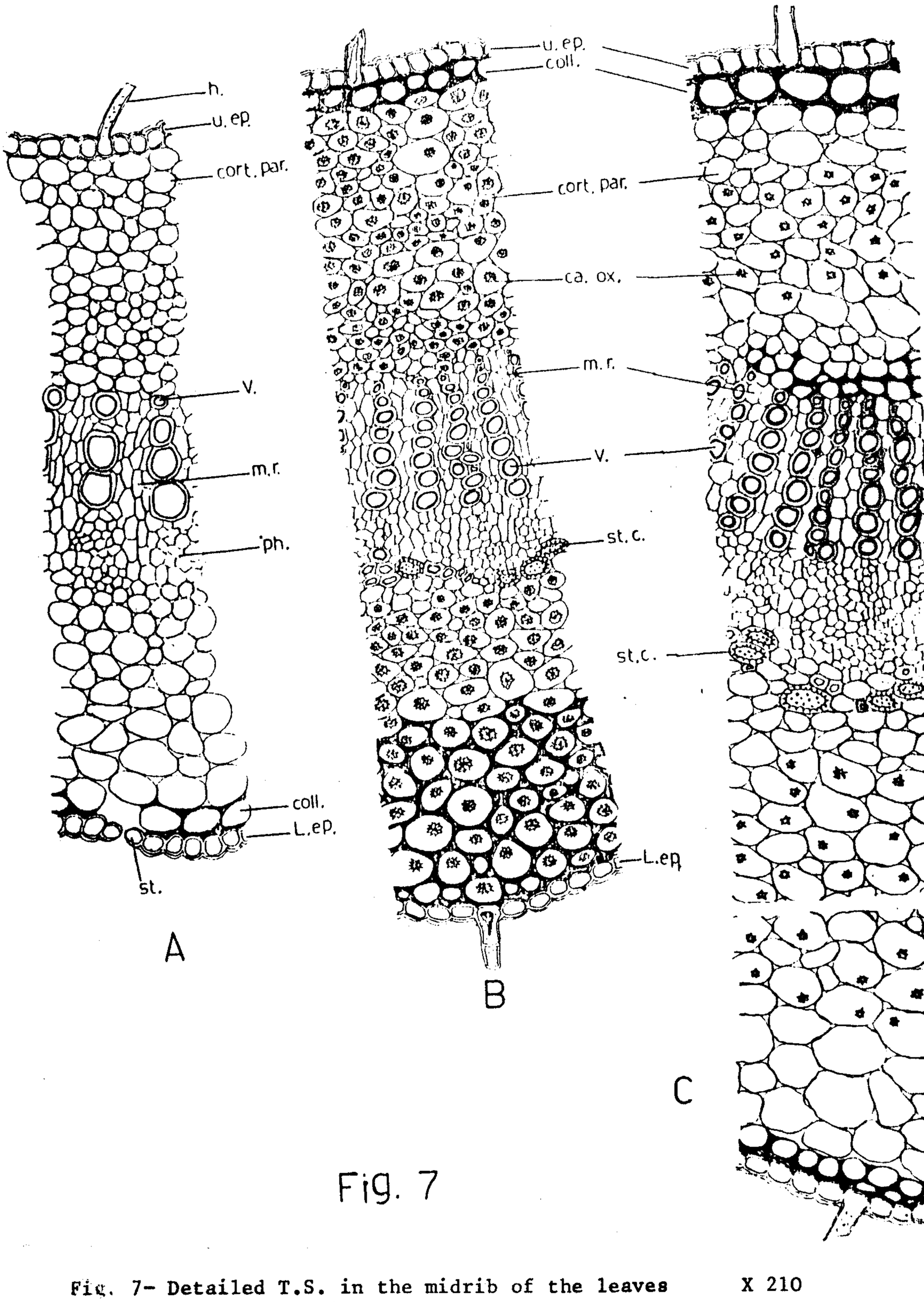


Fig. 7

Fig. 7- Detailed T.S. in the midrib of the leaves X 210
A. J. azoricum.
B. J. sambac, double flower.
C. J. sambac, single flower.

ca.ox., calcium oxalate; coll., collenchyma; cort.par., cortical parenchyma; h., hair; m.r., medullary ray; L.ep., lower epidermis; ph., phloem; st.c., stone cell; st., stomata; u.ep., upper epidermis; v., vessel.

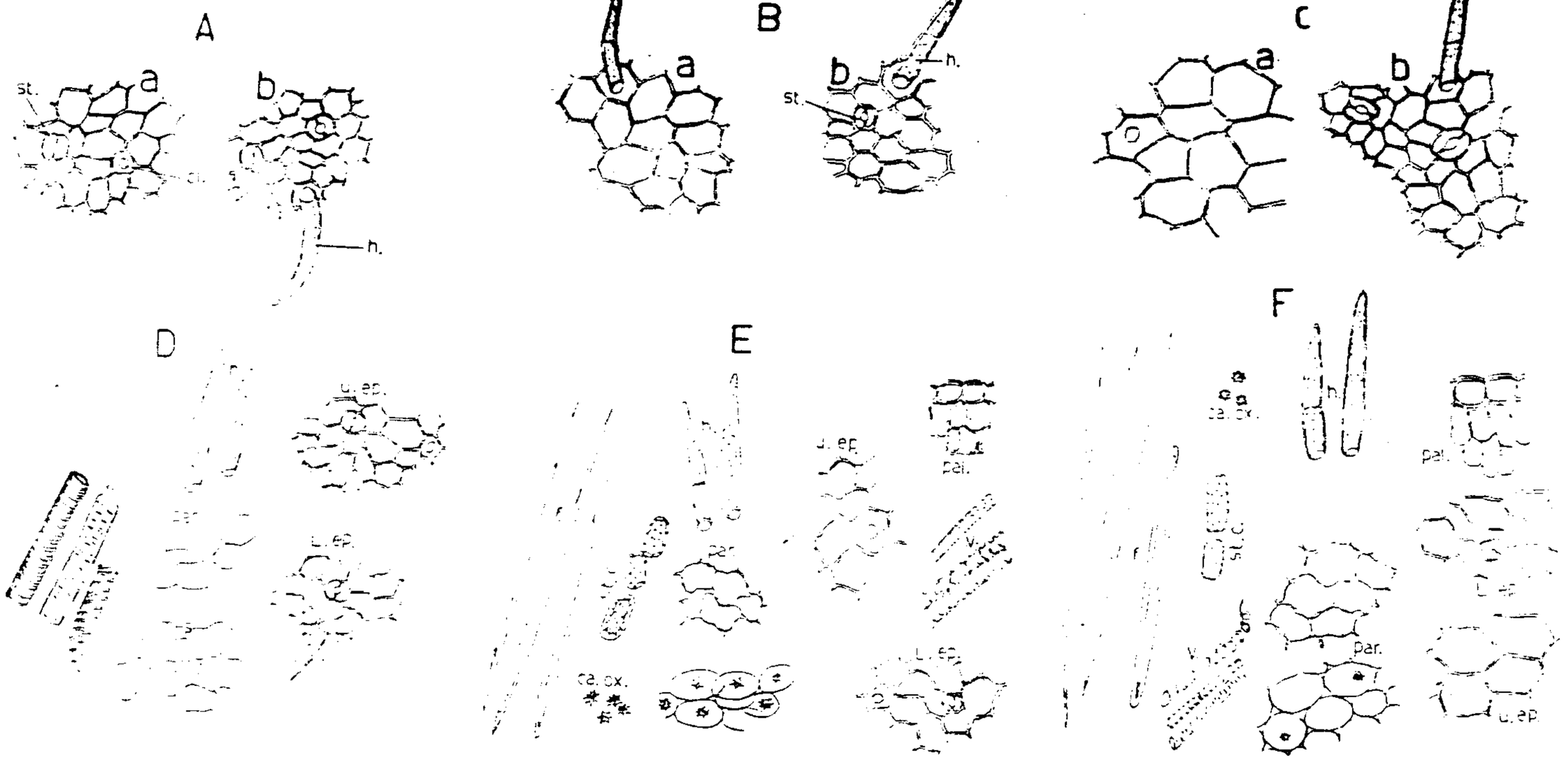


Fig. 8- The leaves

Surface prparations X 210

a. upper epidermis, b. lower epidermis

A. J. azoricum.
B. J. sambac, double flower.
C. J. sambac, single flower.

Isolated elements X 210

D. J. azoricum.
E. J. sambac, double flower.
F. J. sambac, single flower.

ca.ox., calcium oxalate; coll., collenchyma; h., hairs; l.ep., lower epidermis; mes., mesophyll; pal., palisade; par., parenchyma; f., fibre; st., stomata; st.c., stone cell; u.ep., upper epidermis; v. vessel.

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دراسة مقارنة للصفات المورفولوجية والتشريحية لسيقان وأوراق أنواع نباتات من جنس الياسمين

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جامعة أسيوط

فى هذا البحث تمت دراسة ثلاثة نباتات من جنس الياسمين وهى الفل بنوعيه زوجى وفردى الازهار (الجاسمينم سامباس أيت) وكذلك الجاسمينم أزوريكم ال وللنباتات التابعة لهذا الجنس عدة استعمالات طبية معروفه علاوة على الزيت الطيار زكى الرائحة الموجود فى الازهار وقد أثبتت الدراسات المعملية وجود جلوكوسيدات لاكفونية وفلافونويدات وكذلك كحولات سداسية فى أوراق وسيقان هذه النباتات ذات الطعم المر.

وقد أمكن وصف السيقان والاوراق كاملة وعلى هيئة مسحوق وكذلك المقارنة بينها لامكانية التعرف عليها وكذلك تفرقتها.

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